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60 YEARS of UNASYLVA

Weaving knowledge into development

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60 years of *Unasylva* – weaving knowledge into development

Unasylva turns 60 in 2007. With this special double issue we celebrate the rich history of FAO's longest-running periodical.

Unasylva has changed in contents, format and look over the years, but it has always provided a lively chronicle of global issues and concerns in forestry. Its goal remains the same: to bring the latest news about forest science and policy to a broad range of readers – policy-makers, forest managers, technicians, researchers, students, teachers. Authors of the more than 1 000 articles published include presidents of countries, heads of national forest services, field workers and university professors.

The journal also documents the history of FAO's activities in forestry. Every FAO Director-General and every head of the FAO Forestry Division, which later became the Forestry Department, has contributed to *Unasylva*. The results of hundreds of FAO field projects have been recorded in these pages.

The number of issues per year has fluctuated from three to six, although for most of its life *Unasylva* has been quarterly. For years, *Unasylva* was a priced publication. As the Internet grew in popularity, FAO made *Unasylva* available free of charge online, leading to the recent decision to stop charging for hard copies. Since that decision was taken, requests for *Unasylva* – especially from developing countries where online access may be difficult – have rapidly increased.

As FAO membership has grown, from 48 countries – mostly in the industrialized world – to 190 (including one member organization, the European Community), so has the emphasis changed, from wood production and wood technology (early issues had a section on "Equipment", for example) to sustainability concepts and awareness of forestry's social role. The first few decades emphasized assistance to Europe in the recovery after the Second World War. Authors in the early years were predominantly European and North American men. By the 1980s, the balance was changing as women increasingly entered the field of forestry, and contributions from developing countries were increasingly welcomed. Today's *Unasylva* celebrates diversity and is truly global; each issue, to the extent possible, has authors, male and female, from every region of the world and from a variety of academic and research institutions, other UN agencies, non-governmental organizations and civil society.

At the eighteenth session of the FAO Committee on Forestry in March 2007, a slogan was launched for FAO Forestry: "Weaving knowledge into development". This not only characterizes FAO's aims; it is what *Unasylva* has been doing for 60 years.

For this sixtieth anniversary issue, we have chosen to reprint articles or excerpts from past issues of *Unasylva* that demonstrate how knowledge is woven into development in forestry.

Ideas have evolved over the decades covered here. But perhaps more surprising is the extent to which concepts considered emblematic of certain decades had already been discussed long before. The concept of sustainability, codified in the 1990s after the United Nations Conference on Environment and Development (UNCED), was already the basis of concerns back in the 1940s. The human dimension, much highlighted in the 1980s and 1990s, was already considered in the earliest articles.

This anniversary issue opens with an introduction from FAO Director-General, Jacques Diouf, who shares thoughts on FAO's ever-growing role as a knowledge organization, and on the changes he is introducing in the Organization to enhance this role and the contribution of *Unasylva*.

We begin our amble through the past by reprinting the first article in the first issue of *Unasylva* (1947), written by then FAO Director-General Sir John Boyd Orr, who introduced the concept of one world, one forest. The new review, he said, would "attempt to shed light on all manner of problems in the field of forestry and forest products, to compare methods that are being used in different countries, and to present the opinions and suggestions of experts in the various fields".

From the 1950s, an article on "What is technical assistance?" shows how the Organization sought to use its knowledge in aid of developing countries. It was a different age in terms of global politics – but an editorial on "Spreading knowledge" indicates that the philosophy behind today's "knowledge organization" was already in place more than half a century ago.

We emphasize two themes in the 1960s. One is the growing awareness of the role of forestry in world economic development, with many ideas expressed here by Egon Glesinger (head of FAO Forestry) and Sir Henry Beresford-Peirse still ringing true today. The other is the growing faith in technology as a novel means for assisting development. Articles on "The electronic digital computer in forestry" and "The promise of technology" reflect an optimistic period of history.

In the mid-1970s, an article from K.F.S. King, previously Minister of Development in Guyana and at the time Assistant

Director-General of FAO's Forestry Department, reflects FAO's increasing concern with the role of supportive forestry policies in national development.

Women authors didn't appear in the pages of *Unasylva* until 1980 (see Box p. 42). We highlight an article on women in community forestry from that year. In the same decade, *Unasylva* began to print more articles from developing countries, which often share practical on-the-ground experience. An article on forest management practices from a forest administrator in Indonesia is a good example.

The 1990s were a pivotal decade in forestry, with the birth of the sustainable forest management concept at the United Nations Conference on Environment and Development (UNCED) in 1992 and the beginnings of the international arrangement on forests – the Intergovernmental Panel on Forests (IPF) and the Intergovernmental Forum on Forests (IFF), which subsequently led to the United Nations Forum on Forests (UNFF). From an issue published just prior to UNCED, we present an article by Jag Maini, one of the key players in the international dialogue, on sustainable development of forests; and an article on its social dimensions.

Political changes in the 1990s also created new needs – as demonstrated in an article on safeguarding forest resources during the transition to a market economy. Concepts on how to make forestry extension effective were shifting away from one-way offering of solutions. The forestry world was recognizing the need to work with pluralism – the inevitable existence of differing, often conflicting, positions among many groups with an interest in forest management. And the Internet was a new tool for spreading information. All of these themes are represented in this issue.

By 2000, FAO had broadened its concern with food security to an emphasis on sustainable livelihoods. The overview article from *Unasylva's* issue on "Forests, food security and sustainable livelihoods" synthesizes key issues concerning the dependence of people on the forest for food, employment, income or subsistence, and the implications for sustainable forest management. This paved the way for later focus on forests' role in poverty alleviation within the framework of the Millennium Development Goals.

What is the influence of knowledge sharing? Another article from 2000 examines the extent to which seminal publications influence international or national forest policies by influencing conventional wisdom. We believe that *Unasylva* has a similar influence, by disseminating experience and best practices that then enter the mainstream of accepted knowledge.

The anniversary issue closes with a story literally about weaving knowledge into development: an illustrated review of a project that has helped develop the basket willow sector in Chile for enhanced local livelihoods.

One of the most direct ways in which *Unasylva* weaves knowledge into development is through education: teachers and trainers use it in the classroom, students use it for research, project staff and extensionists use it in the field. If it is not in the library nearest you, please let us know.

FAO – a knowledge organization for the third millennium

J. Diouf

Enhancing knowledge sharing is an ever-increasing focus of FAO's work – and Unasylva *is a key contributor.*

Jacques Diouf is the Director-General of FAO.

Since 1945, the Food and Agriculture Organization of the United Nations has served as a source of knowledge and information for its members to improve agriculture, forestry and fisheries practices and ensure food and livelihoods for all.

Enhancing FAO's role as a knowledge organization is one of the key objectives of ongoing FAO reform. In the years to come, developing innovative ways of sharing knowledge effectively and cost efficiently will be an increasingly important part of FAO's work.

The aim is to develop new mechanisms to transfer knowledge to resolve practical problems based on user expectations and needs. Taking advantage of rapidly evolving information and communication technologies, FAO is seeking to ensure in particular the dissemination and promotion of best practices. Progressively, FAO will enlist networks of key partners around the world to assist in knowledge-sharing activities and to provide guidance at the most appropriate geographic location.

Interactive information dissemination services such as "Ask FAO" (see Box p. 6) and thematic knowledge networks are bringing together specialists for the solution of specific problems and sharing of experiences across countries and regions. A special focus is put on capacity-building to assist countries, their decision-makers and technical specialists, and their institutions, to develop their own capabilities and to draw greater benefits from FAO's work.

These efforts are supported by an increased focus on strengthened interdisciplinarity, working together with UN partners, reinforcing alliances with civil society and deepening cooperation with members' organizations.

Unasylva contributes to all of these objectives. It spreads all over the world the knowledge of authors from all over the world: from national and local governments, UN agencies, field projects, the private sector, non-governmental organizations (NGOs), research and academia. It presents direct experiences from the field, providing information and knowledge to underpin technical and policy responses by member countries.

As an educational and capacity-building tool, *Unasylva* is prized by professors and teachers at many levels. For example, interviews with professionals at higher education and research institutes in the Philippines, undertaken as part of an auto-evaluation survey of forestry information carried out throughout Asia and the Pacific in 2004, indicated that "*Unasylva* is usually packed with good quality high-level articles, very widely read and a good source of useful teaching materials" and is valuable for literature review. "The articles are very much useful for updating knowledge for the benefit of our students and also implementing projects related to forestry

ASK FAO

In early 2006, FAO brought access to its knowledge and information to a new level by launching an interactive Web-based information service to provide direct access to both the formal and tacit knowledge of its staff and technical experts around the globe.

"Ask FAO" (www.fao.org/askfao), lets users pose questions directly to experts in the Organization and also includes a searchable "knowledge base" of answers to frequently asked questions covering issues as varied as how to ask FAO for technical assistance, how to control bird flu and what are national rates of deforestation.

Ask FAO is a user-driven service, answering questions related to the Organization's areas of expertise. Involving a collaboration with FAO offices around the world as well as partner organizations, it provides a mechanism for communicating directly with technical experts in a particular field of interest. It is an important vehicle for dialogue and will also help improve FAO's understanding of current topics of concern.

Ask FAO gives access to frequently asked questions and their answers. It serves as a knowledge portal, providing subject-based access to the wealth of information and data available on the FAO Web site.

Similarly, FAO's "Best Practices" Web site (www.fao.org/bestpractices) serves as a one-stop source of technical information on recommended practices and techniques in food production, rural development, natural resource management and other areas.

and environment for the benefit of the community," wrote one respondent to an online *Unasylva* readership survey undertaken in 2004. Readers reported using the journal in their work, studies and research, and to keep informed and up to date.

Unasylva reaches policy-makers, forestry professionals, project staff, extensionists, teachers, students and libraries. FAO recently met a request from the national office of the United States Peace Corps in Benin for copies of *Unasylva* in French and English. The magazine will be distributed to volunteers creating environmental clubs in educational institutions and working with NGOs in projects throughout the country.

Unasylva contributes to the professional development of foresters through the breadth of themes covered, answering questions before they are asked and enlarging its readers' world. Before reading *Unasylva*'s recent issue on "Forests and human health", for example, how many foresters or forest policy-makers had ever thought about the links between deforestation and emerging infectious diseases? And yet these links provide a strong argument for responsible forest management. Other recent issues have briefed foresters on the links between forests and climate change and what the Kyoto Protocol means for forestry; and have demonstrated how specific countries benefit from their national forest programmes, providing practical examples that can be adapted by others.

As demonstrated by an Editorial from 1952 reprinted in this issue, entitled "Spreading knowledge", FAO has not only always had a role in sharing knowledge; it also has a responsibility to help its audiences identify the most authoritative and worthwhile information available to them. FAO takes pride in being a reliable, neutral and comprehensive source of information. *Unasylva* is emblematic of this. FAO's wealth of experience is brought to bear in the journal's preparation and presentation. *Unasylva* articles are commissioned and peer reviewed by a board of forestry specialists to ensure sound scientific and technical information and the highest level of quality. In the 2004 reader survey, 97 percent of readers professed to find *Unasylva* accurate and reliable.

Since the first Director-General of FAO introduced the first issue in 1947, means of disseminating information have greatly expanded – but interest in *Unasylva* has never flagged. The magazine is one means by which the Organization has reached out globally to enhance knowledge sharing for 60 years. Today, every issue of *Unasylva* ever published is available online free of charge. Yet reflecting the needs and priorities of countries, institutions and individuals, requests for hard-copy subscription continue to flow in unabated, especially from developing countries. Production was twice suspended for financial reasons, but both times FAO was convinced by popular demand to bring the magazine back. It is FAO's longest running periodical – and the only truly global journal of its kind in forestry.

from Vol. 1, No. 1, 1947

One World—One Forest

By SIR JOHN BOYD ORR

THE tie between forests and the good things of the earth runs back through history.

"The glory of Lebanon shall come unto thee, the fir tree, the pine tree and the box together," wrote the prophet Isaiah. Solomon the King sang of "a fountain of gardens, a well of living waters, and streams from Lebanon." There are in the Bible more than a hundred references to the cedars of Lebanon and countless other references to the richness of the land lying near them.

Today those forests have gone, and the once fruitful countryside is an arid waste. There is a story of the shocked surprise of the late President Roosevelt, flying to Tehran, upon realizing that the bare waste of rocks below his plane was all that remained of Lebanon's cedars and the one-time heart of the biblical land of milk and honey. The impression bit deep and was an added reason for the United States's firm belief that the projected Food and Agriculture Organization should have a strong forestry division.

Despite an emphasis on timber supply, this introduction to the first issue of *Unasylva* makes it clear that from the beginning FAO was aware of the global importance of forests in the provision of goods and services, and recognized that forest conservation was essential to the Organization's goals of improving the lives of rural people.

In recent months my own experience has underscored the link between forests and human well-being. On my last two trips through Europe, I saw on almost every hand what war had done to the people's homes. I became convinced that next to the great crisis in food, the housing problem is the most widespread and pressing emergency for cities and towns on the Continent and in the British Isles. The crying need is for lumber.

The recent timber conference in Czechoslovakia was an effort to speed and stimulate the great task of reconstruction that lies ahead. I am glad the delegates at that conference were able to agree on constructive plans for co-operation among governments to alleviate the timber shortage and for attention at the same time to longer-range problems of maintaining and restoring forests.

There are many other examples, but these two instances show the place of forestry in the work of FAO. In the long march of civilization man has always looked to the forest for many of his necessities and comforts. In our complex modern world, wood continues to stand first as a building material, is indispensable as fuel, and supplies practically all of the world's paper and a host of other essential industrial materials. Recent discoveries in ways of treating and using forest products may be bringing us to the threshold of a great new era in the use of wood. Moreover, forests are now universally recognized as guardians of soil and water, exerting a tremendous influence for good or evil over field agriculture in all parts of the world.

Sir (later Lord) **John Boyd Orr** (1880–1971), of Scotland, United Kingdom, was FAO's first Director-General (1945–1948). He later won the Nobel Peace Prize in 1949.

THUS, forestry and the use of forest products are inevitably and inseparably a part of the work of FAO. The fundamental aims of FAO are set forth clearly in the Preamble to the Organization's Constitution. These aims are—first, raising levels of nutrition and standards of living of people everywhere; second, bringing about more efficient production and distribution of all food and agriculture products; third, bettering the condition of rural populations; and fourth, as the end result of these three great lines of effort, contributing toward an expanding world economy. FAO could not make a well-rounded effort to reach any of its major objectives without full attention to the forests and their problems.

In the fields of forestry and forest products the forty-eight nations working together through FAO are following a world policy with three main objectives—the conservation of all forests that perform useful social or protective functions; wise use of the world's forest soils for continuing an adequate production of raw materials; and new and better ways of processing and using forest products as a means of raising standards of living.

In forestry, as in its other fields, FAO is not interested solely in studying and solving technical problems for their own sake. Instead, our work in forestry is part of the broader stream of FAO's work as a whole.

ON a world-wide basis, the problems of forestry and forest products offer a great challenge. One set of problems concerns the present emergency arising from the devastation and disruption of war. At the very time when the need for lumber to repair war damage and for the building of millions of new homes and other structures is reaching its height, the capacity of the currently accessible forests has become insufficient to meet these extra demands. During the next few years, the increased cuttings from present commercial forest areas must be made with as much attention to long-range conservation as possible, and meanwhile, new forest areas not hitherto exploited must be brought into production.

The second and long-range world forest problem is that of keeping pace with growing demands for lumber and other forest products, and at the same time seeing to it that forests are in a condition to continue to produce. The world already has experienced far too much of wasteful and heedless forest exploitation. The depressing cut-over areas of both hemispheres are only one indication of the physical and social ills that follow upon this course.

Both the short-range and the long-range problems call for world-wide efforts. The tasks are too large for any one man or group of men, or any one nation or small group of nations. Already, what happens in Europe makes its effects felt in the forests of Siberia and of North and South America. Just as it is becoming clear that the diverse lands and peoples of this troubled planet form one world, both literally and figuratively, so it becomes clear that the world's forest areas are in reality one forest. FAO's part in the task that lies ahead is that of co-ordinating, stimulating, and guiding the work of public and private institutions in many lands. FAO, in turn, will be only one of many agencies co-operating in the work.

The name of FAO's new magazine, *Unasylva*, is well chosen—one world, one forest. This new review will attempt to shed light on all manner of problems in the field of forestry and forest products, to compare methods that are being used in different countries, and to present the opinions and suggestions of experts in the various fields. I hope and believe it will be a keen new blade in the world-wide battle for freedom from want.

"UNASYLVA"

THE international forestry review of FAO's Division of Forestry and Forest Products needed a title.

It was felt that the title should express a policy. By going back to a language that once united scientific thinking, the Division has sought to enhance the basic concept that there must be united thought and effort if the "one world" is to consider its forests as "one forest" for the use of all mankind.

The rapid evolution of world economy and the very circumstances of our present lives demand such a policy.

Forests were originally a huge reserve out of which each man could help himself to meet his own most immediate needs: fire and shelter.

As villages and towns developed, the inhabitants had to go farther and farther afield to find the wood they needed. Economically the woodlands could no longer be considered the exclusive and unrestricted property of the individual. To take undue advantage of them was to deprive the community of an essential supply, not only exhausting a source of valuable raw material, but also depriving the tilled soil of an indispensable complement and a necessary protection.

When roads and railways developed, the immediate proximity of vast forests was no longer necessary, and the modern city dweller drifted farther and farther away from the land which nevertheless continued to ensure his subsistence. By that very fact, however, the responsibility of the forester has increased, expanding to regional or even national boundaries.

Meanwhile, nations pursued their destinies. Wherever the population increased, the forests inevitably disappeared—a natural consequence all too often made more serious by reprehensible negligence. In our own times, when so few nations can provide for their own needs of wood, the uses of timber are becoming increasingly numerous and essential to civilization. Timber has now become an international commodity, crossing frontiers, and even oceans. The smallest forest owner has become accountable to the whole world.

To meet her needs, Europe, for instance, must now turn to countries far removed indeed: to the vast resources of the Americas, to the virgin forests of the Soviet Union, to the scarcely tapped riches of the equatorial regions.

Every tree, every patch of forest has become the whole world's concern. Care of the forests then becomes the whole world's responsibility, at least to the extent of affording to governments and forest owners such assistance as may be needed in this often difficult task.

For if forests are now to be considered as a world resource, either as a source of timber or as a general protection for agricultural lands, the world must manage them with all the forethought of a paterfamilias. At the very least, it should encourage careful management. Each generation which has enjoyed this great heritage should pass it on intact, if not improved, to the next one.

This assistance, which may assume many forms, will have to be rendered by international organizations to those who act as stewards of these riches.

The Division of Forestry and Forest Products can only hope that *Unasylva* will serve this purpose by discussing the problems and helping to broadcast the increasingly complex information and knowledge required for a full utilization of the forest and its products.

Attitudes have changed, as reflected in the paternal language of this Editorial to the first issue, and the tropical forest resources described as "scarcely tapped riches" in 1947 were so overtapped in subsequent years that their overexploitation became a major international concern.

from Vol. 4, No. 4, 1950

What Is Technical Assistance?

By SIR GERARD CLAUSON, K.C.M.G., O.B.E.

TECHNICAL Assistance is not a new concept; it is one of the oldest things in the world. Probably the first time it occurred was when Eve, with her superior sense of dress, helped Adam fix his fig leaf. "Technical assistance," in the sense in which the words are used in the phrase, "An expanded program of technical assistance to underdeveloped countries," is merely one application of a primordial human activity, but an application which is not as well understood as it should be, even in the underdeveloped countries to which this new prospect of help in solving their problems is held out.

Just as there is nothing new in the concept of technical assistance, so also there is nothing new in the concept of technical assistance to underdeveloped countries. Most countries in the world have received technical assistance from other countries at some period in the course of their history; and for centuries now individuals or corporations from the more advanced countries have deliberately gone to less advanced countries to help them in their development.

Sir Gerard Clauson was Assistant Under-Secretary of State in the Colonial Office, London, United Kingdom – a department that disappeared in the 1960s with independence of the colonies.

Indeed for a good many years the governments of the more advanced countries, as well as the citizens, have taken a hand in the process. But until recently it never occurred to any government that its obligation to give technical assistance extended beyond dependent territories for which, in the modern phrase, it had international responsibility. What is new in the expanded program launched under President Truman's inspiration is that, for the first time in history, most nations in the world have publicly accepted a financial obligation to take part in a co-operative program of technical assistance to the underdeveloped countries and bound themselves to do all that they can to make it a success.

FAO's early years were another age in global politics and social attitudes; it was primarily through technical assistance to "underdeveloped" countries that FAO wove knowledge into development. Today's approaches place more emphasis on technical cooperation and networking.

The opening up of vast tropical forests needs specialized experience

*Bullock-drawn high-wheeled carts are still used to haul sal (*Shorea robusta*) logs in remote areas in India, where better roads and modern equipment could step up production. Travel is so slow that fodder must be carried for the bullocks en route.*

The course of events since President Truman included Point Four in his famous inaugural address is too well known to need description, but particular attention should be given to the statement of principles annexed to the Economic and Social Council's resolution of August 1949, which has since been approved by the Assembly of the United Nations and the Technical Assistance Conference at Lake Success as governing the implementation of the program.

It would take more space than is available here to discuss these principles at length; the purpose of this article is merely to discuss their application within the field of forestry; but one preliminary observation is important. "Technical assistance" has limits which are clearly defined, and it is not worth giving it unless it is known in advance that certain conditions exist which will make it useful. To take a simple analogy, if a man's automobile has broken down and he asks for help to get it going again, technical assistance, in the form approved by the ECOSOC principles, would extend to looking at the automobile and telling the owner what had gone wrong and how it could be put right; it would not, however, extend to doing the repair job for him, or giving him the spare part necessary to put it right. That he must do for himself at his own expense, that is with his own money or a loan, if anyone will give him one. So it is no use giving a man technical assistance in such a case if he is obviously as broke as his automobile, and it is known that no one will lend him the money to mend it. Technical assistance, in short, is a procedure for helping underdeveloped countries to help themselves; it is not a procedure for giving or lending them money to be spent on actual development.

An underdeveloped country either has forests or it has none. If it has forests, they are either left to themselves or they are exploited, more or less. If they are exploited, they are exploited either scientifically and properly, or unscientifically and harmfully. If a country has no forests, either the soil and physical conditions are suitable for forest cultivation or they are not. The only country which has no use for technical assistance in the field of forestry is the country which has no forests and knows that there is no prospect of establishing them. Every other kind of country may need technical assistance; even the country at the extreme opposite end of the scale which has forests properly and scientifically exploited may need technical assistance in the form of facilities for its forest officers to visit other countries and study their methods.

Forms of Technical Assistance

The form of technical assistance which the individual country will require depends of course on its actual circumstances, but, broadly speaking, it will fall within one of the following groups:

(1) If a country has no forests, but thinks that they could be established and would be economically valuable, it requires the services of an expert silviculturist to examine the land and advise whether it is suitable for forest development. It is not, of course, realistic to suggest that this would be an isolated mission. There would be no sense in having an area examined simply from one point of view. What would be required would be a land survey conducted by a small team of agricultural, forestry, and animal breeding experts to look at the area in all its aspects and advise on the best use to be made of it.

(2) If the conclusion is that forest cultivation is probably the most economic method of developing the area, the next step would be a pilot project, that is the experimental establishment of a small forest to determine whether this judgment is correct. This would require the services of several experts over a period of some years to conduct the experiment.

(3) If the experiment is successful, the next stage would be to build up the forests and a forest service, side by side, and the forms of technical assistance required would be much the same as those which would be required by a country which has unexploited forests.

(4) If a country has forests which are unexploited, it requires first the services of a small team composed of, say, a silviculturist, a soil scientist and an expert in forest management to advise whether the forest can safely be exploited. This may not always be the case. If the soil is very poor, it may not be possible to re-establish cultivation of it if the forest cover is removed, and the only result of exploitation would be a galloping attack of soil erosion. If, however, the verdict was favorable, the mission would provide a plan of rational exploitation.

(5) Such a plan would not be one for immediate execution. The essential first step would be to build up a staff of forest technicians and forest guards to supervise the work of exploitation. The time is long past when it would be regarded as sensible to give a concession to some private profit-making organization to exploit the forest without proper supervision. Forestry is such a long-term project that it is not reasonable to expect that an enterprise whose main purpose is the making of immediate profits would, without outside stimulus, devote part of those profits to reinvestment in trees which will not in any event be ready for felling for decades and may not be really ready for hundreds of years. Moreover, even if, in principle, the forest is exploitable, it may be essential to leave parts of it untouched in such areas as the headwaters of rivers and streams, if the general agricultural economy of the country is not to suffer injury.

The first need in such a case, therefore, would be for a certain number of foreign experts, serving on medium- or long-term contracts, to start the forest service and train local personnel for it. Simultaneously, facilities would be required for sending local personnel with an adequate educational background to be trained for future work in the forest service in training establishments abroad. The size of the cadres required would depend not only on the size of the forests but also on the country's decision whether to entrust the exploitation of the forests to private enterprise or to carry out the work as a government undertaking. In the first event all that would be required would be a limited number of scientifically trained supervisors and an appropriate number of forest guards. In the latter event a whole range of silviculturists, experts in forest management and timber exploitation and conversion, and skilled forest workers would be required, and the task of recruiting and training them would be proportionately the greater.

(6) If a country has forests which are already being exploited, the extent to which it will require help and the kind of help which it will require will depend on the extent to which the exploitation is already being controlled. If it already has a fully developed forest service, it will probably require no more than facilities to send members of that service to study methods of forest management and exploitation in other countries, facilities to send recruits for the service to training establishments abroad, and facilities for its representatives to study how the timber exported from the country is marketed and to find out whether an alteration in the extraction and conversion methods would make it possible to increase the foreign revenue. On the other hand, if the exploitation of the forests is imperfectly controlled or not controlled at all, the country will require the same kind of help as a country where the forests are not at present being exploited at all.

This is not, of course, a complete and exhaustive treatise on the application of technical assistance to forestry in all its aspects, nor is it written by a technical expert in forestry matters. It is merely a broad picture of the subject designed to help those responsible for the government, the general administration or the forestry departments of underdeveloped countries to consider what technical assistance they should request from the Food and Agriculture Organization.

One final word of warning. Forestry experts are rare animals, and most of them are fully occupied with responsible work in their own countries. It must not be assumed that they can be obtained in large numbers just for the asking.

from Vol. 6, No. 2, 1952

SPREADING KNOWLEDGE

Spreading knowledge through the written word has been one of FAO's core functions from the very beginning. This Editorial also recognizes the need to help readers identify the most authoritative and worthwhile information available to them – an observation more timely than ever now with the proliferation of information on the Internet.

THE heart of FAO's task in Forestry is to help people of many lands to follow the arduous road of forest conservation and use. To this end many devices contribute — conferences, study tours, discussions, visiting specialists in various fields — all aimed at direct co-operation with technicians of the countries concerned. Such measures are indispensable.

But reflection, experience, and the most casual study of statistics show such a method of consultation can work only slowly with the many nations and very many problems demanding attention. Only the written word can really fill the void.

The activities of FAO and other agencies are unquestionably stimulating interest in forestry in many places. But clearly the enthusiastic director of administration or research and the ambitious forestry worker still cannot find a ready-made answer to the proper and insistent question, "Exactly where can I find the most significant technical material produced to date, which may contain fertile ideas applicable to my own project or task?"

Current bibliographies necessarily list the trifling and the weighty alike, and the annual thousands of titles inevitably bewilder the student unless he already knows which authors or journals usually say something worth-while.

The admirable and painstaking *Forestry Abstracts* issued on behalf of the British Commonwealth countries singles out technical publications judged significant, but, like the Bibliography of the United States Department of Agriculture, it deals only with current material.

In too few of the many aspects of forestry have comprehensive and up-to-date critical summaries of work been prepared by men equipped with the necessary scholarship, maturity, poise and critical faculty. Such analyses are usually only national in scope. Many more of an international scope are needed.

Naturally enough, for local, regional or national projects, authors tend to write specifically to a limited audience, and so commonly the "review of previous work" and "selected bibliography" tend to cover primarily only individual, institutional or national items.

This kind of parochial approach was understandable in times before the United Nations undertook the task symbolized by the term "Unasylva." Today it is not enough. Authors and directors now have the opportunity, and indeed an obligation, to aid in the great task of spreading knowledge and ideas to eager workers everywhere, to help them avoid the dead ends of earlier work, and to give them a solid foundation of the world's tested experience.

The recognized discipline of scholarly work involves exploration of pertinent technical literature, and the top ranks of workers and directors are usually not, in fact, as parochial as perusal of their summaries of earlier work might indicate. Some workers and institutions already have made the change. The problem is to make the exception the rule.

from Vol. 14, No. 3, 1960

Excerpted from:

The Role of Forestry in World Economic Development

Egon Glesinger

IN 1960 the world's forests will yield some 1,700 million cubic meters of roundwood. This volume, by weight around 1,350 million tons, may be compared with a world production of all grains of 800 million tons or a world steel output of 290 million tons.

The output of primary forest products will be worth about 35 billion dollars — the same order of magnitude as the national incomes of countries like France, Germany or the United Kingdom, and roughly one fourth of the estimated value of world food production. Primary forest industries will employ something like five million people, secondary industries as many again. Five to six million people will be engaged on felling and extraction and about 1.5 million in growing and tending forests. Thus forestry and forest industries will be affording employment to 17 or 18 million people, quite apart from the incomes which many millions of farmers will be getting from their woodlots, or communities be gaining from their communal woodlands.

There is no doubt that forestry represents a significant element in world economy. The next question is obviously whether it is going to become *more* or *less* important in the future. What should we be planning for, looking 20 or 40 years ahead? Will forests still have an essential role to play in the world's further economic development?

The dangers of human progress

Throughout recorded history the earth's forest area has been shrinking. It has shrunk more quickly in the last 100 years than ever before. Some people held, even a few decades ago, that this was a necessary accompaniment of economic and social progress. To early man the forest afforded food, fuel and shelter. With the advent of settled agriculture and population expansion, tremendous areas were cleared. The early stages of industrialization brought new demands on the forest — for constructional wood and fuel on an ever more lavish scale — and the forest boundaries receded as man progressed and multiplied.

The world's forests are still being destroyed, wilfully or ignorantly. But at the same time the realization is spreading that the diminution of forest areas may have far-reaching consequences because forests provide not just wood but a host of other benefits or "human utilities".

The benefits from forests are essentially twofold, on the one hand wood, and on the other various physical and social effects frequently termed "forest influences". In many instances the latter transcend in importance the significance of forests as producers of wood. Indeed, over much of the earth's surface forests and associated vegetation are the protecting covers which secure the maximum absorption of rainfall, regulate streamflow, help prevent flooding and silting. Thus they improve the efficiency with which water resources are used for almost all of man's activities — irrigation, domestic water supplies, industry, hydroelectric works, to mention but a few. The quantity of water needed every day by modern cities and industry is enormous, yet it is seldom realized what a large part forests play in the complicated process of ensuring steady supplies.

Then, again, forests give protection against erosion, and shelter to agriculture in adjoining areas. They can act as barriers against landfalls and avalanches, they can furnish fodder and grazing for livestock and a habitat for wildlife, they provide places for public recreation, and surroundings

While the emphasis here is on wood production, the need to conserve forests for their environmental and human services is squarely recognized. So is the difficulty of measuring the value of these services, noted as a reason for the low priority assigned to forestry by governments, economists and planners – a common grievance today.

Egon Glesinger, a German national, was Director of the FAO Forestry and Forest Products Division (forerunner of today's Forestry Department, established in 1969) from 1959 to 1963. This address was delivered at the fifth World Forestry Congress (Seattle, United States, 1960), which had the theme "The multiple use of forests".

for rest and the restoration of health — as well as contributing to the beauty of the landscape.

The trouble is that while almost everyone accepts in theory the indispensable role of the forest in all these connections, yet governments, economists and planners conveniently forget about it and assign to forest investment far lower priority than it deserves, because foresters have not yet succeeded in measuring the value of these "influences" in monetary terms. The studies made in connection with FAO's Mediterranean Development Project produced many striking illustrations of the catastrophic consequences which threaten a large number of countries as a result of inadequate provision of funds and priorities for the restoration and maintenance of a proper forest cover for protective purposes.

Let me reassure you that, by recognizing the many purposes of the forest and acknowledging the multiple use concept, we do not mean that there should be equal division of forest lands among all possible uses or all uses on every hectare. What we do mean is that, in defending our forest resources against competing claims for land, we must weigh any one exclusive use against a possible combination of uses, with the idea of getting the optimum combination in a given management unit. The forest will not necessarily yield maximum production for any one of the uses selected, but the total benefits will probably be greater than could be obtained by exclusive use for one purpose.

We all know very well that there is scarcely a country in the world where one does not find substantial areas which should be covered by forests — areas which are at present either used for cultivation or grazing or have become denuded and unproductive. Moreover, with the growth of world population and the inevitable rise in living standards particularly of the underdeveloped countries, the areas needed to be reserved for tree cover or where productive forests have to be restored are bound to grow. It is one of the important responsibilities of foresters, economists and statesmen to see to it that the maintenance or establishment of forests in critical areas becomes accepted as an indispensable aspect of all national programs for economic and social development. This process must go hand in hand with increased food production and be complementary to it.

Wood consumption trends

Let us now turn to the second aspect of our question about the future role of forestry and examine world trends in the consumption and production of wood. One of the first facts which comes to mind is that technical progress has resulted in a steady displacement of wood in uses for which at one time it was the only conceivable material. *Per caput* consumption of fuelwood in Europe has fallen from 0.42 cubic meters in 1913 to 0.24 cubic meters in 1955, and this process continues because it is an expression of progress. Before the last war the average dwelling unit in Europe needed nearly 15 cubic meters of wood. In 1950, 10.5 cubic meters. In 1955, only 7.5 cubic meters. In the United States, between 1940 and 1953, the wood requirements for a dwelling unit fell from 33 cubic meters to under 25 cubic meters.

Does all this mean that the "age of wood" is slowly passing?

The answer is emphatically NO. This is not only my personal conviction as the author of a book which tried to demonstrate that wood and forests will be called upon to play an increasing role. It is supported by considerable evidence.

First, despite substitution, *per caput* consumption of industrial wood has risen over the last decade in nearly every region of the world. Secondly, there is a positive correlation between consumption of industrial wood and national income. It is not a high correlation, because wood availability (either in the shape of domestic supplies or capacity to import) is also a big factor. Moreover, FAO investigations have shown that, while the response of consumption to increases in income is very high at low income levels, it becomes progressively less marked as income rises. But, despite this flattening of the curve, the correlation between rises in income and the consumption of industrial wood remains a basic fact of the greatest importance.

We must of course be careful not to say that as the presently low income countries move up the income scale to the level of the more advanced countries, they will necessarily need to consume as much industrial wood per head as do, say, Japan, Canada and the United States today. But it is a fair generalization that no low income country will reach higher levels while maintaining low wood consumption levels.

I personally would guess that the world will need at least twice as much industrial wood as it consumes today by the end of the century and probably earlier, some time between 1980 and 1990. We can also conclude from FAO's present knowledge that needs will rise relatively fast in the less advanced areas of the world; and that for low income countries, that is for more than half of humanity, a substantial increase in wood consumption will be an essential accompaniment of and indeed a condition of economic growth.

The slow rise in output and its reasons

In the light of what I have said on wood consumption trends, can we be satisfied with the progress that has been made in forestry over the last decade?

Unfortunately, I do not think we can. Forest output has been lagging behind the progress of national incomes. Between 1950 and 1957, the gross national product of industrialized and underdeveloped countries has risen by close on 30 percent but the output of the world's forests by not much more than 15 percent. For industrial wood alone, the picture is slightly better, a rise of nearly 30 percent, but part of the increase has been provided by shifts from fuelwood to pulpwood and by better utilization of previously waste

materials. But there is an obvious limit to such shifts and in many countries this limit has been reached. Moreover, there is the same trouble as in agriculture, that the biggest increases have on the whole been in the already developed countries and in the U.S.S.R., and least in the underdeveloped countries where production might almost be said to have been stagnant. This defect mars even more what would otherwise be the brightest spot on the production side, namely the growth of pulp and paper industries. In the past 20 years, world capacity has risen from 25 to 60 million tons of paper. This increase has proceeded substantially faster than the simultaneous growth in world industrial output and has made pulp and paper an industry which by value (15,000 million dollars), size and capital is fully in line with the traditional large-scale industries of former days such as iron and steel, textiles, and oil. Yet, despite some recent progress in Latin America and the Far East, 90 percent of all the world's pulp is still produced in Europe and North America. And the growth of paper consumption for education purposes and packing in the poorer countries is being delayed by inadequate local supplies and the inability of these underdeveloped countries to allocate substantial amounts of foreign currencies for paper imports.

There are many reasons that explain this development, which is all the more disappointing since one would normally expect that the existence of enormous unexploited forest reserves would render an expansion in output particularly easy. Most of these reasons are well known and I would, therefore, like to deal only with some aspects which have emerged as particularly significant from our systematic observation of similar developments in some 80 to 100 countries all over the world.

1. It cannot be overstressed that governments, legislators and administrators still fail to appreciate fully the importance of forest development and conservation with the result that investments are insufficient, forest services understaffed and politically weak, and private capital not attracted even where forest development would be profitable.

2. Planners and economists often tend to give low priority to forest development as our experience in FAO has unhappily proved, because they believe that trees must always take 100 years to grow and are low-yielding, long-term investments. They overlook the fact that quick-growing plantations can reduce the growth cycle to 10 to 20 years especially for the supply of pulpwood and fuelwood, and they fail to appreciate that forest development usually starts with natural forests which, unlike agricultural crops, do not have to be grown, but only need to be made accessible, put under management, and cut.

3. Population pressures often combined with political expediency are another major reason why little priority is accorded to the conservation and maintenance of existing forests or to the establishment of new ones. The inability to put a value in economic terms on the protective benefits that come from the forests, contributes very significantly to this situation. The underfed half of the world population can hardly be expected to correlate food production and forestry if even their leaders and many technical specialists do not understand or are unable to demonstrate that connection. It was one of the main purposes of FAO's Mediterranean Development Project — which started out as a forestry program — to demonstrate how wrong it is to base national economic policies and development programs exclusively on short-term considerations and the need to secure quick returns.

4. A further difficulty we encounter in some parts of the world is that governments tend to go from one extreme to the other — from no control whatever to complete prohibition of any kind of forest cutting and industrial development in the belief that such action is the best way to prevent forest destruction. I need not stress that such measures are almost as misguided as doing nothing. I regard it as one of our important educational tasks to spread understanding for the need to combine conservation and cutting restrictions in some areas, with commercial cutting and forest development in others.

5. Then there is the fact that most of the forests of the underdeveloped countries, where output should have risen, are tropical forests, often believed to be difficult of access. FAO's experience in its technical assistance program, for instance in the Amazon region, has shown these forests generally to be poor in presently commercially valuable species but not nearly so difficult of access as is generally imagined. But development must often await lamentably slow colonization and agricultural settlement; and there is little to attract investors during this process. A different picture of what can happen is provided by the eastern forests of Russia, also difficult of access and remote but, of course, of softwood. Their rapid present development is perhaps comparable to what happened in North America a century ago. Neither of these cases, however, provides a solution, and even less a much needed large-scale demonstration of converting tropical forests into real centers of forest operations and industries.

6. The biggest difficulty of all, however, stems in my opinion from the fact that in large parts of the world foresters have become accustomed to organize forest output almost exclusively in accordance with their views about the capacity of the resource and with little or no thought to present or prospective national needs. I have often been surprised to find that although planning is an indispensable element of all forest management and

should therefore be highly developed among foresters, there are only a few countries where forest production is organized and planned in accordance with modern economic concepts. The establishment of steel mills or any other industry has always been determined by demand for the products. Foresters, however, have not yet adopted this approach and there still exist in fact many foresters who regard themselves as "conservators only". There is no doubt that one of the basic responsibilities of foresters is the maintenance or building-up of the fertility and productivity of the soil. But this should not lead to such a slavish attachment to the conception of sustained yield (especially in the tropics, where yield is often extremely low) as to preclude the adoption of management plans designed to yield in quality and in quantity what industry and the consumers need.

We are thus led to the conclusion that for a number of well-known reasons forest output, especially in the underdeveloped regions, is not progressing at the rate which appears desirable and even needed. Unless this situation is changed and the tempo of forest expansion greatly stepped-up, many countries of the world are bound to experience three equally serious difficulties in their development process. These are, first, that inadequate supplies of paper, building timber and other forest products will act as a real bottleneck in achieving better living standards and rising national incomes; secondly, that even the artificially reduced amounts of paper, timber, and so on, which still have to be imported will act as an increasingly serious drain on currency reserves which should be directed instead to the purchase of capital goods; and thirdly, that this growing and somewhat artificial shortage of forest products will lead to increasing overexploitation and destruction of accessible forests.

Signs of hope

Fortunately, the picture is not only one of unresolved difficulties. Indeed some of the basic obstacles which have impeded forestry progress are beginning to be removed.

(a) The most important development is perhaps the trend towards establishing plantations of quick-growing species. This is a development in the forestry field, if continued on a sufficient scale, comparable to the transition in agriculture to selected strains and hybrids in crop cultivation. There is the possibility of obtaining three, five or ten times the yield per hectare as is obtained from natural forests. This leads some people to advocate the sweeping removal of mixed tropical hardwood forests and their replacement by new plantations, a subject which provides a perennial topic for argument amongst foresters.

(b) Of parallel importance, especially for developed countries where labor costs are high and there is full employment, is the progress of modern logging techniques. We can compare the mechanization of forest operations, and other improvements in working techniques, with the revolution which the introduction of tractors, harvesters, and other machinery a generation ago brought to agriculture. In underdeveloped countries, these techniques can fundamentally change the notion of forest accessibility and help reduce the almost prohibitive costs which primitive logging methods entail today.

(c) Technical progress is producing every day new practical demonstrations of the dictum that wood is a most versatile raw material. Timber industries are using much ingenuity and enterprise in taking advantage of what wood has to offer. But more can be done, not only in devising new uses for wood and perfecting manufacturing techniques, but in the "art of selling" where I often think we lag behind other industries. Wood chemistry is as yet in its infancy, and a breakthrough is overdue and is perhaps in sight in the use of lignin, which forms some 30 percent of the dry weight of wood. Pulp and paper capacity is spreading and the rate of progress is accelerating in the less developed parts of the world.

(d) Despite the difficulties experienced at high levels of government and economic planning to which I referred earlier, some statesmen and administrations are beginning to realize that forestry can provide a ready basis for industrial and economic development. Progress is slow, because of lack of experience in planning, lack of technical services — though the picture in regard to forest services, while still fairly dismal, is greatly improved from ten years ago — and lack of capital. But there are glimmerings that forest development, integrated with agricultural and industrial progress, will come to be used deliberately as an essential part of measures to promote a self-sustaining economic growth, and often as a particularly useful form of public works capable of absorbing unemployed and underemployed rural manpower.

(e) The impact of these more encouraging developments has reached the point where it can be clearly discerned. Maybe the most important example is provided by Europe, where FAO's first regional Timber Trends Study, published in 1953, revealed the danger of a serious pulpwood deficit and urged the adoption of immediate measures to step up forest output. Despite doubts voiced at the time, foresters have been able to meet the challenge and not only are production figures, by 1960, up to the level of our most optimistic projections, but there are also indications in many countries that further stepping-up of output can be expected. Europe, moreover, is one of the regions where, together with the United States and apparently also in Mainland China, the area of forests is on the increase.

(f) Finally, although we in FAO are not too satisfied with the practical achievements to date, we are still rather proud to have seen established seven Regional Forestry Commissions, which among them cover the entire membership of FAO, and which provide machinery for planning concerted action to achieve the changes which in our opinion are necessary.

Tasks for the future

I have tried in the course of this address to touch on some of the problems we are facing. What I would like to convey to this distinguished Congress, is that there is an urgent need to step-up very substantially and on a continuing basis, the rate at which the world's forest output is growing, and also to increase the area on which forests are restored or maintained in order to exercise their protective influence. These objectives can and must be reached, and it is my belief that this Congress could render an important service by drawing attention to the four central tasks towards which foresters should, during the next years, devote attention. These are:

1. Systematic studies to develop methods for evaluating forest influences in quantitative terms. These, I believe, will provide support for forestry claims for investment funds in competition with claims from other sectors.

2. Research and experiment with quick-growing species for all climates, with special attention to the introduction of plantations in tropical areas as a means of harnessing at last the vast reserves constituted by tropical forest lands.

3. A gradual spreading of pulp and other forest industries, in order to create in the major underdeveloped regions centers of forest operations and industries corresponding to their forest wealth and in line with their growing needs for forest products.

4. The systematic adoption of quantitative national plans for forest production and development related to prospective requirements for forest products. This approach should become the standard basis for forest policies in every country.

Let me conclude by calling on you, ladies and gentlemen, to help the nations of the world derive ever-growing benefits from the world's forests. Wood has an enormous function to fulfil in a rapidly expanding world economy, and the world will be the poorer if its forests are not made to meet the requirements for paper, packaging, building materials, and the many other things which wood can provide.

And in the process of producing wood or providing shelter, the beauty of the world can be enhanced, and the lot of those who live in and on the forest and process its products, can be made happier and healthier.

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The evolution of forestry

Henry Beresford-Peirse

The latest trends in thinking

BEFORE discussing what can be called the present evolution in forestry thought, it may be well to reiterate certain platitudes. Foresters all over the world and those concerned with planning economic development are always concerned, or should be, with two fundamental problems:

1. How is the growing need for wood in all its many forms to be met?
2. How best can trees and forests fulfil their protective role of safeguarding the basic resources of soil and water?

First, then, the supply of wood. The Timber Trends Studies which have now become a recognized and an important part of the functions of FAO's Forestry and Forest Products Division are already making a real and valuable contribution to the data needed by forest services and others when planning to ensure for the future adequate supplies of this essential raw material. For the first time regions and countries have a general indication of the likely future trends of wood consumption and can compare these with the apparent possibilities of meeting them. It can already be seen, for instance, that in Latin America there is the paradox of a region possessing one quarter of the world's forest resources and at the same time being a net importer of wood and wood products. Again, in the subcontinent of India, with its dense and growing population and with its mounting need for wood, the *Far East timber trends study* has put before governments clear evidence that, unless drastic steps are taken, the gap between consumption and production of wood will widen until in 15 or 20 years it can reach proportions which will be a major hindrance to the social and economic development of that area. North America, which is now one of the great exporting regions, will on its own showing probably by the year 2000 only just be able to supply its own wood-based industries with the raw material they need. It appears that Europe will run into a heavy deficit in the next 30 or 40 years. This very superficial summary of some of the findings of the studies on consumption and production trends is enough to show how formidable and varied are the problems brought to the fore.

On the other side of the picture is the generally accepted view that the forests of the world, many of them inaccessible as yet and untapped, can provide from their yield enough wood on a growing scale and yet on a sustained basis to meet the world's growing requirements for as far ahead as it is reasonable to look. It is probably also true to say that until recently it was the foresters' view that countries should indeed seek to meet their growing need for wood mainly through bringing into use more and more of these natural forests and managing them for increasing and sustained production, broadly along the lines of traditional forestry practices. Again speaking generally, at heart foresters are apt to consider almost all kinds of forests, from low producing tropical forests to the high yielding and intensively managed coniferous forests of Europe, as essentially areas whose function is the production of wood. They pay lip service, perhaps less reluctantly than in the past, to the concept of multiple use and concede that their forests may, for instance, be used by tourists or even by wild animals. Even where a forest is playing predominantly a protective role, foresters generally like to extract as much timber and wood as possible, so long as the protective function is not impaired.

The fundamental problems facing foresters remain fundamental today – as does FAO's role in collecting and disseminating information towards their solution.

Quick-growing tree species

Two factors in particular seem to point to the need, and indeed to the existence of a radical change in this way of thinking.

First, it is becoming increasingly clear that the difficulties involved with bringing into use inaccessible or complex forests can make the wood extracted from them so expensive (if this is properly costed to take account of the massive injection of capital that is often required as well as the high recurrent expenditure) that the use of this wood becomes

Sir Henry Beresford-Peirse wrote this article while he was Deputy Director of FAO's Forestry and Forest Products Division. He was Director-General, Forestry Commission of Great Britain when it was published.

uneconomic. Although, therefore, on a yield basis the forest resources may be wholly adequate to meet world needs, in fact it looks as if great areas may well have to be discounted because of the high cost, both initial and recurring, involved in bringing them into use.

Fortunately, there is a second factor which offers a much brighter prospect of making secure and economic the future supply of wood. Did this second factor not exist, foresters would have to confess that wood as a raw material would have to be replaced on an ever-growing scale by other, perhaps less satisfactory, materials.

This second and cheerful factor is the great possibilities being opened up of depending more and more on man-made forests. There is nothing new, of course, in plantations. As was seen at the Second World Eucalyptus Conference in Brazil in 1961, the State of São Paulo depends for its wood supply almost entirely on Eucalyptus plantations established around 70 years ago to supply its railways with fuel. The 500,000 hectares of these plantations are one of the earliest and still the most ambitious, large-scale introductions of an exotic tree species for commercial purposes. In the southern part of Africa, exotic pine plantations have led to the development of a major industry over the last 20 or 30 years, and there are examples from all over the world of successful, man-made forests. But it is only comparatively recently that the science of genetics and plant breeding has been applied to forestry, and this opens up a great new horizon. Most, if not all, of the remarkable improvements in farming, the spectacular increase in production per unit of area, and the confidence with which agriculturists face the task of feeding the world's growing population, are based on or greatly influenced by the scientific breeding of animals and plants. Similar spectacular changes can surely be brought about in forestry. Already, for instance, breeding of poplars has enabled foresters to obtain yields undreamt of a few decades ago of good commercial timber from disease-free trees. But for most other species, breeding and selection, and all that goes with it, is merely in the stage of research and early trials. Yet there is sufficient evidence to show that yields from plantations can be 10 or 20 times as high as from many natural forests.

Tree breeding, however, is not the only new weapon in the hands of foresters. While the use of fertilizers is common practice in the cultivation of most agricultural and horticultural crops, its use in forestry is relatively new and the possibilities are only now beginning to be understood. With the judicious use of fertilizers the rate of growth of existing stands may be substantially stepped up, the huge yields of plantations may be increased still more, and land now considered incapable of carrying an economic forest crop may be made fit to do so. With the use of fertilizers must go the latest techniques of cultivation and irrigation, as they do in farming.

Another relatively modern forestry development which has almost limitless possibilities is the use of trees as a farm crop. There is perhaps a natural resistance by agriculturists to the use of good farm land for growing what are not generally accepted as farm crops; yet there is no logic in growing, for instance, a fibre crop such as cotton on good farm land and excluding a fibre crop such as poplar. Should not economic considerations be the main criterion on which to judge what crop to use, assuming, of course, that site is suitable for the alternatives under consideration? Similarly, why should not Europe, for instance, particularly in the circumstances of the expanding Common Market and of approximate sufficiency in food supplies at home or from abroad for many years to come, avoid what seems like an inevitable and serious shortage of wood by using on a much greater scale than at present farm land even of high quality for growing timber crops? Should not economic considerations, tempered as they always should be by social considerations, be the criterion for land-use planning in relation to farm or forest crops, rather than any preconceived concept of a "natural" distinction between farm and forest land?

This growing emphasis on plantations, which seems to be essential if the increasing need for wood is to be met economically, does not, of course, imply the abandonment of the many valuable and productive natural forests in many parts of the world, nor does it imply that plantations should be made only on land which is not now carrying a forest crop. In many countries much of the plantation work, if not all, can best be undertaken on land now under forest, though planting will probably cause a radical change in the composition of the tree cover.

The references made to exotic species and the frequent use of exotics in present-day plantation work, must on no account lead to neglect of valuable indigenous species, especially as the careful selection and breeding of these and other techniques can often substantially increase their yield. Nor does the emphasis on plantation imply the abandonment of natural regeneration. Whether one or the other practice is used or a combination, must depend mainly on economic considerations — which costs less in relation to outturns? — these considerations being influenced by the care that must be taken never to impair but, if possible, to improve site quality (and the fertility particularly of tropical soils is often only finely balanced), and by considerations of simplicity. In the highly developed forest countries, management and silvicultural practices, particularly in Europe, have become extremely complex and there are examples of even more complicated practices being used in tropical forests. Even if these can be shown to be satisfactory in the long run, it is open to question whether the subordinate staff and labor forces in less developed countries can achieve at all quickly the skills required to use these practices effectively and extensively: they may be sound but too complicated.

The really important implication arising from the widespread and growing use of plantations, with what can be an immensely increased yield per unit of area, is that, in

land-use planning, a substantially smaller area can be set aside specifically for timber production than was the case when countries felt they had to depend mainly on natural forests and their development. For some countries, particularly those with large forest areas, many of them at present unused and inaccessible, the second implication is that areas of existing forests can be "written off" — written off, that is, from the point of view of wood production.

The multiple-use concept

This brings us now to consider the second of the two roles of the forest referred to at the beginning of this paper. "Writing off" for wood production does not, of course, mean writing off for protection and the many other uses to which forests can be put. In discussing the protective role, the first point to make is that timber-producing plantations and man-made forests, while their role is first and foremost production of wood, can also have a protective role as shelter and to safeguard soil and water, especially in catchment areas, and they can have other secondary functions as well. It is the natural forests, however, not earmarked for wood production that are the main source of protection: they can now be allowed to exercise this role unhampered by the favorite objective of all foresters — to produce wood. It will be unimportant what shape the trees in these forests develop, whether they are bent and crooked or tall and straight, dense or scattered, whether the forests have many or few species — provided they perform the function of maintaining a suitable vegetative cover for the protection of soil and control of water-flow. Nor will the old argument need to be pursued acrimoniously as to whether forest or grass or other vegetation should be grown: any combination will be acceptable if the main objective is achieved. There are great areas too, where the natural forest has been destroyed and where a protective vegetative cover must be restored. The same consideration should apply here, and choice of species need not be influenced by thoughts of producing wood. The protective role of any vegetative cover is something extremely difficult to evaluate, though there is no doubt that this value, and sometimes a very high one, exists when, for instance, the vegetation safeguards costly reservoirs or irrigation works from silting or flooding.

Because these protective forests need not be called upon to produce wood (except incidentally) this does not mean they can have no productive function. Forests and scrubland, together with adjoining and merging rangeland, can be developed to the full for the grazing of domestic animals and wild animals as well; and the yield can be in terms of meat, hides and other animal products and as fodder. Grazing would obviously have to be carefully controlled but with the objective not of protecting the trees from damage by browsing or rubbing but only to the extent of ensuring that the protective role of the vegetation is fully safeguarded. These protective forests and rangelands can merge also with intensively managed pastures, these being devoted essentially to animal and fodder production. This use of forests for grazing is something repugnant to many foresters who have been brought up to look upon wild and domestic animals as almost always enemies of the forest. But this is an attitude which will have to change, even perhaps to the extent of welcoming goats, of course under controlled conditions, into certain forest and scrub areas if full use is to be made of forests and maquis not wanted for wood production, and their related range and pasture lands.

These protective forests and rangelands, as well as producing meat, etc., and harboring wild animals, can offer recreation on a growing scale, and the opening up of these areas for this purpose can relieve the pressure on the essentially productive forest areas. Recreation inevitably brings with it an increased risk of fire, but that is something that must be faced and, if the people of a country demand recreation facilities, they must surely be prepared to pay what is necessary for fire protection and other controls.

The concept of the "multiple use" of forests was readily accepted at the Fifth World Forestry Congress without perhaps much deep and careful thought as to what this really implied. Indeed, there is the risk that the concept may be interpreted to mean: a little of everything in every forest. The true interpretation of this concept is one which could perhaps better lead to the name "multiple role." There would be forests devoted essentially to wood production, mainly man-made or heavily influenced by silvicultural treatment designed to step up to the maximum the yield, both in quantity and quality, and always regulated by economic and social considerations. And there would be forests devoted essentially to a protective role but producing as much as possible of animal and fodder products, and these could also, together with rangelands, provide for recreation, tourism and for wild life. This planning in terms of a dual role does not imply the need to put into one category or the other all the forest areas in any country, for as far ahead as it is reasonable to look there will be vast forest areas which can be totally forgotten. One of the largest would be the great part of the Amazon forests which could be left undisturbed to grow and be the habitat for animals and primitive tribes as they have been for many thousands of years: and there are many similar, though smaller, forest areas elsewhere.

If this picture of the two distinct roles of forests is accepted, there must be a reorientation in much of the thinking and action on the many different aspects of forestry with which foresters are concerned. In policy, and in land-use planning which follows from it, there will need to be a much closer link with farming policy since the boundaries between the forest and the farm will in many instances entirely disappear. There will, of course, and always must be, great areas devoted to wood production where farming has little or no part to play. But there will be an expanding

area earmarked for tree farming and forest plots used as part of farm rotations where food and wood production are both part of a co-ordinated intensive agricultural enterprise — agricultural, that is, in its widest FAO sense. And there will be extensive protection areas — forest, rangelands and pastures — devoted, in conjunction with their protective role, to the production of animal products, fodder, recreation, and wild life. It then becames virtually impossible to evolve for a country a forest policy, as distinct from a farming policy. It follows from this that any new or existing forest law must be looked at with care to see that the distinction, which should be made to disappear, is not perpetuated by legislation.

Basic principles unchanged

In the light of the latest thinking on forestry, it is interesting to look back to the Principles of Forest Policy, approved by the FAO Conference in 1951. It would seem that none of the changing thoughts or practices — which are in many respects revolutionary — makes it necessary to vary at all these principles which were the result of farsighted thought and much discussion,

Perhaps one of the most difficult problems will be that of devising suitable administrative machinery. It might be argued that the close co-ordination of farming and forestry should lead to one omnibus service. That, however, does not seem a necessary or desirable solution; because of the very special skills which have to bear on managing trees and forests for either role, there must continue to be specialist forest services. Similarly, since production forests are essentially an industry or a business, they must be managed as such to yield a profit, and a different form of administration is necessary for them as compared with an agricultural administration concerned mainly with extension work and implementation of the law. Where control of land use is of fundamental importance is in catchment areas, particularly in steep mountain country, and for this reason there is much to be said for the Italian arrangement which puts under one authority forestry and the whole economy of the mountain regions.

This merging of forestry and farming, particularly in the protective areas, will considerably simplify the social problems which so often seem an insuperable barrier to proper management. When catchment areas have to be put under or kept under proper vegetative cover, the approach is often complete exclusion of grazing animals and, therefore, a drastic alteration in the peoples' way of life. If now the concept is that these forests and adjoining lands can be managed so as to carry a reasonable stocking of domestic and wild animals, the change will be not nearly so drastic and the full benefit can be achieved more simply by the co-ordinated use of range and protective forest instead of the separate use and management of the two.

Education and research

Education and training are rightly given a very high priority in FAO's work for less developed countries. Is it certain that the advice given is really sound for these countries? Changes in thinking and practice must be fully reflected in the curricula of new education and training institutes as they are set up. While it is difficult and perhaps unnecessary to change quickly or fundamentally the teaching of universities in the older forestry countries, it would be disastrous if these well-tried, intensely valuable ways of thought were transplanted without "spring cleaning" into the newly developing countries. Not only must the teaching and training incorporate the latest thinking and experience, but it must be adapted to the circumstances, and particularly the social circumstances, of the new countries. The objective for many years ahead should be, however heretical this may seem, teaching which is practical and simple rather than deeply scientific and theoretical. In saying this it is not implied that standards should be allowed to slip but rather that the standards, while set high, should be of a kind suitable to newly developing countries. These countries can have the advantage of the long years of thought and experience of the older forestry countries, but they need not perhaps go through the same processes of training and education evolved over many years, mainly in and suitable for Europe and North America.

A great responsibility rests upon research. In describing, inevitably superficially, the two complex roles of forestry, it might be thought that it has been assumed that the techniques and methods of the establishment and management of man-made forests, of tree cropping and the combination of protection forests and grazing, are all known. Far from it; there is a vast field of new research as well as the pursuit of old lines of investigation which need to be carefully thought out and followed. A basic aim in all the growing of trees for whatever purpose must be the assurance that the fertility of the site be maintained or, if possible, improved; but we know all too little about how to achieve this best and cheapest. Is the farmer right when he so often condemns tree crops as using too much water or reducing fertility? Or is the forester right in contending that in many instances a tree crop can be more profitable than a normal farm crop and at the same time maintain or improve the site quality? What is the level of grazing that can be tolerated in forests of different kinds and still maintain a satisfactory vegetative cover and a proper regeneration of grasses, herbs and trees? Much research and experimentation is needed on these and many other subjects, above all on the way tropical forests should be treated as simply and cheaply as possible to improve their productivity, while the delicate balance of their soil fertility is maintained. A difficult task is to determine which are the most important problems to be tackled and to settle this not necessarily by reference to the well-accepted lines of research but from the point of view of the unsolved

problems of each of the two main forest roles as they are adopted for the developing countries.

In the field of wood technology one of the problems frequently encountered in many parts of the world is how to put to good use the almost countless different species which grow in natural forests, especially in the tropics. If we accept the view that man-made forests will on a growing scale provide the wood that is needed, this problem of using many different species will become a lessening rather than a growing problem. The very complex structure will not be repeated after initial clearing; instead the composition of the forest will be chosen for maximum wood production of a kind which is most suitable for and needed by industry. Selection and breeding can be directed more specifically to developing types of tree whose wood is most suitable for a variety of industries, and to forests which will produce relatively uniform products. In this way the problems of industry will be considerably lessened. Agricultural crops are now being bred to produce, in conjunction with ever-improving techniques, higher and higher yields for various sites and for various end uses, and they maintain a remarkable uniformity. The same process will certainly be increasingly introduced with regard to forest crops especially for pulp and paper. But in thinking about simplifying and increasing the production of raw material for industry, it must not be forgotten that one of the most urgent needs is for wood for fuel, primitive houses, and general village purposes.

The Function of FAO

Finally, the growing importance of man-made forests emphasizes once more the highly important part that forestry economics must play. As in the case of genetics, the application of economic theory to forestry is of comparatively recent origin and even now the number of trained economists in this field is one of the main obstacles to practical planning of forest and forest industry development. Yet it is economic considerations, the aim of producing wood as cheaply as possible and the necessity of fitting forest and forest industry development into the general framework of a country's growth, that must be a weighty factor in settling the pattern of plantation forestry, of farm woodlots and tree cropping. But while cheapness and efficiency of production both in quantity and quality are essential, as they are in any business, it is important never to lose sight of the social aspect of forestry. Economic considerations may sometimes have to be largely disregarded so that the way of life of man and women, families and tribes, whose heritage lies in the forest and related lands, are not drastically disturbed; on the contrary, it is only by making full use of the inherent skills, characteristics, beliefs, and even prejudices of the local people that the effective improvement of the general productivity of land can be achieved, even if this is done by slow and costly procedures measured by purely economic considerations.

The task for which FAO was originally set up has been described in *So bold an aim* as the "collection and dissemination of information using a variety of media — international meetings, publications, visits" and "the acquiring of expertise principally by the less developed countries from the more developed." This was the basis of FAO's Regular Program, now greatly widened or extended by field or action programs. However large and important these field programs become — and the need for them is almost infinite — the Regular Program must always remain the foundation upon which they are built and sustained. But — at any rate so far as forestry and forest products are concerned and if we accept the existence of this evolution in our midst in thinking and practice — FAO has a further and more fundamental responsibility which should be fully recognized and implemented. Not only must FAO collect and disseminate information and knowledge of techniques, but it must play a role which no other organization or institution can do so effectively, that of shaping and guiding the thinking and practice of the older countries to fit the quite different circumstances of the new, so that they are applicable to the aspirations of the people of these new countries and are offered to them in a form in which they are able to take full advantage of them. The concept of the two great roles of forestry, merging with intensive cultivation on the one hand and extensive grazing on the other, and taking full account of the people for whom, after all, all this thinking and planning, education and research is undertaken, infringes in not the smallest degree the principles of ecology in its widest sense, "the study of the reciprocal relations of living organisms — plants, animals and men — and their environment," which should be the essential guide line for all the work undertaken by FAO.

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The Electronic Digital Computer in Forestry

J.N.R. Jeffers

SINCE the last Congress of the International Union of Forest Research Organizations (IUFRO), one of the notable developments in forest research and management has been the increased use of electronic digital computers. Indeed, it is no exaggeration to say that this development has completely transformed the scientific background against which these congresses are held. For the first time in the history of man it is now possible to make an attack on some of the problems which underlie our fundamental knowledge of forestry, and many of our existing techniques have been outdated by the more powerful mathematical tools that have been made possible by the computer.

This paper is intended to provide a brief description of electronic digital computers, review the present situation of their application in forest research, and to make recommendations for their more effective use in the period up to the next congress.

Electronic digital computers

The electronic digital computer is a machine which is characterized by the ability to store numerical information, and to carry out arithmetic and logical processes on this information by obeying a sequence of instructions also stored within the machine. The word "digital" indicates that the form in which the computer stores and manipulates the information is closely akin to that by which we have become accustomed to handling numerical information, that is as a series of digits. This is in contrast to certain other types of computers which are able to store and manipulate numerical information in the form of physical quantities, for example, as electrical potentials or resistances.

The sequence of stored instructions by which the computer is controlled is called a program, and these instructions are specially written for each problem that the computer is called upon to undertake. By means of these programs, the computer can be made to perform any desired mathematical operation or logical process quickly and efficiently. The effort of programming can be further reduced by taking care to generalize the procedures in the solution of individual problems so that the resulting programs can be used for a number of separate applications.

It is the speed at which the computer is able to obey the sequence of instructions in order to follow through a particular computation, and the accuracy of the calculations even at these very high speeds, which constitute the main advantages in using electronic computers as opposed to other forms of calculating machines. A further advantage, however, lies in the fact that once the program has been prepared for a particular computation, the computer will obey the sequence of instructions faithfully, without deviation, and any number of similar computations can then be made without expert supervision. In this way, a small number of experts can undertake a vast program of research, without fear that their instructions may be misinterpreted in the handling of the information.

A future was foreseen for computers, which were at the time large machines only just being introduced into forestry research. But the extent to which they would become everyday tools for the forest manager was evidently still beyond the imagination.

Use of computers by forest research organizations

In March 1960, the President of IUFRO carried out a survey by correspondence of the use that was being made of electronic digital computers by forest research organizations. The results of this survey indicated that extensive use of electronic computers was taking place in Australia, Canada, Sweden, Switzerland, the United Kingdom, the United States, and that less extensive use was being made

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of these machines in Japan, the Netherlands and New Zealand. Valuable experience in the application of computers was therefore being gained in all these countries. Rather surprisingly, many organizations stated categorically that they were not interested in the application of electronic computers to problems of forest research, and some were clearly confused between computing methods based on punched cards and electric desk machines and those based on electronic digital computers. While it was expected that forest research organizations in countries in which electronic computers were being actively developed would be the ones most aware of their possibilities, and the ones which would have easiest access to computers, it was not expected that so many organizations would have been unaware of the possible economies in the use of these machines.

It should perhaps be stressed at this point that the computer is of the greatest importance in those countries which have only a small reserve of trained scientific staff, as it relieves this small body of experts of the tedium of calculation and routine handling of information, and enables them to devote their energies to more worthwhile matters.

Applications of electronic computers in forestry

In countries making extensive use of electronic computers in forest research, the first applications of these machines were very naturally concerned with the speeding up of computations which were already being undertaken by other means. Examples of this class of computation are given by the calculations involved in large-scale forest enumerations, in the construction of yield tables and volume tables, and in the mathematical analysis of designed experiments and surveys.

In all of these applications, little advantage was taken of the basic properties of the computers, except that of the speed of calculations, and the form of the calculations was little different from that which would have been used by more conventional computing aids. Later, however, it became apparent that the most important use of computers was in their extension to types of computation that had never before been attempted, not merely because they would take too long, but also because they were too complex to be handled by the conventional computing machines. Examples of these calculations are multivariate analysis of complex problems, such as the effects of site on choice of species and on growth, of the relative values of physical properties of timber in assessing its quality, of taxonomy of plants and animals important in forestry, and of crop-weather relationship. Other applications of this kind include the building of mathematical models to simulate practical problems, as in the various techniques known as operational research, e.g., Monte-Carlo methods, linear programing, the queue theory, and the theory of games.

The present phase of the advanced use of the electronic computer in forest research is in the greater exploitation of the basic processes and principles of the computer, in the ability to sort, store, and handle information rapidly and in new ways, as opposed to the substitution of these processes for the more usual and slower methods in previously elaborated theories. These developments will undoubtedly lead to entirely new methods of forest research, exploiting computer techniques to the full, and based on completely automatic data processing systems.

International library of programs

As more and more forest research organizations come to use electronic computers, the stock of programs for computations of interest to foresters will increase rapidly. To avoid waste of time in duplicating work that has already been done, therefore, and to make available the work of any individual organization to the widest possible field of application, it will be desirable to arrange for the interchange of the basic programs that are written. There are however a number of difficulties. First, different machines use different order codes or languages for their programing and, even among the machines made by the same manufacturer, there is frequently no common language between the machines. On the international scale, the problem is further aggravated by the fact that the persons writing the programs do not speak the same language.

In the United States, there has been some success among a certain range of computers in the use of a common language, capable of being obeyed by a number of machines, and known as "Fortran," and this common language between machines may well help to solve the worst of the problems of the communication of computer programs for that continent. In Europe, an alternative common language between machines is being pioneered, that of "Algol." It is too soon to say whether or not this language will be as successful as "Fortran" has been in the United States, but it may well enable programs to be interchangeable on a wide range of future machines, if not on those already existing.

In the light of this difficulty, perhaps the best that can be done to avoid duplication of effort is to keep a register of existing programs, and to revise this register as new programs are developed.

In addition to the library of existing programs, it would also be desirable to maintain an index of those organizations and individuals who are actively using computers, and particularly those which have computing time to spare, and which would be prepared to take on computing work for other organizations on repayment. Although it will probably always be possible to have such computations done by nonforestry organizations, or by commercial computer firms, experience has shown that there are many advantages in having forestry calculations done by organizations that are also concerned with forestry.

Further developments

In the years between the present congress and the next congress, there will be many developments in the field of electronic computers, and in their application to problems of forest research and management. The use by forest research organizations of computer facilities existing in other organizations is essentially a temporary phase and, in a very few years' time, many forest research organizations will have their own electronic computers, and will have developed advanced methods of research based on modern data processing and computer techniques.

There is no substitute for foresters themselves becoming involved in this process, and for foresters themselves learning to program the machines, if the best possible use is to be made of the exciting and almost unlimited possibilities which these machines have disclosed. Actual programing is the only constructive way of becoming familiar with the machines and their possibilities, and it is important that the realization of what these possibilities are should be spread to the largest possible number of foresters. The author of this paper believes that so powerful an apparatus has never before been placed in the hands of the forester to enable him to fulfill his part in the great project for the preservation and rational utilization of the world's forests. The danger is rather that the electronic computer will be ignored in forestry rather than misused.

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The promise of technology

F.F.P. Kollmann

TECHNOLOGY is the scientifically-based representation of working procedures and expedients which increase the value of raw materials at the disposal of mankind. Technology is a typical human activity based on intelligence and common sense. Even the highest developed animals which form societies and build complicated nests are doing this, influenced by instinct and not by intelligence. Technology either changes the form and shape of raw materials — as, for example, of wood by sawing, planing, molding, routing, turning, sanding, or of metal by rolling, forging or stretching — or it leads to a chemical change in the raw materials — for example, by fermentation, dyeing or bleaching. In this respect a distinction must be made between mechanical and chemical technology.

This is a world of rapid technological changes which greatly influence the economies of industrialized countries. Doubtless there is a promise of technology or, shall we say, a challenge of technology. Most people assume that technological changes have improved working conditions by eliminating the most dirty and menial services, by shortening working hours, and by creating a continuous supply of better and new products. Modern technology is closely connected with automation: to some extent this is followed by fear and concern that technological progress may cause unemployment.

But this fear is not justified. In the United States the Commission on Technology, Automation, and Economic Progress reporting to the President and Congress stated that "technology eliminates jobs, not work."

Technology in all its consequences means a persistent change and even a replacement of technical phenomena. Modern traffic began with the invention of the steam locomotive by Stephenson. He was the first to use smooth rails and he constructed the steam locomotive in all its essential parts. Nevertheless, the steam locomotive is now being more and more replaced by the electric or diesel engine. A few years ago it was a world of electronics characterized by electronic valves but now, with solid-state physics, transistors have outmoded the inventions of the very recent past. Heavy metals like steel and cast iron are being replaced by aluminum, and several plastics are being substituted for aluminum itself.

The replacement or substitution of wood by other materials is also obvious in some fields. The promise of technology seems to be against the further application of wood in many kinds of building construction, in mining, for railroad ties and in aircraft construction, for instance.

Wood has some unfavorable properties. It can be attacked by wood-destroying fungi and insects, it is combustible, and its dimensional stability is low as compared to that of inorganic materials. But modern technology has provided remedies to overcome these disadvantages. Wood preservation guarantees long life for wooden parts even under unfavorable conditions of service, and treatment with fire-retardent chemicals can make wood and wood-based materials almost noninflammable. Solid wood — after drying at high temperatures and impregnation with some artificial resins — plywood, laminated woods and particle board have a reduced absorption capacity and therefore a higher dimensional stability.

New technology as seen from the point of view of the wood industry: panel products, which today account for more than half of world sawnwood production, as well as the use of waste products such as sawdust.

In the past, technology was the science of the conversion of one raw material. From this point of view technology consisted of many branches devoted to various materials. The promise of technology was restricted to metallurgy, woodworking, manufacture of textiles, for example. In the modern industrialized world, technologies are highly differentiated and mutually dependent.

The diversity of interwoven technologies is a characteristic of modern industrial economy. Input/output analyses in this respect are most instructive. Consider the production and delivery of any industrial product to its final market. Thirty years ago the output of furniture merely required the input of raw material, some components, and few services. Within the last two decades, nonmaterial or general inputs have remarkably increased.

These general inputs are characteristic of today's technolo-

F.F.P. Kollmann, of Munich University, Germany, was president of the International Academy of Wood Science when this paper was written. It was presented at the sixth World Forestry Congress (Madrid, Spain, 1966), whose theme was "The role of forestry in worldwide economic change".

gies. They mean higher consumption of energy — partly caused by increased mechanization of the productive processes — improved communications, adequate packaging: and trade, reliable maintenance construction, finance, insurance and other business services, use of business machines, information activity. The whole industrial system has become more complex and the co-ordinative functions have become more important. In the past, single kinds of materials determined the aspect and economy of various industries. There were industries where metals, stones, glass, wood, rubber, leather, natural or artificial fibers and plastics dominated. But this classical dominance of particular materials has given way to increasing diversification of materials used in each industry. Furniture consists not only of wood but also of metals, plastics, glass, textiles and glues. A competitive refinement in the properties and qualities of materials used is evident.

Forest products utilization is essential for the preservation of forests. In the atomic age and for highly industrialized societies, forests are a prerequisite for wealth and comfort. Forests regulate climate and watersheds, impede erosion, form centers of recreation and preserve wildlife. Technology applied to forest products is in part highly developed and partly underdeveloped.

Sawing, for instance, is an antiquated technique. The gang saw, converting revolutions into strokes, is a very primitive machine. The optimum cutting speed in sawing wood is about 60 m/sec (i.e., speed at which cutting teeth revolve) but the average cutting speed of heavy-duty gang saws is restricted to 6 m/sec. Gang saws, Otto engines, and even diesel engines do not meet the requirements of modern technology. The power of the modern gang saw has been increased to its limit. Further technical development cannot be expected, so the problem of yield cannot be solved. Sawing by gang saws, band saws, and especially by circular saws means the production of kerfs. The material removed from the kerfs is sawdust. The average yield in converting round logs into lumber amounts to 70 percent when using gang saws, and to only 55 percent when using circular saws. Sawdust is a real waste, being short-grained and more or less disintegrated. It is therefore not suitable for raw material for the pulp and paper industry, or for the manufacture of fibreboard or particle board. There is a catalogue of possible ways to utilize sawdust. In this long list, no method solves the problem on a large scale. Thus, combustion at low efficiency is still the rule; here exists not the promise but the failure of technology.

Theoretically there are two ways to solve the problem. The first is the utilization of the sawdust. Perhaps in the future new chemical processes will allow the conversion of sawdust into attractive products. We know that cellulose can be transformed into sugar, but the product is more expensive than sugar made from cane or beets. This is especially valid for proteins produced from cellulose-sugars with the aid of special yeasts. Besides, cellulose forms only about 50 percent of the wood substance which contains 35 percent or more lignin. The economical utilization of lignin in great chemical industries is urgently required, but as yet there is no promise of quick success.

The second possible solution of the sawdust problem would be a complete change of sawing technology or, speaking more correctly, woodcutting technology. The width of the saw kerf cannot be reduced beyond a certain limit since any saw blade needs a minimum thickness with respect to its strength and stiffness. Circular saw blades which are too thin have a tendency to flutter which not only increases the width of kerf but reduces the surface quality which subsequently has to be improved by planing. Instead of less, more residues will occur. By slicing or peeling the wood, it is possible to avoid any sawdust or chips at all. These techniques are the basis for the economic production of veneers, plywood, and laminated boards. Thin boards of solid wood can also be manufactured by slicing or cutting. Large-sized thick boards or planks cannot be obtained by simple cutting operations.

Completely new suggestions for separating solid wood without residues have therefore been made and already partially tested. In the U.S.S.R. and later in the United Kingdom, a steel wire oscillating rapidly in its longitudinal direction was used as cutting tool for wood. The application of a needle-thin, high-pressure water jet is another idea. First experiments were promising. The application of the laser technique in wood-cutting is a third possibility. In the United States, even the use of high-energy electronic rays has been discussed. The picture of a completely automatic mill cutting logs without waste and meeting highest quality requirements can be imagined.

The present-day sawmiller may be disconcerted by the possibilities of technology in the atomic age. Up to now most forest products industries are still awaiting the promises of technology and their realization.

In this connection, one question is justified: What is meant by "the promise of technology?" In the introduction, the term technology was defined. Technology is the expression and manifestation of advanced technical activity. Maybe one day, even in the near future, robots will be the bearers of technology. But, like most sophisticated electronic computers, robots working automatically are nothing but technical slaves. They are and will remain forever slaves of mankind; man's spirit, his endeavor, his will, and his program guide and control all these servants of technology.

From this point of view, the promise of technology is the creed for the technical genius of mankind. In other and more simple words, we cannot expect to reap what we did not sow. An example may clarify this truism.

Since about the middle of the last century the idea of creating "artificial boards," replacing solid wood and converting wood wastes into valuable sheet-like materials with even improved properties, is to be found in many patents. Nevertheless, the technological know-how was not available,

A fashion of the times

The cover of Unasylva 89, 1968, insists, *"No, we have not taken leave of our senses. This dress modelled by a member of FAO's Division of Forestry and Forest Industries, is made of a material in which wood is the basic component. With a small addition of artificial fibers to improve the strength, paper for such dresses is generally made on common types of paper machines. The production of paper dresses may alter the prospect of new world-wide markets for a wood product."* However, after a brief moment of fashion, the paper dress never really caught on.

appropriate procedures and expedients — such as special machines and artificial resin glues — were lacking. The promise of technology was a presentiment, the necessary genius had not yet appeared. The promise of technology is directed to technical progress which is the basis of the valuation of any invention.

The concept of using sawdust for the production of particle board was near at hand but misleading. It was the completely new idea of producing cutter-type "engineered" splinters and flakes with well-determined geometrical properties as raw material for particle board which was required. After that, further ideas, no less bold in character, were necessary for starting the particle board industry. After particle preparation, screening or classifying and drying must be carried out. Both operations are combined in the most recent suspension driers. Continuous-type blenders for rapid and uniform distribution of the binder (most frequently using urea-formaldehyde and phenol-formaldehyde resins) had to be developed. Sophisticated installations for forming the mat had to be created. Prior to pressing, the surfaces of the mat are moistened. The moisture content of the particles, which is higher in the deck layers than in the core, guarantees the following advantages: smoother surfaces, higher bending strength, short pressing cycles due to improved heat transfer.

The continuing development of the particle-board industry in the world is a fascinating example of the impetus of well-co-ordinated technologies. Once again, and with special evidence, we can see that the promise of technology is a challenge to the human genius.

The diversity of interwoven technologies characterizes the board and related industries. Particle-board plants are attached to plywood factories. An increasing proportion of the total production of particle boards is veneered or overlaid with plastic sheets. One inventor of the extrusion process combined the production of his board with the manufacture of prefabricated houses.

Interwoven technologies are also marked by the combination of various materials. This fact has been mentioned in connection with the manufacture of modem furniture. More interesting and striking are sandwich constructions. Here we are really faced with the promise of technology. During the second world war a military multipurpose aircraft, the de Havilland Mosquito, was most successful. The wings and fuselage of the plane were constructed in sandwich-shells. Rather thick balsawood core layers were sheeted on both sides with highly tensile Oregon pine veneers. Such sandwich boards and shells are specifically very light, but rigid and stiff. Due to the "skin-effect" their resistance to buckling is extraordinary. Sandwich constructions allow a combination of woods with metal sheets, plastics and impregnated paper, with textiles, glass fibers and honeycombed layers, and so on. Sandwich constructions have a wide field of possible uses in lightweight engineering, for example, in radar towers, gliders, and the bodies of cold-storage wagons.

Modified woods include other interesting products, such as Kompreg, a high-density impregnated wood with mechanical properties similar to those of light metals, and Staypak, produced by compression without any impregnation. Egon Glesinger, later director of the Forestry and Forest Products Division of FAO, in 1949 wrote in his book *The coming age of wood* the following: "Combining the inherent natural virtues of wood with the tailormade qualities of synthetic plastics, the modified woods come closest to achieving the qualities of hardness, strength, moldability, elasticity, and resistance to fire, vermin, and decay projected for the ideal material."

Finally, it should be stressed that the promise of technology is directed toward the creation of integrated forest industries.

An ideal chart of integrated forest industries would show a network of mills and plants utilizing wood of all kinds and qualities including forest wastes and producing end products of high value. For such integrated forest industries, the reprocessing of residues generated by each process and utilized by the following one is also typical: Egon Glesinger showed such a chart of plants for the production of lumber, veneer, fibreboard, wood alloy, pulp, rayon, plastics, wood sugar, alcohol and lignin fuel.

In 1949, particle board had hardly any importance. Today its manufacture would obtain a dominant place in the chart, whereas lignin is still regarded as the "enigmatic key to wood chemistry" in the future. The promise of integrated forest industries is that they "add up to a sum greater than its parts."

The promise of technology in forestry and forest products utilization means that wood becomes exclusively a raw material for mechanical and chemical processes but will no longer serve as fuel. The forests as permanently self-renewing sources for one of the most reliable raw materials offer a brighter future for mankind on condition that the human genius redeems the promise of technology. For this brighter future and for technical progress, the interdependence of interwoven technologies and integrated industries is essential.

The world will become more and more co-operative and integrated, inspired by ideals of international peaceful co-operation and competing in scientific endeavor. This is "the promise of technology."

FAO and Russian forest inventory

In 1965, *Unasylva* reported on technical assistance that the Union of Soviet Socialist Republics (USSR) – an FAO founder but never a full member of the organization – provided to FAO in organizing forest inventory training:

> "THE U.S.S.R., through its technical assistance program, co-operated with FAO in 1963 in organizing a training center on the planning and execution of forest inventories over extensive forest areas, by means of aerial photography and other similar techniques. The course, which lasted two months, was organized at the Forest Research Institute of Leningrad and at Sochi on the Black Sea coast. Twenty foresters from an equal number of developing countries participated." (from *Unasylva*, No. 77, 1965, "Aerial photography for forest inventory")

Some things have not changed: forest inventory continues to be a major concern in Russian forestry. The Russian Federation became a member of FAO in April 2006 and attended the FAO Committee on Forestry (COFO) for the first time in March 2007. At COFO, the Russian Federation requested FAO assistance in the establishment of an international training and development centre for forest monitoring and assessment, which it envisages as an important implementation tool for the FAO Global Forest Resources Assessment (FRA) and international conventions (e.g. on biological diversity and climate change) and processes (e.g. related to forest law enforcement and governance). FAO is now providing forestry assistance to the Russian Federation in the development of a national forest inventory.


Aerial photography for forest inventory

from No. 107, 1974/75

Forest policies and national development

Forest policies need to be formulated rationally, as an intrinsic part of national development plans. Land should be allocated to forestry on the basis of forestry's capability to contribute to the improvement of living standards. Foresters need not fear that if such criteria are employed they will come out second best. On the contrary, forests, forestry and forest industries are intrinsically well suited to the solution of many of the problems of underdevelopment and to the amelioration of many of the discomforts of industrialization.

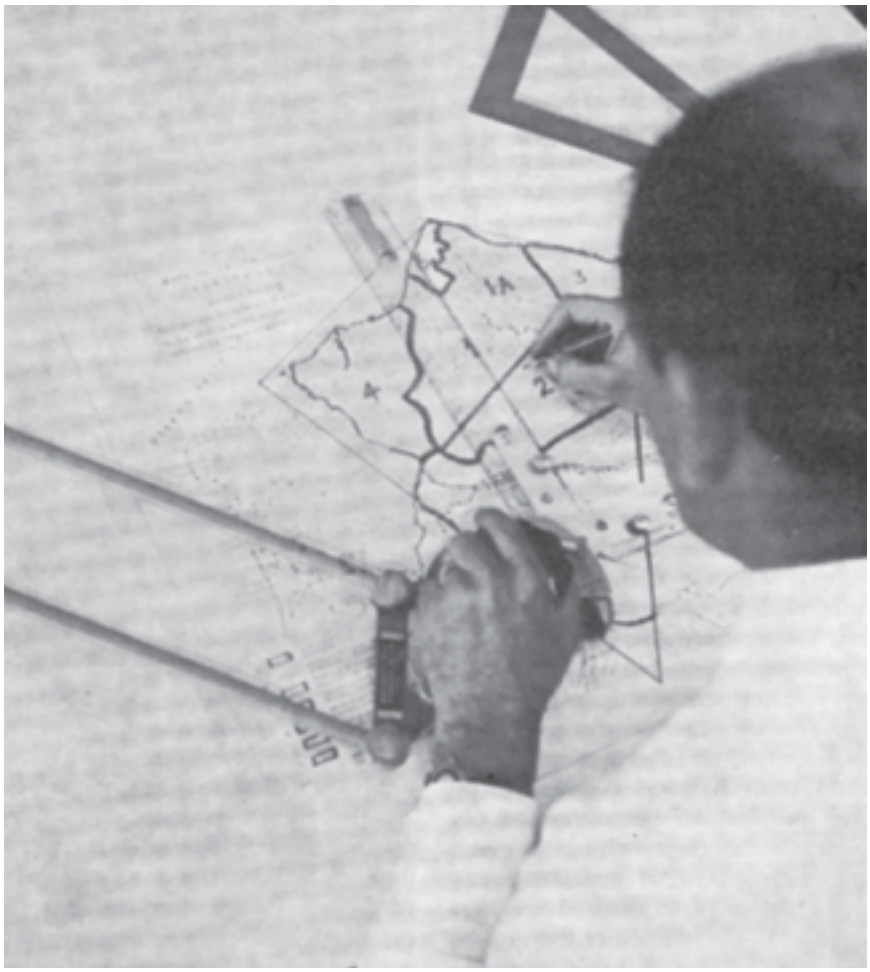
An article reflecting FAO's increasing concern with the role of supportive forestry policies in national development – and recognizing the need to take into account other sectors and changing conditions, including socio-economic, demographic and technological changes.

K.F.S. King

It appears that in the past forest policies were often formulated in the belief that the forests were the most important factor in forest policy formulation. Indeed, sometimes the forests were considered to be the only important factor.

It is therefore not surprising that an investigation of those forest policies which are extant reveals that there is a terrible and alarming similarity among them. This similarity exists no matter whether the forests of the country under investigation are moist tropical evergreen or temperate coniferous, no matter whether the nation is well developed technologically or extremely underdeveloped, no matter whether it is well forested or possesses only a modest area of tree cover, no matter whether there is severe and endemic unemployment or relatively high employment in the country, no matter

F.K.S. King was Assistant Director-General of FAO's Forestry Department from 1974 to 1978 and had previously been Minister of Development in Guyana. The article was based on a paper delivered to the tenth Commonwealth Forestry Conference.



PREPARING A MAP FOR USE IN AN AERIAL SURVEY
fitting into the picture

whether there are serious balance of payments difficulties or favourable payments balances, no matter whether the economy is dependent on the production of one or two commodities or whether it is well diversified.

It should also not be surprising that although governments enunciate these policies and pay lip service to them, they seldom ever appear to take them seriously, and rarely implement them.

It is the thesis of this paper that forest policies should not be formulated *in vacuo*; that they should be an integral part of the socioeconomic development of any nation; that the forests and trees are not the only considerations, but that an almost all-embracing amalgam of factors should be taken into acount when attempts are made to formulate forest policies. A subsidiary but no less important thesis is that because forest policies are dependent on the political and economic philosophies of nations, and on a wide range of changing socioeconomic conditions, they cannot be treated as if they were, like the laws of the Medes and Persians, immutable. They should be subject to periodic review, and should be changed as new conditions, new technology and new philosophies warrant. It is not only the strategy of development and implementation which should change with time. Circumstances might necessitate that the policy itself be altered.

It has already been pointed out (King, 1972) that "the rapid increase in the world's population, the new concern for economic development and growth, the rapid advances in technology and science, the recent predilection for the environment, and the emancipation of large sections of the world from political domination by alien peoples are but a few of the factors which have helped to make anachronistic many of the sacred tenets of the past, and to demand new approaches to the solution of the world's problems." Some of the so-called sacrosanct principles of forest policy have been seriously questioned by Zivnuska (1966), King (1968), Nautiyal and Smith (1968) and Muthoo (1970). Accordingly, new methodologies for forest policy formulation must be employed. Before these are examined, however, it may be pertinent to restate the characteristics of forestry, forests and forest industries in order to provide a background of relevant information.

The range and scope of the art and science of forestry cannot be adequately described in a paper of this sort. It is important, however, to outline a few salient characteristics in order to demonstrate the systemic nature of forestry activities, and to emphasize that even though forestry may be described as a system, the system is not and cannot be considered closed. The practice of forestry is often inextricably linked with other national and international systems, and cannot be meaningfully examined without reference to them.

FORESTRY WORKERS IN SOMALIA
plenty to do

A forester establishes, maintains, tends and/or regenerates a forest not because the individual trees, or the forests as a unit, are in themselves, and without reference to their products and services, of intrinsic value. Indeed, it is possible that the existence of trees and forests may be considered a "disbenefit" and an obstacle to other types of economic and social development. It is the value ascribed by society to forest products and services which provides the rationale for forestry activity. It follows, therefore, that the management of forest resources cannot be examined in isolation. It must be related to the benefits which it is expected will be derived from such management. More important, provision must be made, wherever possible, for the establishment of those further stages of development which will ensure that the raw material, so carefully nurtured and tended, be utilized.

For example, if logs are to be exported, roads must be constructed to the ports of export. If they are to be processed, processing facilities must be planned for and established. If the forests are to be managed for their recreational or aesthetic values, provision must be made for ensuring that these values are enjoyed by people.

Westoby (1962) has described some other characteristics which are relevant to the formulation of forest policies. He has pointed out that:

— Forests are capable of yielding commodities which may differ considerably both in their properties and in the uses to which they may be put.

— It is possible to choose the form in which forest output is harvested, and to vary the volume and time of harvesting within reasonably wide limits.

— It is possible to renew the forest resources after use.

— The duration between regeneration and harvest may vary from short periods of about three years to periods of over a century.

— Forest industries vary between the very simple and the very complex, demanding varying intensities of capital and labour, and varying levels of skill.

— Forest industries possess high forward and backward linkages.

— There is hardly a country, whatever its stage of economic development, and whatever the state of its resource base, in which forestry and forest industries may not be appropriate activities.

There are other attributes of forestry and forest industries which are seldom given the attention and prominence they deserve in the literature of the profession. The fact that forests and forest industries are generally located in the rural areas often reduces migration to the towns. This leads not only to a reduction in unemployment in urban areas, but also to a more equitable distribution of economic activity in a given country or region. Another and perhaps more important attribute in these days of increasing unemployment is that forestry generally provides more employment opportunities for each unit of capital employed than is possible in most other sectors of the economy. Moreover, the system of agri-silviculture (or *taungya* or *shamba*) which has been practised by foresters in many parts of the world for more than a century, if nationally and scientifically pursued, offers exciting symbiotic possibilities for the development of both forestry and agriculture to meet the increasing demands for food and for homogeneous supplies of wood.

In addition to these benefits, forests perform valuable services for the community. They regulate and purify water supplies, they reduce erosion in areas under and adjacent to them, they assist in the maintenance and improvement of soil conditions, they protect crops and animals from the harmful effects of wind, they provide recreational facilities for the community, and food and shelter for wildlife. The forest ecosystem also absorbs heat and noise, and acts as a climatic buffer in many areas of the world. Most important, the forestry and forest industries sector offers the basis for an integrated system of rural development in which agriculture and forestry can be developed to their fullest potential.

Those responsible for advising on the formulation of forest policies are therefore in possession of a great body of evidence which indicates that the forests can assist mankind in several ways: they can play an important role in the attack on economic underdevelopment, and they can improve mankind's quality of life in nonmaterial ways. They can be of benefit to the industrialized, often polluted, developed countries, and they can assist the developing countries to achieve higher rates of economic growth and lower levels of unemployment.

Forestry's benefits

However, it would be inadvisable to list all the recognized benefits of forestry as policy objectives in any policy statement — for two main reasons.

First, many of the benefits can only be fully attained if certain disadvantages are considered to be acceptable. For example, the *maximization* of timber production from some forests might lead to a reduction in their recreational potential, an increase in erosion and siltation, and a diminution of their potential to purify water and control its release. This is not to deny that by the adoption of particular management systems some degree of success in the attainment of multiple benefits might be achieved. If all that is required is some level of benefit from the various uses, then it may even be possible, through the use of indifference curve analysis, and by applying the principles of joint-production theory, to calculate the correct mix of managerial and other inputs in order to achieve a desired mix of output (Gregory, 1955). Another potentially useful approach to the quantitative assessment of the degree of compatibility among a number of uses has been developed around the concept of multidimensional "conflict functions" (O'Brien and Roy, 1971). What is being asserted here is that it is often impossible to maximize the output of more than one product or service at the same time. Nevertheless: "Multiple use allows for the provision of many community requirements within the one management and operational framework, and, for many situations, community benefits in relation to costs are more readily maximized under this system of management than would be the case if single primary uses were identified and allocated for management by different authorities. It is a method of management which can efficiently respond to changing emphases in community requirements" (Australian Forestry Council, 1974).

Not in isolation

Second, man does not live by forestry alone. The benefits which might accrue from the possession of forests, the practice of forestry, and the establishment and management of forest industries must be weighed against those benefits which might flow from other forms of economic activity. The forestry subsector must be judged within the context of the socioeconomic life of the community. It should not be examined in isolation.

It is desirable that before a forest policy is formulated the following information be collected:

1. Data on those factors which influence land productivity, e.g., climate, topographic relief and soil characteristics.
2. Data on present population and its distribution (by location and age classes).
3. Data on current labour force and its deployment.
4. Trends in population and labour force growth.
5. Per caput income.
6. Consumption trends of the various land-produced commodities.
7. Supply possibilities, e.g., areas, volume and types of forests, forest productivity (from natural and artificial forests), productivity of other crops, etc.
8. The cost/benefit ratios of various land uses.
9. The gestation periods of alternative crops (their time-pattern scales).
10. The labour-absorptive capacity of the various possible activities and their influence on population stabilization.

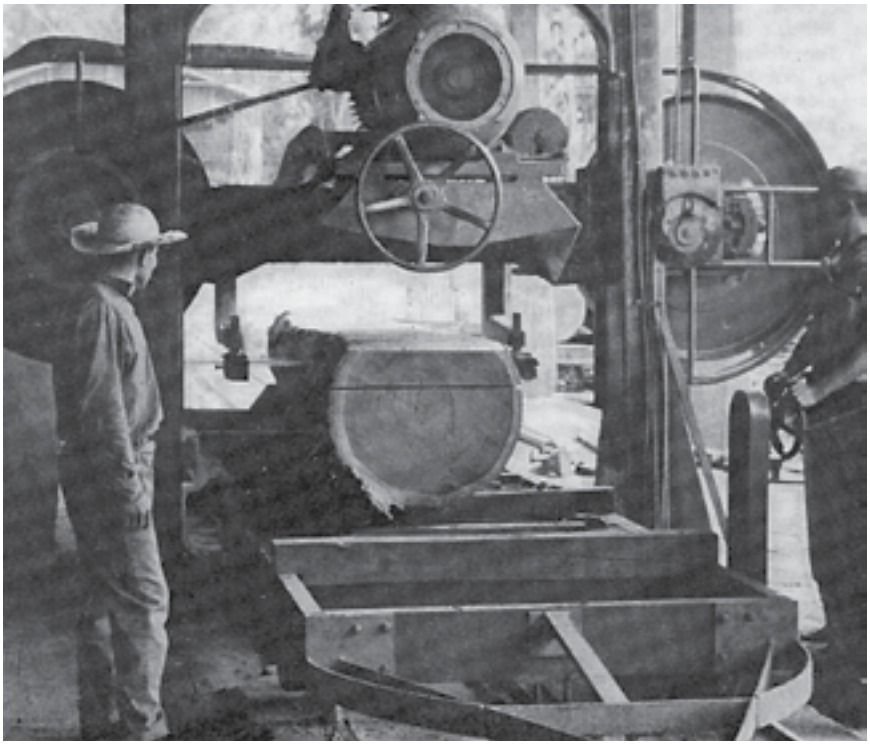
11. The possibility of using the products of the land for industrialization.
12. The possible contribution of the various types of land uses to the balance of payments.
13. The linkage indices of the range of crops.

If it is at all feasible, a land-capacity classification of the country for which the forest policy is being formulated should be made, and a land-use plan drawn up. Land is a scarce resource in many countries, as is capital. It is therefore desirable that the total picture be studied, and all the options ascertained.

It is not being suggested that forest policy formulation should await the preparation of a land-use plan. If the required information is not available, and it will not be readily forthcoming, then policy formulation should be undertaken using what information exists. However, the degree of sophistication of the policy should bear a direct relationship to the amount of general, nonforestry information on which it is based. A policy formulated on the basis of relatively little information should be skeletal in the extreme. Conversely, it should be possible to enunciate a more refined and all-embracing policy if all the extra-forestry information requested is available, for then forestry will have been placed in its proper perspective and the interrelationships of various types of land use taken into account.

After the often conflicting demands for land and other scarce resources are examined and reconciled, more detailed attention should be directed to the forestry subsector itself. Because the factors which indicate what proportion of a nation's resources should be devoted to forestry and forest industries are controlled by the present and future supply of, and demand for, those goods and services which forests bestow, the following exercises should be considered basic to forest policy formulation, and to the integration of forest policies with national economic policies (King, 1972):

— Evaluation of the existing forest resources, including nonwood products and services.
— Estimation of forest resource potential, including nonwood products and services.
— Estimation of present and potential yields from existing and future forest.
— Assessment of the demand for forest products.
— Assessment of the demand for forest services.
— Surveys of the feasibility of establishing various types of forests and forest industries.
— Studies of the economics of location of forests and forest industries.



A BAND SAW AT A COOPERATIVE SAWMILL IN PARAGUAY
do it yourself

These studies would indicate the extent of the area of a nation's land which should be devoted to forestry, and for how long production from those areas should be maintained.

The methodologies for evaluating the extent of the forest resource, estimating yields, assessing the demand for forest products, and studying the feasibility of establishing forests and forest industries are well developed. However, methods of forecasting the demand for the various services which forests provide are not as advanced, although they are being rapidly refined and improved.

Protective policies

In forecasting the demand for the protective services of the forests, more than usual care must be taken to link the development of a protection policy with other aspects of the overall national development policy. In addition to data on population, population trends, and on present and future income, information must be obtained covering plans to develop the agricultural sector, the location of present and planned agricultural projects, and the current and future water needs of the community.

Self-sufficiency

It must not be assumed that a national policy of self-sufficiency and economic isolation in wood and wood products is always desirable. Indeed, it is often untenable. Moreover, even if a self-sufficiency policy were considered

desirable, the demands of other sectors of the nation's economy might render it unrealistic.

If there were no communication between countries, if each nation were an island entire unto itself, if national resources were not scarce, and if no nation possessed comparative advantages over others in the production of particular commodities, then to be self-sufficient would perhaps be a necessity. Resources are scarce, however, and because of differences in climate, soil, technology, and so on, comparative advantages are enjoyed by one nation over another. It therefore follows that other things being equal it is economically better for each country to specialize in the production of those goods and services for which it is best equipped.

Conflicting demands

The problem of how much of a nation's land should be devoted to forestry cannot therefore be considered solved merely by estimating future demand, assessing physical yields, and from these calculating the desired area. After these requirements have been ascertained, conflicting demands from other land users and competing demands for capital and labour from other sectors of the economy must be reconciled. As shown earlier, this reconciliation might best be effected by the analysis of the relative profitability, different time-pattern scales, contribution to the balance of payments, labour-absorptive capacity and the possibility of industrialization of the various land uses.

The forest policy-maker now has two broad sets of data. On the one hand, he has the estimate of total requirements of wood and wood products and of forest services, and an estimate of the area of land needed to supply these requirements; on the other, he has an estimate of the amount of resources which the economy can afford, or considers desirable, to allocate to forestry. If the latter permits the implementation of the former, he has no problems; if it does not, he must adjust his first, self-sufficient estimate to meet the restrictions and constraints of the economy as a whole. The area which can finally be dedicated to forestry is determined, therefore, not only by the needs of the forestry sector, but also by the needs and resources of the overall economy. No fixed proportion or fixed area of land must be devoted to forestry, or to any other form of land use for that matter. The physical and socioeconomic circumstances of a country must be the deciding factors in resource allocation.

References

Australian Forestry Council. *Report of Panel 3. Multiple use of forest resources.* Canberra, Forestry and Wood-Based Industries Development Conference FORWOOD. 1974

Gregory, G.R. An economic approach to multiple use. *Forest Science*, 1. 1955

King, K.F.S. *The formulation of forest policies in developing economies.* Paper presented at ninth British Commonwealth Forestry Conference, New Delhi. 1968

King, K.F.S. *A plan of action for the next six years. A summary of the revised FAO study on Forest policy, law and administration.* Paper presented at seventh World Forestry Congress, Buenos Aires. 1972

Muthoo, M.K. *Renewable natural resource planning for regional development with special reference to Kashmir.* Oxford University. (Thesis) 1970

Nautiyal, J.C. & Smith, J.H.G. *Acceleration of economic development depends on harmonization of technical and economic objectives for forestry.* Paper presented at ninth British Commonwealth Forestry Conference, New Delhi. 1968

O'Brien, W.T. & Roy, G.G. *The multi-objective management of natural resources.* Paper presented at forty-third ANZAAS Congress, Brisbane. 1971

Westoby, J.C. Forest industries in the attack on economic underdevelopment. *Unasylva*, 16(4): 168-201. 1962

Zivnuska, J.A. *The integration of forest development plans.* Paper presented at sixth World Forestry Congress, Madrid. 1966

from No. 130, 1980

Community forestry depends on women

Marilyn W. Hoskins

My first awareness of forestry as a special concern for women in developing countries came from women in Upper Volta. I was holding seminars there and although forestry was not on the agenda it dominated one of the most animated discussions of the programme. The women who participated in these conferences were social workers, schoolteachers, lawyers, doctors, and others who were in leading or essential occupations. They were all educated women, but none of them had been trained in forestry or agriculture. Nonetheless, they spoke with great authority and knowledge about the growing scarcity of leaves, nuts, and fruits needed for traditional dishes essential to the family diet. They talked of the scrub-bush land that looked so useless to developers, and which had been cleared to plant fast-growing exotic trees. Even when no trees identified as valued species were cut, these women considered the clearing of the "useless" bush a very serious loss. It is this scrub growth that formed the basis of emergency supplies, especially for the poor rural women and their families, by providing leaves, roots, seeds and bark for food, medicines and crafts. It also furnished fuel for cooking and heating that was extremely important to them. This "useless" bush was also food for humans and animals in times of scarcity or drought. Exotic fast-growing trees, they said, might fill the needs for urban fuel or building supplies more quickly than the bush, but these trees usually offered no secondary products and were even declared off limits to local residents who had previously had access to that land. It seemed to them to be a trade-off that was to the disadvantage of local people and their families, and especially to women, and to the benefit of the distant urban dweller. Wood products, they said, are needed by the population, certainly, but more thought should be given to at least minimizing the loss that results for the rural family.

The women spoke of species of trees which were preferred for firewood and of other relations between trees, soil, water, and crops. They obviously had a wealth of knowledge about the place of trees in their environment because they had grown up using these resources. They also had concerns about the local and national loss of ground cover resulting in impoverished soil and in diminishing forestry production. They were frustrated because they felt that the needs, the knowledge and the concerns of women and, therefore, of families had not been considered in the design of policies and programmes (SAED, 1978).

Marilyn W. Hoskins wrote this article while working as a sociologist at the Virginia Polytechnic Institute and State University, United States. She was subsequently appointed head of FAO's first unit devoted to community forestry, becoming a world leader in this field. This article was derived from an address to an FAO/India seminar on "The role of women in community forestry and rural development", Dehra Dun, India, December 1980.

Importance of trees to rural women

From the time of that conference I have been asking questions and learning about the uses of trees and their products. I read especially about rural women in non-industrial societies and found that the relationship of women to their environment was similar all over the world. A sexual division of work emerged based on the woman's role as bearer of children and nurturer of the family.

Historically, women all over the world have taken on the tasks that are built around this role. While men might go great distances to hunt, women gathered seeds and plants near their camps or homes. Almost everywhere women got the water and wood, they prepared the grains and vegetables, built the fires, and cooked. People lived as conveniently close to water and wood resources as possible. In settled areas some women also raised vegetables and fruit around the home or in the compounds. They fished in ponds and streams, or raised small animals that grazed on nearby bushes and grass. They helped in house construction, made mats and baskets, medicines, fish nets, cloth and dyes. All this they did with the vegetation that grew about them.

One of the first articles in *Unasylva* written by a woman, and the first full-length article to address women's contributions to forestry.

In many places, this is still the pattern. In one evening conversation, women in a village in Sierra Leone mentioned 30 items that they gather or make from the bush growing on their fallow fields

At a national tree planting scheme in Lesotho
women don't appear in project documents, but they show up on the job

or from the surrounding wooded areas. Local men did some of the same activities but they were neither focused on nor limited to the use of resources found near the home, as were the women.

The dual economic and nutrient role works only in situations in which local resources are abundant. This is less and less frequently the case. The problem of expanding deserts and degradation of soils in semi-arid as well as more humid areas has resulted in a serious decline in the carrying capacity of land at the same time that demands for produce are growing. A recent World Bank publication reports:

"Although the forest area in developing countries exceeds 1 000 million hectares, it is being consumed at such a rate for agricultural settlement that it could disappear within 60 years – unless some fundamental changes occur to alter the current trend, or unless extensive reforestation programmes are undertaken to offset the losses. Between 1900 and 1965 about half the forest area in developing countries was cleared for agriculture, and more than 3 000 million hectares (or 30 percent of the world's exploitable soils) are currently under shifting cultivation" (World Bank, 1978).

The effect on women of the scarcity of trees and forest produce

Statistics on the worldwide loss of vegetative cover coupled with information about the need for that vegetation are frightening. But it is more frightening to realize that home consumption of forestry resources is almost always underestimated. This is true even though a currently accepted estimate is that 90 percent of the annual wood consumption in developing countries is used for fuel. Most of the raw materials, including fuels, that are derived from trees and used daily by rural women do not come from areas that are officially classified as forest, the total amount of these necessities of life that come from trees being seldom measured. In themselves, all the figures related to fuelwood use and deforestation do not tell us much about how this loss of vegetative cover actually affects rural women.

A woman in a small village in the groundnut production area of Senegal described what happened to women in her village as fuelwood became more scarce. She remembers only a few years ago when she could pick up wood just around the village. Then more fields were cleared to cultivate more groundnuts, and there was less and less wood. The women found themselves walking four hours to find dead branches. Then the distances and time spent in foraging for fuelwood became greater. They took their daughters along with them so as to bring back more wood and then they needed to make the trip only two or three times a week instead of every day. In this way they managed to find the time to care for the gardens, the children, and household tasks, and still collect wood. The women also become more parsimonious in their use of wood for cooking and they used alternate fuels, including the stalks of plants. Sometimes they cut branches from valued trees though they knew they needed those trees and that

the green wood did not give off as much heat as dry wood. They used cow-dung, though there were few cattle in the area and they knew the dung was valuable for fertilizing their gardens. The Senegalese woman who told me all this said that in some neighbouring villages the men had carts and went out to collect wood but this did not happen in her village. In other villages the women bought wood from vendors, strangers who collected it in distant places. But, in general, wood was not often available to buy in the villages of the countryside because the vendors could make more money by selling it in the cities. This woman and her friends told of changing their meals from two hot meals a day to one. Then they changed to a hot meal every other day, serving their families uncooked millet flour mixed with water when there was no fuel with which to cook. The spokeswoman for the group I was talking to finally ended by saying, "A person can starve with a full granary if there is no wood with which to cook."

As changes occur in the availability of fuel, the health and nutrition of the whole family are affected. They eat more food that cooks rapidly, more uncooked food, and fewer vegetables because there is less time to take care of gardens and there are fewer fertilizers. And, of course, as fuel prices increase there is less money to buy food. In Niger there is a saying, "It costs as much to heat the pot as it does to fill it." And indeed in some places fuel prices are half again or more of the total food bill and prices are continually rising.

Spending more time collecting fuel also affects other aspects of family life. A film made in Nepal showed a girl standing outside a school she could no longer attend because she must help her mother collect wood from more distant areas. One study pointed out that women may choose to have larger numbers of children based on the knowledge that they will need more hands (and feet) to collect fuel. A Lobi potter reported that her husband had left home in search of work since his blacksmith trade had become uneconomical due to the scarcity of fuel. She herself had given up making large pots and was wondering how much longer she would be able to support her family as a potter because it was becoming difficult to get fuelwood to fire even the smaller pots. Many women in developing countries depend upon wood fuel not only to cook for their families but also to earn money by processing foods such as the snacks that are sold in the markets. Many work in small industries that depend on fuelwood, for example, smoking fish.

However, fuel is not the only forestry-related issue for women and the life of the family. A woman in Upper Volta told me that she could no longer make the medicinal recipes her mother had taught her because the plants that had once grown around her village were no longer there. A Peul woman said that she had to give up raising small animals for her family's food and income because the forage plants were no longer available close to the village. In another area the women who fished could no longer do so because the denuded area surrounding the pond had become eroded and had silted up the fish pond. Many women complain that they have smaller and smaller garden plots and poorer and poorer soil, because of the disappearing ground cover throughout the countryside around many villages and rural communities.

What is forestry for local community development?

In the early 1970s, FAO called international attention to the possibility of local community participation in selecting, directing, and benefiting from forestry projects. It organized a series of expert consultations of foresters from around the world and held a session at the 8th World Forestry Congress in Djakarta on the issues involved. Out of all this expert advice and experience came a movement called Forestry for Local Community Development (FLCD), which they define as follows:

"... any situation which intimately involves local people in a forestry activity. It embraces a spectrum of situations ranging from woodlots in areas which are short of wood and other forest products for local needs, through the growing of trees at the farm level to provide cash crops and the processing of forest products at the household, artisan or small industry level to generate income, to the activities of forest-dwelling communities. It excludes large-scale industrial forestry and any other form of forestry which contributes to community development solely through employment and wages, but it does include activities of forest industry enterprises and public forest services which encourage and assist forestry activities at the community level. The activities so encompassed are potentially compatible with all types of land ownership. While it thus provides only a partial view of the impact of forestry on rural development, it does embrace most of the ways in which forestry and the goods and services of forestry directly affect the lives of rural people." (FAO, 1978a)

Foresters and community developers became aware that projects that did not include local participation might not be able to have much effect on certain specific economic, social or environmental situations within a community. For instance, in some communities cashew trees are considered dangerous, in others only young women can put seeds into the ground, among some people competition is considered good while in a neighbouring group individual success is looked upon with suspicion. These individual community variations, not readily known by an outsider, often determine whether or not a project will be successful. Therefore, they need to be taken account of in the project design. Planning cooperatively, using the knowledge of local residents combined with the technical information of the forester, is not easy. Forestry services have traditionally been isolated from community development issues and have focused their concern on protecting the environment of the forests *from* local people. Understandably, it is difficult to convince villagers, who have little land and little time, to invest their scarce resources in long-term tree planting; but it is twice as difficult to get the official

agencies and the rural dwellers themselves to focus on the special concerns and needs of women in projects involving community development.

Reading project descriptions, it is difficult to find out what roles women are actually playing in planning, participating or benefiting from forestry projects. Generally, these descriptions use a neuter term – "farmers" or "residents" – to describe the participants or beneficiaries. There are some examples, however, where women's contributions have been cited. These projects can be roughly divided into three kinds: conservation, forestry production, and more efficient wood use mainly related to stoves.

Conservation

Conservation projects have special problems. It is not always easy for economically oriented planners – and for that matter the farmers themselves – to see the long-term and indirect benefits of conservation as being worth an investment of time, labour and land. In fact, the benefits of conservation projects often accrue to people living in distant areas. For example, planting trees on hillsides may reduce the amount of land locally available for growing food while protecting the farms of those living in the distant river valley where siltation is becoming a problem.

In Cape Verde where the drought has destroyed much of the vegetation and the majority of the men have migrated elsewhere for employment, the women form the backbone of all efforts to terrace and plant the hillsides. They work as paid labourers. In Honduras, men were not interested in conservation projects even as paid work. They agreed to join in this work only after several groups of women who had understood its importance had started on the project. In Lesotho women receive only food rations from the UN/FAO World Food Programme while they work on building roads, doing soil conservation activities and planting trees. These examples, especially the first two, are not FLCD; however, they do demonstrate how women can successfully do heavy planting and terracing work that project planners had originally thought impossible for women. The last two examples also show women taking the lead in work to improve their environments.

Examples from China, El Salvador and Honduras show a different model of participation.

In China in 1954, women planted a shelterbelt along the coast in Guangdong Province. In this area the men are fishermen and the women raise the crops. They had experienced crop failures over many consecutive years due to sandstorms. Women commune members led others in forming voluntary tree planting groups so that their crops would grow better (FAO, 1978b).

> Exotic fast-growing trees might fill the need for urban fuel or building supplies faster than "the bush." But it seemed to these women to be an uneven trade-off that was to the disadvantage of local people and their families, and especially to women who depended upon the bush for all sorts of basic needs, first of all fuel.

In El Salvador in 1971 the government purchased a private estate and turned it over to the 130 families that had worked there. Some of the women formed homemaker groups, others joined the farmers' association. They discussed their tasks: procreation, preparing meals, washing clothes, carrying water and wood; broadly speaking, tending to the family and homemaking. They then discussed how they could better their lives and decided on a project of soil conservation and reforestation. They organized a group and planted vegetables and fruit trees around terraces, and reforested small areas for firewood and timber.

In Honduras the government called on farmers to collaborate in the replanting of an area destroyed by a hurricane. They were surprised, but did not object, when a group of women also presented themselves for work. The women had the motivation to reestablish the farmland, they had lightweight and easily obtained tools, and they had flexible working schedules easily adjusted to household duties. These women reforested 40 hectares as well as doing other conservation work. The officials noted that they set a good example for the men (Wiff, 1979).

The "Embrace a tree" movement in India could certainly be considered a successful conservation effort by a group of rural women and it is famous throughout the world. Still another conservation effort was made by a group of urban women in Kenya. This women's organization recognized deforestation as a major national problem and designed a programme to solicit money from people for planting memorial trees. The money covers not only planting the trees but caring for them for five years. The idea is that because they are a memorial, there is less chance that they will be cut down or damaged. Often rural women are hired to plant and care for these trees, thereby providing additional employment and family income.

Two other examples of conservation projects in which women were not consulted at the planning stage are instructive. The first is a forest-service project of fixing sand dunes in Senegal. After foresters had planted several vegetation bands, the project directors wanted villagers themselves to plant trees around their small garden plots. The people were polite but would not plant any trees. Some of the officials considered it laziness or lack of understanding of the way trees would help to save their garden plots from the encroaching sand. However, in a short conversation with local women, it became clear that they

TERRACOTTA STOVES IN BENIN
stoves are usually designed by men who don't consult women

understood quite well the relation of sand and trees. One reason for their lack of motivation stemmed from not being able to sell the vegetables they raised and, therefore, finding those gardens of limited value. Their attitude was, why should we do the forest service's work if the forest service does not do something for us? And why should we plant trees on our land if we feel that the trees will not benefit us? Incentives such as the provision of better roads or marketing infrastructure might have provided the motivation to plant the trees.

Officials, i.e. men, are in the habit of ignoring or not taking women into account. In Mali a young forester had a plan to build berms along the hillside contour in a forestry service area. He then planned to plant trees every three metres. The object was to save the soil for farming instead of allowing it to wash down into the town below. The forester said he had talked with the farmers who had permits to farm this land, and they had supported the idea. The written description had received its first approval. However, at the site it was found that the hills were already planted and did not appear to be badly eroded. They were, in fact, already terraced with crude stone walls. Women described spending the dry season collecting animal fertilizer and mixing it in the soil. They then built stone walls to help prevent erosion and watched every rain. When they saw areas that began washing away they built them up with stones. Since only men held farming permits, and these women were gardening on their husbands' lands, they had never been consulted, nor had they heard of the proposed project.

This project would have cut through their stone banks into their vegetable gardens and, in a year or two, would have shaded the land too much to continue using it for planting. Fortunately, the project was redirected in time, but many conservation efforts have similar negative consequences for rural women farmers.

Production forestry

Involving women in production forest projects raises different issues. Here the main issue for women is valued benefits and their distribution. Why should women plant trees on someone else's land if they know that the trees will not be available for their use? It has been difficult to convince planners that women need to be involved in all aspects of resource development. Their participation may differ, as these examples demonstrate. In Cameroon the women in maize-milling societies discussed the fact that the forest service wanted to plant woodlots but the local men did not trust the project and destroyed the fences. The women, however, needed fuelwood close to their village, so they helped the foresters to repair the fences and plant the trees. This act dissolved a traditional hostility that had existed between the villagers and the foresters and the men joined in support of the project.

In Senegal, women have worked with the forest service in growing seedlings to sell. Some have individual home nurseries and others grow the seedlings in communal plots, using the profits for community owned enterprises or equipment. An integrated development project at Lagbar, Senegal, has been cited as one of the most successful projects in which herding communities planted trees. In this project women as well as men were consulted about tree preference, and they chose shade-, forage- and income-producing trees. Women took their traditional roles and watered the trees that the men planted. In some areas where women were not involved, the trees have died from lack of water. The project designers had not recognized the importance of this local tradition in the division of labour.

In Lesotho women plant woodlots of their own, whereas in Guinea women requested that trees be planted communally. If the women worked along with the men they felt that their contribution would be appreciated. If they worked alone, they feared that their husbands would be resentful if dinner were late or their wives busy with their own work.

Appropriate secondary forestry activities can also interest women. A bee-keeping project in Kenya could not get the support of women until a project director realized that local women would not climb to reach the hives. Once he introduced hives close to the ground the women participated. In China women are reportedly very involved in small wood-based industries, and in Senegal they also produce the pots used in forestry nurseries.

An example of problems which arise when women's contribution in product processing is not considered comes from Sierra Leone. Here large communal plantations of oil palm and coffee

were planted by men without realizing that their harvest and processing would come at a time when crops were also being harvested. Much of this processing could be done only by women, who were too busy with the food crop at that time. This overtaxing of women's time resulted in a great deal of the project produce being lost.

Wood stove projects

The third category of project involving women concerns the move to more efficient wood stoves. If stoves can, as some claim, cut fuel needs by half, this is obviously an important avenue to explore. However, changes in the use of stoves have been slow in most parts of the world and developers often blame the old-fashioned or traditional attitudes of women. There are exceptions, as in Honduras where energy-efficient earthen stoves have become very popular. One researcher attributed the acceptance of this innovation to the fact that women were trained to make them and, therefore, women were introducing this technology to other women. Also, credit facilities through a cooperative made loans available for which the monthly payment for both the stove and the kitchen shelter amounted to the same as the monthly savings on fuel (Elmendorf, 1980). A stove project proposed for Nepal has suggested sending Nepalese women to India to learn to build stoves; they would then teach other women these skills at home in Nepal. In Niger a new programme by the Church World Service plans to introduce improved stoves to urban women through a women's organization.

But no matter who introduces the stoves, if they are not appropriate to local conditions they will not be accepted. A stove project in Ghana that was reported to be very successful at the time that it was going on was found a decade later to have been a failure. Not only had more new stoves not been built, but the first stoves were not being used. It turned out that they had not been designed for making the local dishes and that they sometimes used more, not less, fuel than the traditional and supposedly less efficient models. In certain areas of Upper Volta, the government is putting great emphasis and pressure on women to build stoves and the women's extension service is promoting the project. Because stoves are being advertised as the "modern" thing, no one criticizes them. However, I have a picture of one that is said to be marvellous, but which was being used to hold the wood for a three-stone fireplace built next to it. There are a number of bilateral and multilateral international development agencies which are prepared to put money into fuel saving programmes based on more efficient stoves; but we, as women, should insist that stoves be designed not for the laboratory but for our use. Only then will this money not be wasted. A basic precept of research and development for stove making ought to be that, in the areas of the world for which the stoves are intended, local women be involved at the design stage.

Foresters, women and community forestry

In many countries foresters are completely unfamiliar with or even oblivious to the goals and methods of community development. They find it difficult to change their approaches from technical and regulatory ones to activities that support or serve local community efforts. Furthermore, forest services, especially in developing countries, receive a low priority in government budgets and usually have neither the infrastructure nor the personnel to launch new programmes in social forestry. Social forestry projects require imagination, patience, policies that are flexible and officials who are capable of dealing not merely with land resources but with other people.

A forester friend of mine says, "Actually, foresters and women have a lot in common. We are both given inadequate resources and we are ignored when it comes to policy making and conservation planning." No one can disagree with that.

Foresters have professional and technical skills and women have a realistic knowledge and experience of local community needs. If community forestry projects are going to get anywhere, these two will have to recognize each other and work together. ■

References

ELMENDORF, MARY. 1980 *The human dimension: energy survey methodology.* National Academy of Science International Workshop.

FAO. 1978a *Forestry for local community development.* Rome.

FAO. 1978b *Women of New China are an important force in forestry development.* Submitted to the 8th World Forestry Congress, Djakarta.

SAED. 1978 *Social and economic development in Upper Volta: woman's perspective.* AID, Ouagadougou, Upper Volta.

WIFF, M. 1978 *La mujer en el desarrollo agroforestal en América Central.* Submitted to an FAO/SIDA seminar, Oaxtepec, Mexico.

WORLD BANK. 1978 *Forestry sector policy paper.* World Bank, Washington, D.C.

Women in *Unasylva* before 1980: where were they?

Every *Unasylva* issue in recent years has included women authors, and many articles have addressed issues concerning women – who carry out much of the work in forestry, particularly in developing countries. *Unasylva* No. 146 (1984) was devoted to women in forestry. But not long before that, the journal's name might well have stood for "one world – one forest – one gender". Women authors didn't appear in the pages of *Unasylva* until 1980.

Women are mentioned in 300 *Unasylva* articles; but only 40 of these were published before 1980. The nature of the references to women in these 40 articles is a reminder of how things used to be – and how much things have changed.

About half of the references to women were contained in the generic phrase "men and women" or "men, women and children". But perhaps this was an early sign of progress, since the generic term "man" was then widely used, starting from the first page of the first *Unasylva* ("Forests were originally a huge reserve out of which each man could help himself") and continuing in the same vein for decades.

There was the barest mention of work carried out by women. A few articles mentioned women's organizations or associations. Two photo captions indicated timber carried "by a strong woman" in India (No. 82, 1966) and "Arab women tending an experimental dryland nursery" (No. 119-120, 1978). Surprisingly, only five articles before 1980 referred to the labour of women in collecting fuelwood or non-wood forest products (a common theme in later years). In an article on "New designs for fuelwood cooking stoves" (Vol. 15, No. 3, 1961), women (presumably the usual users of cooking stoves) are mentioned – but only once.

One article noted equipment used in mechanized tending as "physiologically unsuitable for women" (No. 90, 1968).

Other articles mentioned an English princess, the wife of a president and the wife of a retiring FAO Representative – or other roles tangential to forestry: Vol. 10, No. 4 (1956) described a controlled burn in the United States, where "98 men were on the firelines; 17 women prepared and delivered lunch and refreshments". An article in No. 115 (1977) advised prospective trade fair exhibitors: "Women at a stand may be an asset, especially when in their country of origin trading is traditionally in the hands of women. Besides they are quite an attraction when wearing their national costumes."

No. 83 noted that in 1966 the Forestry Division had only one fully qualified woman forester at headquarters (Miss L. Larcher-Graça of Portugal). Yet a contribution in No. 108 (1975) noted that in one of the largest plywood plants in the world, in the Republic of Korea, about half of the 5 500 employees involved in panel production were young women.

That leaves only four references to professional women in book reviews, and two articles genuinely about women in forestry: an announcement of a fellowship winner in 1962 ("Mrs. E.A. Artuz Philipps of the Forest Products Research Institute, Laguna, Philippines, has been awarded an André Mayer FAO Fellowship to conduct research on the relationship between fiber characteristics and pulp-sheet properties of Philippines hardwoods. She will work at Yale University, U.S.A."); and a short news item in World of Forestry, No. 111 (1976), "Women's work in Thai forests", which asked "What kind of work and working conditions do women have in tropical forestry?"

Outnumbered: the caption to this 1960 photo (from Vol. 14, No. 1) described the organizing committee for the fifth World Forestry Congress as "composed of men and women representing every phase of American forestry". The evidence shows 35 men – and one woman.

from No. 146, 1984

PERSPECTIVES

A multi-purpose species: woman

Pia Bergman

In 1984, an issue was published with the theme "Women in forestry". This ironic contribution implies the challenges women faced in gaining acceptance in this previously male-dominated field.

● Foresters, like doctors of medicine, prefer speaking Latin, and classify their surroundings according to shallow or deep root systems, nitrogen-fixing ability, yield capacity and multi-purpose use. Because of the wood energy crisis, foresters today give special attention to species that generate easily on low-nutrient soils and that survive in difficult environments. Unconventional scientific research in this field has recently identified a species that might be a key factor in combating the energy crisis: woman.

Applied research shows that this species has an outstanding ability to adapt well to different sites and that it establishes easily, requires little care, is renewable when properly treated and has a high potential to enhance economic development. Further, the species is native to almost all parts of the world, with no known fixed environmental requirements. Yield varies according to region and soil fertility but, generally, woman must be regarded as ideal in areas of low fertility suffering energy shortages.

It seems that the plant has been known locally for a very long time, but, being used only for domestic purposes, it has not gained any wider reputation. Laboratory tests, however, indicate that it is a multi-purpose species highly useful in several sectors, particularly forestry. This fact has already been discussed in several symposia. While the present underutilization of the species is therefore almost scandalous, it can probably be explained by territorial jealousies or discord among experts.

Some attempts have also been made to introduce woman into forestry departments in developing countries. The response so far is polite, but a trifle sceptical as to the purpose of such an exercise. The existing flora is considered sufficient to safeguard the vegetative equilibrium. Introducing a new component would uproot traditional management systems as well as requiring a botanical inventory and later the establishment of special nurseries to raise woman seedlings. Such an enterprise is considered both too revolutionary and far too costly.

It should not be denied that highly qualified foresters with international experience share such fears and apprehensions. Because of its genetic structure, woman can be both aggressive and quick-growing and should be cultivated only in areas of extreme energy shortages, particularly where climates and soil conditions are harsh. In more hospitable environments, where no acute shortages exist, such potentially invasive plants should be introduced only with great care. The threat of their weediness is too great.

Nevertheless, donor nations seem to ignore the reluctance in certain quarters and are now frequently including woman in project proposals in order to support alternative, low-cost energy systems.

As a gesture to compensate traditional foresters for this unorthodox matchmaking, it has been suggested that Latin should be used as a mode of communication at the field level. ■

Pia Bergman wrote this article as a forester working for the International Rural Development Centre at the Swedish University of Agricultural Sciences, Uppsala.

from No. 130, 1980

Excerpted from:

Social forestry

Mantri + Lurah = Ma-Lu

Sofyan Hanafie

How forestry, agriculture and the needs of people in the countryside are being dealt with by an Indonesian state forestry company

A TREE NURSERY IN CENTRAL JAVA
an area of massive erosion and massive reforestation

Sofyan Hanafie wrote this article while Forest Administrator, Telawa District, for Perum Perhutani, the Indonesian state forestry company operating in Java.

The main task of Perum Perhutani, Indonesia's forest state corporation for Java, is to implement reforestation and afforestation activities in the best possible manner and in the shortest possible time. In 1975, barren land covered 90 031 hectares, or 14 percent of the forest areas in central Java. This entire area has now been reforested.

The afforestation programme undertaken by Perum Perhutani aims at improving soil fertility, enhancing the social and economic standards of the population and rehabilitating water resources.

Perum Perhutani's efforts to conserve the living environment, especially its forest vegetation, are undertaken through a preventive measure called the "prosperity approach." This approach creates projects designed to improve the standard of living of those living near forests. These projects include mass intensification of inter-cropping, honeybee cultivation, creating fuelwood supplies, planting elephant grass (*Pennisetum purpureum*), building check dams and supplying clean water.

Such projects, as part of the prosperity approach, do not, of and by themselves, necessarily ensure environmental balance. Guidance or education of the local population is also necessary. Such guidance is provided through the *Mantri*, or Forest Guard. and the *Lurah*, or Head of Village, programmes. Since the *Mantri* and the *Lurah* are intended to work together, the entire effort is called *Ma-Lu (Mantri-Lurah)*.

We believe we have developed a self-help method that fits our needs and our culture. It is flexible and it works.

Why are the *Mantri* and the *Lurah* connected to efforts to achieve environmental prosperity? The answer lies in their importance in the village, where they can communicate directly with villagers and oversee the surrounding forest.

By 1980, when this article was written, *Unasylva* was also beginning to publish more authors from developing countries – and more articles documenting local forest management practices, presented by the people practising them.

The *Mantri* act as important field workers, handling technical problems directly in accordance with a policy outline given by their superiors. The *Lurah*, besides his natural hierarchical authority, has a psychological influence over the village population.

In the *Ma-Lu* programme, the *Mantri* must become the centres of agricultural and silvicultural information for the population around the forests. Their own houses must serve as models, with seedling beds of forest and fruit-bearing plants. Their efforts are supplemented through mass education activities such as radio broadcasts.

In addition to material benefits, the *Ma-Lu* programme can also achieve psychological benefits in that it promotes personal relationships between Perum Perhutani officials and village leaders, resulting in the development of a mutual sense of responsibility. Based on its success so far, the *Ma-Lu* programme was expanded in 1979. We believe we have developed a self-help method that fits our needs and our culture. It is flexible and it works. ■

The economics of a lion

LION IN THE PRIME OF LIFE
high value

In *Unasylva* Vol. 33, No. 134, 1981, FAO economist Philip Thresher used a computerized model to estimate the importance of lions as a tourist resource at Amboseli National Park, Kenya.

Based on number of visitors to the park, the demographics of the lions there, the visitors' foreign exchange expenditures, their time spent seeking and viewing wildlife and the lions' share of that (2.5 percent), he calculated that the tourist value of a lion over a 15-year period (1977–1992) was US$1 195 000.

Because a lion should be on view for at least six to seven years, one individual lion would thus draw about $515 000 in foreign exchange receipts. This value as a tourist resource compared favourably with the value of a lion as a hunting or sport resource ($8 500) or as a commercial resource (based on the retail value of a lion's well-cured skin, i.e. between $960 and $1 325). One maned lion's present value to each rancher family in the park was thus close to $90, compared with $10 from a lion shot legally.

Thresher further showed that the present national value of one maned lion was comparable to that of 30 000 zebu-type cattle, because a herd of that size would produce about $665 000 over 15 years, and the value to the national economy would be about 180 percent of that sum, or $1 197 000. To put these figures in perspective, the 6 000 Masai living in the Amboseli ecosystem were at the time supported by 50 000 cattle and 20 000 sheep and goats.

"The immediate implications for managing wild animals in general and lions in particular in an area such as the Amboseli ecosystem are staggering. Over 2 000 jobs could be tied to wildlife viewing in Amboseli alone," Thresher concluded.

from No. 169, 1992

Excerpted from:

Sustainable development of forests

J.S. Maini

This article briefly describes the context surrounding the international deliberations on world forestry and proposes a conceptual framework for the sustainable development of forests. While the framework and objectives proposed may be applicable to the sustainable development of all types of forests worldwide, the actual practice of sustainable forest development would require the development of silvicultural techniques appropriate to local ecological and socio-economic conditions.

When this article was published, **Jagmohan Maini** was Assistant Deputy Minister, Forest Environment, Forestry Canada, Ottawa. He went on to become the Coordinator of the Intergovernmental Panel on Forests (IPF), subsequently the Intergovernmental Forum on Forests (IFF), and the first Director of the United Nations Forum on Forests (UNFF).

FORESTS AS A GLOBAL ISSUE

Forests are nature's most bountiful and versatile renewable resource, providing simultaneously a wide range of economic, social, environmental and cultural benefits and services. The worldwide demand for their numerous functions and outputs is increasing with the expanding population, while the global forest resource is shrinking either as a result of overharvesting, deforestation and permanent conversion to other forms of land use in many tropical regions, or as a consequence of forest decline associated with airborne pollutants in temperate regions.

Forests represent a unique situation in terms of global environmental issues. Physically, they are located within the territories of sovereign states, yet their environmental role extends beyond their borders at both transboundary and regional as well as global levels. For example, the management, or mismanagement, of watershed forests of international rivers has transboundary implications in terms of soil and water conservation in neighbouring countries. Similarly, airborne pollutants generated in one country may be transported across the boundary and cause forest decline in others. The role of forests in global ecological cycles highlights the environmental significance of forests beyond the boundaries of the nations where they are located. In this context, they are being viewed as global commons similar to the atmosphere and oceans.

Conservation and sustainable development of all types of forests worldwide have now emerged as priority items on the international policy agenda, particularly in the context of the United Nations Conference on Environment and Development (UNCED), to be held in Brazil in June 1992. The role of forests is receiving particular attention in the biodiversity and climate change conventions currently under negotiation. While special interest groups are only focusing on a specific role or function of forests (e.g. as a reservoir of biodiversity, for carbon sequestration, economic development, subsistence, fuel, etc.), national and international policy-makers face the challenge of reconciling the role of forests in meeting national socio-economic and environmental objectives as well as the global environmental and socio-economic interests of the community of nations. Ecological considerations are now being viewed not as subordinate but as an integral part of economic policy and planning (Ullsten, 1991).

The United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro, Brazil in 1992, marked the birth of the sustainable forest management concept and the current international dialogue on forests. This article, by one of the main players in the international arena, introduced a *Unasylva* issue on the theme of sustainability published just before UNCED.

Sustainable forest development is also emerging as a consideration in the international trade of forest products. Many consumers, individually and collectively, are preferring to buy products obtained from sustainably managed forests and manufactured by environmentally acceptable

processes. There have been consumer threats to boycott wood products that are not "green" both in terms of raw materials and manufacturing processes.

In contrast, most members of the forestry community have usually dealt with local issues and with "delivering wood to the mill gate". The national and international forestry community is relatively inexperienced, both technically and politically, in dealing with the globalization of forest-related issues. Consequently, their participation in these deliberations and their influence in shaping the international forestry agenda to date have been marginal. Forestry, involving long-term commitments, usually receives limited political attention in comparison with most other, often shorter-term, socio-economic policies. The current attention being paid to forest-related issues by international political communities should be viewed as a rare window of opportunity to advance the interests for forestry of political support and sustainable forest development, and to promote the multiple benefits provided by forests. These benefits range from meeting the socio-economic needs of forest dwellers, forest-based communities and forest industry to conserving environmental values.

It is important to understand the evolution of the structure and content of international deliberations on forests, the shifts in our values and the consequent impact on forestry practices. The forestry and scientific communities are faced with the challenge of defining sustainable forest development, formulating a conceptual framework and establishing internationally accepted criteria and approaches for the practice of sustainable forest development to meet multiple human needs.

SUSTAINABLE FOREST DEVELOPMENT

What does it mean?

The term "environmentally sustainable economic development", more commonly known as "sustainable development", has been popularized globally by the report of the World Commission on Environment and Development (WCED), *Our common future*. In this report, sustainable development is defined as "economic development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). The term sustainable development has captured the imagination both of the public and politicians at local, national, regional and international levels, and has instigated much discussion. However, there have been limited attempts to put the concept into practice.

The forestry sector, perhaps more than any other, is well positioned to provide worldwide leadership in the practice of sustainable development. The forestry community is accustomed to a long-term perspective; it is reasonably knowledgeable about the response of forest ecosystems to natural and human disturbances; it is comfortable with the sustained yield principle; and, in a few instances, it has attempted to practise a multiple and integrated use of forests. As compared to many other industrial sectors, it is relatively easier for the forest community to expand its scope from sustained yield to sustainable development, which requires a shift from forest management to forest ecosystem management.

Sustained yield is a deeply embedded principle in the forest community. Is sustained yield the same as sustainable development? Yes, but only partially. While sustained yield in forestry is mainly concerned with a perpetual and even annual flow of timber for human use, sustainable development of forests is much broader and is concerned with integrated forest management, maintaining the ecological integrity of the forest environment and keeping future options open. This does not imply that all forests everywhere should be managed for all benefits simultaneously. In practice, forests in specific areas are likely to be dedicated to primary uses or benefits (e.g. to the production of industrial wood or fuelwood, the protection of watersheds, or for use as ecological reserves, wildlife habitats and reservoirs of biodiversity, etc.), while other secondary values are also respected. This approach would allow periodic and selective harvesting of watershed forests, provided it is not detrimental to the primary objectives of soil and water conservation.

As a part of the demands on forestry to meet present needs and our ethical responsibility toward future generations, the following definition of sustainable forest development is proposed (Maini, 1989):

> Sustainable development of forest land and its multiple economic and environmental values involves maintaining indefinitely, without unacceptable impairment, the productive and renewal capacities as well as the species and ecological diversity of forest ecosystems.

The acceptable threshold of "impairment" is determined by the choices and decisions made by individuals, institutions and nations as well as by the international community. It is based on our understanding of both ecological principles and socio-economic imperatives. What is acceptable under a specific socio-economic and ecological condition may be totally rejected under another set of conditions. Consequently, choices and trade-offs are made in terms of risk management and the cost of inaction.

The formulation of approaches to sustainable forest development requires the harmonization of human activities with the biological and physical aspects of forest ecosystems. Human activities and forest ecosystems as well as the interactions between the two are dynamic and change over time and space. Consequently, monitoring the two systems and their interaction is crucial when practising sustainable forest development, and it involves a number of ecological, socio-economic, technological and political considerations.

From an ecological perspective, all

forests are composed of an assemblage of diverse species and a life-support system that has the capability to renew itself. As long-lived and rather resilient ecosystems, most forests are not ecologically fragile. To a considerable degree they are able to withstand a wide range of natural disturbances such as weather extremes (wet and dry periods), storms, fires, insects and diseases. These disturbances are an integral part of the dynamic nature of forest ecosystems and play a critical role in their health, species diversity, renewal and rejuvenation, as well as in their gradual evolution over time. The mosaic structure of natural forests in tropical (Lamb, 1990) and temperate (Suffling, Lihou and Morand, 1988) regions is often a reflection of past disturbances attributed to natural causes.

Of course, primarily, our concern with the potential for sustainable forest development lies not with the natural changes that occur over time in undisturbed forests, but rather with the impact of human activity on the forest resource. While in the remote past forest dwellers across the globe utilized forest resources for subsistence with limited permanent impact on the resource, the expansion of the agricultural frontier has led to the significant and increasingly rapid permanent conversion of forest land to other uses. Permanent conversion of forest land to agricultural use, currently concentrated in the developing regions of the world, is similar to that experienced in the now industrialized temperate regions over the past several centuries. To meet the demands of growing populations, most of the developing countries will need to continue converting some of their forest area to other uses, including agricultural production, shelter and infrastructure. The key is that this conversion should be well-planned and implemented only on lands with the potential for sustainable, non-forestry use. This article, however, concentrates on principles for the sustainable development of land designated permanently for forestry.

Actions toward sustainable forest development

- **Make fuller use of existing knowledge to practise integrated forest ecosystem management and establish a national and international network of demonstration areas.**
- **Strengthen research to predict the response of forest ecosystems to disturbances associated with natural causes and with human activities; develop the capability to recognize early warning signals and indicators of environmental stress and degradation in forest ecosystems.**
- **Accelerate the development of national and international monitoring systems to provide timely and reliable information on the state of national and global forests.**
- **Promote the establishment of, or further develop, national ecological reserves of representative and unique forest types to protect biodiversity and ecological diversity as well as to provide baselines against which the environmental consequences of human activities can be determined.**
- **Increase forest land productivity in selected areas through improved management of forests and forest plantations as well as reduce losses from fire, insects and diseases so that more forest land is available for other uses without a reduction in the overall timber flow.**
- **Reduce waste in forest harvesting operations and in product manufacturing; improve utilization of wood for a variety of end-products; encourage recycling where appropriate to reduce demand for raw materials and to "do more with less".**
- **Reduce effluents from forest product manufacturing processes to environmentally acceptable levels.**
- **Reduce pollutants from non-forest sector industrial and consumption activities that cause forest decline through reductions in productivity, renewability and species and ecological diversity.**
- **Dedicate more resources to systematic policy research to understand and influence decision-making processes in the forest sector and develop innovative approaches to harmonize different economic, environmental, policy and political time horizons.**
- **Continue work to develop appropriate international policy and institutional frameworks to foster international cooperation in technology transfer and financial assistance in support of the conservation and sustainable development of forests.**
- **Formulate criteria for sustainable forest development to strengthen international trade in forest products derived from sustainably managed forests.**
- **Publicize more widely the commitment, policies and programmes undertaken by various stakeholders in the forest sector to achieve the objectives of sustainable development.**

THE CHALLENGE AHEAD

The world community is now deeply concerned about the sustained use of natural resources and the quality of the environment for both present and future generations. There is an increasing move toward environmental ethics, including: use and not abuse; reduce environmental stress; recycle; and do more with less. Particularly in the industrialized countries, the general public is also very concerned about past and current forestry practices in many parts of the world, especially forest degradation and deforestation in the tropical regions, forest decline in industrialized countries and environmental degradation associated with the manufacturing of certain forest products. The challenge of practising sustainable development as described above may be pursued through a number of specific actions, including research; legislation; forest and environmental policy; forestry practices and management; and international cooperation in developing criteria for sustainable forest development, the transfer of technology and financial assistance.

Practising sustainable forest development, through the management of forest ecosystems for their multiple benefits and values, would be relatively more costly in the short term than the management of forests for wood production only. However, failure to practise environmentally sound forest management is likely to lead to prohibitive future costs. As it is in our collective economic and environmental interest to practise sustainable forest development at the national, regional and global levels, there is a need to develop an appropriate international policy and institutional framework to foster global technical and financial cooperation (Maini, 1991a). A set of guiding principles for the conservation and sustainable development of global forests must also be formulated (Maini, 1991b; UNCED, 1991) and international criteria for sustainable forest development agreed upon.

EPILOGUE

Global issues, such as economic inequity, population growth, hunger, illiteracy, inadequate shelter and environmental degradation, have led to concern for the future of this planet and its inhabitants. Environmentally sustainable economic development is seen as a societal value to ensure that, while attempting to satisfy current demand, we bequeath a healthy environment and adequate natural resources to meet the needs of future generations. Sustainable forest development is aimed to help address many of the above-mentioned global issues by providing food, fibre and wood as well as multiple environmental benefits.

Forest products are environmentally friendly, biodegradable and are obtained from a renewable resource base. The world forestry community now faces two major challenges: first, given the expanding world population and the anticipated increase in demand for wood and non-wood products, how to meet this future demand without degrading the forest resource base and forest environment; second, what technical, financial, institutional and political means to tap in order to promote sustainable development of all forest types worldwide. The international forestry community should be actively engaged in defining national and international forestry agenda.

The stewardship of the world's forests, both on a national and global scale, is a collective socio-economic and environmental responsibility. The forestry community, with its long-term perspective, technical capability and commitment to the sustained yield principle, is very well-positioned to provide national and international leadership in sustainable forest development. This practice will require collective international commitment and cooperation, an appropriate policy and institutional framework and a shift from forest management to forest ecosystem management. ◆

Bibliography

Lamb, D. (Unesco). 1990. Exploiting the tropical rain forest. *Man and the Biosphere Series*, vol. 3. Cornforth, UK, The Parthenon Publishing Group.

Maini, J.S. 1989. *Sustainable development and the Canadian forest sector.* Discussion paper presented to the Canadian Council of Forestry Ministers on 6 October 1989 at Niagara Palls. Forestry Canada, Ottawa.

Maini, J.S. 1991a. *Towards an international instrument on forests.* Paper prepared for intergovernmental consultation, February 1991, Geneva. Ottawa, Forestry Canada.

Maini, J.S. 1991b. *Guiding principles: towards a global consensus for the conservation and sustainable development of all types of forests worldwide.* Ottawa, Forestry Canada.

Suffling, R., Lihou, C. & Morand, Y. 1988. Control of landscape diversity by catastrophic disturbance: a theory and a case-study of fire in a Canadian boreal forest. *Environ. Manage.*, 2(1): 73-78.

Ullsten, O. 1991. Keynote speech. *In* D. Howlett & C. Sargent, eds. *Proc. tech. workshop to explore options for global forestry management.* Bangkok, Office of the National Environment Board, Ministry of Science, Technology and Energy.

UNCED. 1991. *Land resources: deforestation.* A non-legally binding authoritative statement of principles for a global consensus on the management, conservation and sustainable development of all types of forests. Geneva, Prep. Com. for UNCED.

WCED. 1987. *Our common future.* Oxford, Oxford Univ. Press.

from No. 169, 1992

Excerpted from:

Forestry for sustainable development: the social dimension

D.D. Gow

Forestry is uniquely positioned to make a major contribution to addressing the problems of environmental degradation and rural poverty, given the multiple roles that trees can play in the provision of food, the generation of income and the maintenance of the natural resource base. The concept of sustainability implies ideas about resource stewardship, on the one hand, and quality of life on the other.

David D. Gow was in the Planning and Institutions Service of the FAO Forestry Department when this article was written and with the World Resources Institute in Washington, DC, United States when it was published. He is currently Professor of International Affairs and Anthropology and Director of the International Development Studies Program at the Elliott School of International Affairs, George Washington University, Washington, DC.

> "When all is said and done, conservation is about people. It is about the balance that must be struck between humans and nature and between generations. And if it is to be relevant to the developing world, it must address the needs of the poor and the dispossessed who ironically share their rural frontier with the earth's biological wealth."
>
> (Wright, 1988)

The issue of sustainability assumes crucial proportions when confronted by the twin challenges of environmental degradation and rural impoverishment. In much of the developing world, conservation for the sake of conservation – environmental fundamentalism – has become an anachronism. There is an increasing awareness and acceptance of the fact that if the natural resource base is to be sustained, it must be done so in a productive manner which benefits the local population. Respect for natural resources must be accompanied by respect for human needs.

The growing recognition of the links between environment, poverty and sustainability has been an important step forward in development thinking. While this interlinkage poses a formidable challenge to those who worry about the future of the planet, it also offers an opportunity for integrated, multidisciplinary solutions – an approach often honoured with little more than lip-service in the past.

Sustainability for whom?

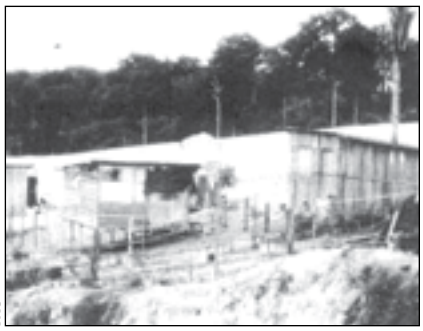
While everyone believes in sustainability, just what it is that everyone believes in remains open to interpretation:

> "The concept is variously used to convey human needs, levels of economic production and consumption, and the desirability of conserving natural capital. It is difficult to formulate a definition which is comprehensive but which is not tautological, and retains analytical precision."
>
> (Redclift and David, 1990)

The fundamental premise of much mainstream thinking about sustainable development is a direct link between poverty and environmental degradation; however, the reality is really much less simple since both have deep and complex causes. A convincing argument can be made that differential access to resources and the resulting affluence for some, in the form of overconsumption, may be linked much more directly to environmental degradation than is poverty *per se*, in either the North or the South (Lele, 1991).

Distinguishing between ecological and social sustainability is the first step toward clarifying some of the confusion. Sustainability should mean that the local population does not degrade its natural resource base, at least not irretrievably, but rather maintains or even improves it. For example, the definition

This article in the *Unasylva* issue on sustainability addressed social concerns that are prominent today – people's involvement in forest management, clear property rights and the importance of forests to the poorest groups of people.


FAO

The link between poverty and environmental degradation is complex: both have deep and multiple causes


FAO

Sustainable forest management requires a delicate balance between protecting resources and providing opportunities for their use

favoured by the Brundtland Commission (WCED, 1987) refers to the maintenance or enhancement of resource productivity on a long-term basis which meets the needs of the present without compromising the ability of future generations to meet their own needs. It should be noted, however, that this definition does accept that ultimate limits exist. In this context, it is necessary to go beyond the notion of sustainable yield and consider the dynamic behaviour of the resource in question, particularly in response to environmental conditions, human activities and the interactions between different uses or features of the same resource (Lele, 1991).

Sustainable development means increasing the potential of rural people to influence and control their future on a long-term basis


G. TORTOLI

Equally important from the perspective of social sustainability is the fact that the Brundtland Commission's report regards sustainable development as a policy objective, the end-point of development aspirations. But this also demands that the quality of human life improve somehow. Perhaps the simple definition of a "continuously improving quality of life" is best, since it allows for cultural gains as well as material ones and for a future of continuing hope (Jolly, 1989).

The uniqueness of forestry

Two aspects of the forestry sector's contribution to sustainable development distinguish it from others concerned with natural resource management (Miranda *et al.*, 1990). First, forestry has evolved from tree production to management of vast and complex ecosystems, with a wider set of concerns – the provision of a broad range of forest products, revenue generation, community forestry and local environmental benefits. Added to this is the growing concern about global environmental issues and the increasing public interest in the role that forestry can play in addressing some of the more acute problems.

The second unique aspect concerns

The interests and needs of forest communities must be integrated into forestry development activities


FAO

A decision to restrict access to non-timber forest resources such as food and fodder often has a direct negative impact on women

resource control. The forestry sector, in addition to lying within the control of both the public and the private domain, must also deal with all of the gradations of common property ownership. This requires a delicate balance between protecting the resource and providing opportunities for its use, especially by the poor. The sector must determine which areas of the forest and which aspects of forest resource management would best be devolved to local groups and which should remain under the control of government authorities. The critical issue in the determination of property rights is whether the responsible forest institution can promote and strengthen the vested interest of the local population in the forest resource while, at the same time, accepting the idea of joint management or even local control of the resource in question. ◆

Bibliography

Jolly, A. 1989. The Madagascar challenge: human needs and fragile ecosystems. *In* H.J. Leonard, ed. *Environment and the poor: development strategies for a common agenda.* Overseas Development Council. New Brunswick, NJ, Transaction Books.

Lele, S.M. 1991. Sustainable development: a critical review. *World Dev.*, 19(6): 607-621.

Miranda, L.M., Corrales, O.L., Regan, M. & Ascher, W. 1990. *The design of forestry institutions: lessons from unconventional structures.* Paper prepared for the World Bank. Durham, NC, Institute of Policy Sciences, Duke Univ.

Redclift, M. & David, R. 1990. *Sustainable development and the rural poor.* Paper prepared for the Human Resources, Institutions and Agrarian Reform Division, FAO, Rome.

WCED. 1987. *Our common future.* Oxford, UK, Oxford Univ. Press.

Wright, M. 1988. *People-centered conservation: an introduction.* Washington. D.C., World Wildlife Fund (WWF). ◆

from No. 176, 1994

Excerpted from:

Tourism for conservation, conservation for tourism

P. Dabrowski

Reflections on the relationship between nature tourism, environmental conservation and sustainable development.

Nature conservation and tourism in the contemporary sense date from the first half of the nineteenth century and, to a large extent, have developed parallel to one another. Their common root was the ideology of romanticism with its new look at wild nature, no longer regarded as sinister and repellent. Instead, nature became a value in itself and a quest for contact with it became one of the factors that was responsible for development of tourism.

Society's attitude towards historical monuments evolved in a similar way. During the period of romanticism, people acknowledged the value of relics of the past and started to set up museums. "Monument-discovering" was followed by a natural need to explore them, thus giving a second boost to the development of tourism.

There was also feedback; the people who enjoyed tourism were finding new, interesting cultural and natural objects in the course of their wanderings. By recording various threats, in many cases they became the first defenders of nature and culture.

In the history of many European and North American countries, numerous examples can be found of efforts by tourist organizations as a whole as well as those by their members to protect the natural and cultural heritage.

At the end of the nineteenth century, however, there began to be signs that a rapidly developing tourism industry, treated as a part of the economy, might threaten nature and culture. In 1913, Prof. Jan Gwalbert Pawlikowski, a lawyer, alpinist and one of the most active nature protectors, wrote in his prophetic work *Culture and nature*: "Some people, moved by the beauty of nature, wanted to share their impressions with others and started to facilitate access to it by building roads, trails and shelters. A docile public understood that nature must be beautiful, for the spirit of the epoch demanded it.... Seriously, modern man needs some comfort, so shelters were replaced by hotels which the catering and alcoholic beverage business eagerly supported. Would this not be in the interest of a superior level of excellence, since the public's love of nature would contribute to the national wealth? So, the trails were equipped with railings and guide-posts, narrow paths were turned into roads and, eventually, engineering skill achieved a miracle: in the manner of Herostratus, it violated mountains by building railways up to their summits."

An article noting the challenges of reconciling the impacts of tourism and development with conservation, introducing the term "ecotourism" to the pages of *Unasylva*.

Unfortunately, subsequent development confirmed the accuracy of this diagnosis, and not only in mountain regions. The next decades were dominated by economic and consumer interests that disregarded the consequent environmental devastation. A certain disillusionment came about by the end of the 1960s, a period that can be recognized as a turning-point for the awakening of ecological consciousness on a global scale. People started to look for ways of reconciling economic development with ecological security, a quest which, in a theoretical sense, has been crowned with the World Conservation Strategy.

When this article was written **Piotr Dabrowski** was vice-president of the Polish Tourist Society, which later merged with the Polish Country Lovers' Society to become the Polish Tourist Country Lovers' Society; he is now Chairman of its Cracow Academic Section.

In terms of tourism, this change in emphasis was possible because, alongside the vast commercial tourist industry, there had continued a strong trend of traditional nature tourism, based on the knowledge, joy and satisfaction resulting from contacts with nature, historical monuments and people of different cultures – a form of tourism where physical effort is not viewed as a nuisance but as a source of satisfaction, that wonderful feeling that occurs on the top of a mountain after long hours of climbing. Tourist adventures can be experienced either alone or with companions. In the latter case, there is an additional humanistic aspect: the consciousness of a close relationship with another person, a deep common emotion.

Essentially, therefore, ecotourism is not a new phenomenon. Rather, it is a return to roots and the rediscovery of values that have been covered with concrete and drowned by the noise of cars.

Ecotourism and protected areas

Protected areas, which are also regions of significant tourist attraction, are formed in three ways:

- Tourist regions that have been exploited particularly intensively are put under protection. This is a typical case for mountain national parks.
- A region is recognized as an interesting site after it has been declared a protected area – who would have thought that vast marshlands or peat bogs could become an attraction until naturalists began calling for their protection?
- Protection is introduced, among other reasons, to save the tourist attractions of a region, e.g. from industrial exploitation. This is the objective of many scenic protection areas.

In all these cases, if tourism evolves into a large-scale movement, sooner or later a sharp conflict appears between the requirements of protection and the tourist industry.

Frequent contact with natural environmental and cultural devastation brought about by large-scale, commercial tourism has often led to restrictive or even prohibitive attitudes on the part of those who are professionally or emotionally connected with nature conservation, and such an attitude is manifested in a tendency to expel tourism from the protected areas. For this reason, nature conservationists are often accused of fundamentalism, of hampering development or obstructing local community welfare and of wanting to establish exclusive reserves for scientists and/or wealthy people. The reaction may be rapid forest exploitation or development in commercial tourist sites in order to anticipate possible conservation measures. A recurring worry for devoted nature tourists is to find all interesting regions turned into either huge amusement grounds, fashionably called "parks", or strict reserves that are closed to the public.

Information limits of green tourism

For ecotourism to be a solution, or at least for it to mitigate the conflicts just mentioned, a lot of goodwill and accurate information are required on the part of all parties involved – especially the conservation organizations, local communities and the commercial tourist operators. They should know what ecotourism is good for as well as what its virtues, drawbacks and possible limitations are.

Conservationists should be conscious of the fact that suppressing tourism is impossible and inexpedient: impossible, because the pressures and expectations are too high, and inexpedient, because an intelligent form of tourism imparts important human values and might be the best form of environmental education.

The authorities responsible for conservation should consider tourism when deciding on management plans for a given area. Rules aimed at sustainable use as well as accurate estimates of the tourist carrying capacity of a given region become crucial. This is not a simple challenge, and requires environmental, economic and social studies on quite a large scale. It is not sufficient to estimate the environment's tolerance threshold. On the one hand, by definition ecotourism should not devastate the natural or cultural environment's while it should provide the satisfaction and benefits anticipated by all interested parties.

Only when all these basic limitations are specified and the purpose of conservation is clear can an operation policy be worked out. This should not be an administrative procedure but should rely on cooperation with whomever it may concern. Local communities and tourists ought to be properly and convincingly informed about necessary limitations. ◆

from No. 179, 1994

Safeguarding forest resources during the transition to a market economy

T. Marghescu

The risks of overexploitation of forest resources in countries of Central and Eastern Europe during the transition from centrally planned to market economies.

Tamás Marghescu, a national of Hungary, wrote this article as a consultant on international forestry.

Forest resources, in addition to their many other functions, are a source of economic capital. Moreover, if properly managed, this source of capital can be perpetual. It is an unfortunate fact, however, that in times of general economic crisis forest resources have often been drawn on at a rate that exceeds their ability to renew themselves, i.e. in a manner incompatible with the principle of sustainability. Many of the countries of Central and Eastern Europe that have embarked on the transition from centrally planned to market economies currently find themselves in a high-risk situation in terms of their forest resources. In the past, management of both forest resources and forest industries was the direct responsibility of the state, but sweeping changes are occurring on both fronts.

In most of the countries in transition, the forest industry sector is being privatized in an attempt to increase the efficiency, productivity, capacity and competitiveness of the industries. However, it appears that, in many countries, the privatization of forest industry is occurring in isolation from forestry. Increasing the capacity of the forest industries will increase the demand for raw material and, in the face of economic recession, governments (still the major forest owners) may be tempted to draw excessively on forest resources to obtain badly needed capital for investment. There were examples of this practice even before the onset of the transition towards market economies. Cost-benefit calculations of the consequences of excessive capital (wood) withdrawal from forests could reveal that the costs of forest resource rehabilitation are higher than those associated with borrowing capital for needed investments.

The raw material demand of forest industries is determined by the demand for its products, by its capacity and by the availability (and price) of the raw material. Governments should "guide" the development of forest industry capacities in their countries to ensure the stability of the sector and thereby promote the stability of the labour market and the economy as a whole. The isolated development of excessively high forest industry capacities could result in destructive competition, unsustainable utilization of national forest resources or too high a dependency on imports.

By 1994 the countries of eastern Europe had abandoned centrally planned economies following the destruction of the Berlin Wall in 1989, but had still to adapt to the market economy and to restore property to its former owners – and to address impacts on forests.

Governments also have to realize that the forestry sector is itself in need of investment, especially during the period of transition, for the preparation of an adjusted framework for sustainable forest management. But investment capital is in short supply. The privatization of industrial sectors – including forestry – that were formerly owned and managed by the government has resulted in a decrease in the revenue with which forest administrations were financed. This gap is only partially being filled by taxes imposed on forest industry and its products, and these taxes often are not devolved appropriately to forestry.

The situation is further complicated in that the ownership structure of forest resources in some countries in transition is also changing with unprecedented speed. Primarily as part of claims for the restitution of land or other goods nationalized by the state under the previous regimes, large numbers of very small tracts of forest land are being privatized. Unfortunately, the framework for ensuring sustainable forest management of these small private holdings is not in place.

The personnel of government forest administrations were educated and trained in the management of public forests only. Policy and legal frameworks have not, or have only partly, been adjusted to the rapidly changing ownership situation. Forest management plans do not exist for the new forest estates and, in their absence, the owners, also desirous to obtain an immediate return from their property, may be tempted to harvest their forests excessively. Forestry extension services with trained personnel to support, advise and train new, private forest owners are often merely in the process of being considered.

During the transitional period, special measures need to be designed and implemented to mitigate the negative effects of the non-existent or only partially existing framework for sustainable forest management. In some cases, the proclamation of a "state of forest emergency" at the highest political level might even be justified. A less dramatic solution would be to declare the existence of an approved forest management plan as a precondition for any activities in forests, thereby temporarily "freezing" harvesting in forests for which an appropriate plan does not exist. Some countries in northern Europe require the deposit of a reforestation or regeneration "bail" as a condition for the granting of permission to harvest forests.

The success of this type of measure will, of course, depend on the effectiveness and intensity of monitoring and control. All concerned government agencies (forest administrations, nature conservation and law enforcement agencies/institutions etc.) and non-governmental organizations should collaborate closely to streamline forest conservation efforts, to overcome personnel shortages and to avoid an unnecessary loss of energy through institutional friction. Governments should offer an incentive package to the private forestry sector as an integral part of the regulative scheme, possibly including assistance in the preparation of forest management plans, the provision of management advice, short-term tax relief, the provision of free seedlings for reforestation, etc. At the same time, governments must ensure that no double standards are applied; the management of state forests has to act as a "shining example".

CONCLUSION

The profound political, social and economic changes in the transitional countries of Central and Eastern Europe must not be allowed to have a permanent negative impact on the multiple functions of forests. The forestry and forest industries sectors need to adapt to the new political, social and economic environment by ensuring that an appropriate framework for sustainable forest management and use (policies, legislation, management plans, investment, well-trained human resources, etc.) is in place, before on-the-ground decisions are taken. The development of the forest industry sector has to be harmonized with and paralleled by forestry sector development in general. Moreover, special measures may be needed to ensure the conservation and sustainable use of forest resources during the period of transition.

The utilization of existing government budget provisions for the forestry sector may need to be reviewed. For instance, large-scale afforestation of marginal agricultural land, being undertaken to adjust agricultural production to the demand of the European market, may need to be allocated a lower priority in favour of efforts to secure the conservation of existing forest resources. Some forest administrations own real estate other than forests; consideration could be given to selling some of this to raise investment capital.

Finally, given the increasing recognition of the multiple benefits of sustainably managed forests (clean air, clean water, recreation, maintenance of biodiversity, protection of the land base for agricultural production, etc.), it would be appropriate to place forestry higher on the overall sectoral priority list, with an increase in its share of government budget provision. If necessary, governments should also consider taking out loans to finance the sustainable development of forestry and forest industries; the interest-associated costs would almost certainly be lower in the long term than those resulting from the need to restore or reforest forest lands that have been excessively or improperly utilized. ◆

from No. 184, 1996

Excerpted from:

One-way, two-way, which way? Extension workers: from messengers to facilitators

T. Enters and J. Hagmann

An analysis of the relationship of research and extension in improving sustainable natural resource management practices, based on experiences in northern Thailand and Zimbabwe.

Extension was always a key means of weaving knowledge into development. But in the 1990s, concepts of effective extension were shifting – away from the one-way offering of solutions developed through research, towards stimulation of discussion geared at linking research and practice.

The farmers had struggled for many years. Owing to increasing population pressure, land had become scarce. Consequently, they had to shorten fallow periods, as no suitable forest land was left for conversion to agricultural production. The farmers knew very well that rice yields would decline as a result – and yields had declined dramatically over the most recent years. Not knowing what to do, the farmers organized a village meeting and agreed to approach the agricultural extension officer to ask his advice. The extension officer who frequently paid a visit to the village listened to the farmers and promised to approach the research branch of the agricultural extension unit to explain the farmers' concerns. On contacting the researchers, he learned that the investigation of the problem of decreasing crop productivity had already been initiated. Researchers were in the process of editing the final research report and were confident that they had developed the appropriate technology for introducing sustainable farming practices. Before the start of the next growing season, the extension worker was able to return to the village

The successful application of soil and water conservation techniques in Pha Charoen, Thailand

T. ENTERS

Thomas Enters was with the Center for International Forestry Research, Bogor, Indonesia when this article was written, and **Jürgen Hagmann** had recently completed an assignment with the AGRITEX/GTZ Conservation Tillage Project, Masvingo, Zimbabwe. Both now work as consultants.

with an innovative package, soil and water conservation technologies consisting of agroforestry components. The farmers were very grateful and immediately implemented the researchers' recommendations. They eagerly adopted the innovative technology offered. As a result of the timely research efforts and the efficient and effective communication, rice yields stabilized and even increased in only three years.

What used to be the farmers' biggest problem had been solved by research and extension. In fact the agroforestry technology developed killed two birds with one stone. Not only did it contribute to stabilizing soil productivity, it also provided additional benefits such as fodder for livestock and fuelwood. Therefore, it was also appreciated by the Forest Department which had been concerned for many years about the high rate of deforestation and forest degradation through overgrazing and overcutting for fuelwood.

FROM FAIRY TALE TO REALITY

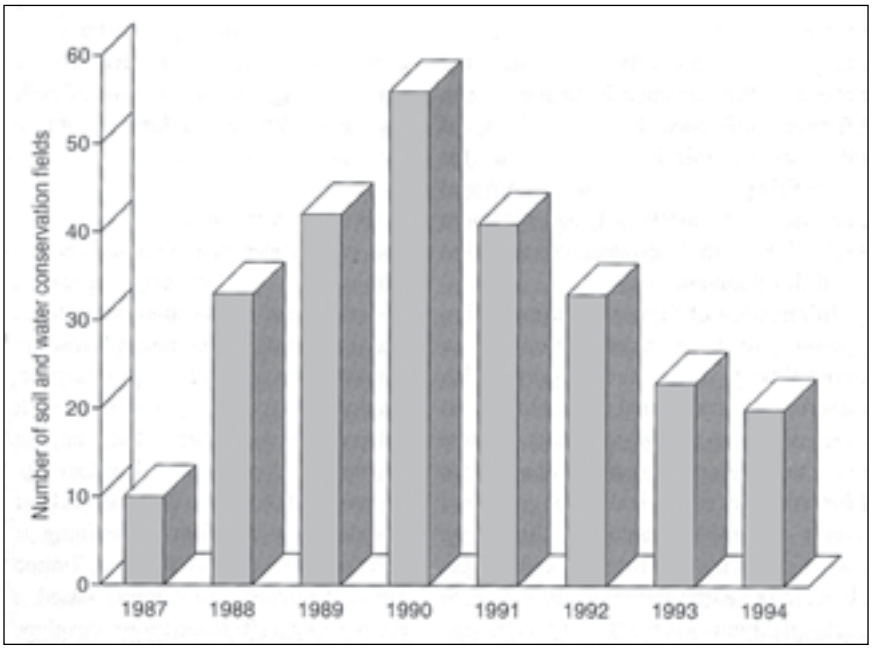
What may sound like a fairy tale *is* in fact a fairy tale. It is based on the paradigm of the conventional research process and our implicit thinking about the adoption of research results by clients or managers, in this case the small-scale farmer or shifting cultivator. According to conventional wisdom, clients have a problem which can only be solved by analytical researchers. It is the researchers' task to identify and analyse problems and to develop solutions which can be readily transferred from the experiment station to the field. Thus, researchers tell farmers what is best for the farming community and the environment. The link between the researcher and client is the extension worker whose role it is to assist clients in applying technology and to support the adoption process.

In recent years, soil conservation technologies for agricultural lands have received substantial attention as a way of increasing production and thus reducing the pressure to convert additional forest lands. Research and extension have offered farmers agricultural innovations that have been advocated as "sustainable" farming technologies with on-site and off-site benefits. However, adoption rates have been disappointing. The following discussion considers why extension has been less successful in resource conservation activities than one would hope. The focus of the discussion is on the role of extension and the link between research and extension. The first part of the article is based on research conducted in northern Thailand and the second part on experiences in Zimbabwe.

RESEARCH AND THE MESSENGER WITH NO MESSAGES

The literature on land degradation and resource conservation in Thailand is filled with warnings about the consequences of deforestation; floods, droughts, loss of soil fertility, climatic changes, water quality reduction and sedimentation of reservoirs are referred to in practically every publication (Komkris, 1978; Henderson and Rouysungnern, 1984; Putjaroon and Pongboon, 1987; Sombatpanit *et al.*, 1993; Hundloe, 1994). To limit deforestation, research activities are directed at developing means that enable farmers to abandon "destructive" and "wasteful" shifting cultivation. On-site benefits (e.g. increased land productivity) and off-site benefits (e.g. diminished siltation and flooding) are expected to result from stabilized land-use systems. However, in spite of research, extension, incentives offered and some limited success, the sustainability of projects initiated in northern Thailand is being questioned (TDRI, 1994). The soil and water conservation activities of the Thai-German Highland Development Programme (TG-HDP) may serve as an example. [*Note:* The discussion of the TG-HDP involvement in soil and water conservation refers predominantly to the early years of the project activities (1987-1990). Since then, the soil and water conservation component has

The number of soil and water conservation fields maintained by 85 households in five villages in Mae Hong Son Province, Thailand, between 1987 and 1994



T. ENTERS

Leucaena and pigeon pea hedgerows were promoted where grass strips proved inappropriate

been replaced by a broader sustainable farming systems approach.]

Within the framework of the TG-HDP, soil and water conservation practices were developed and extended to farmers starting in 1987 with the objective of reducing erosion to acceptable levels, thus enabling more permanent crop cultivation (Salzer, 1987). The practices consisted of contour buffers, alternating grass (*Brachiaria ruziensis*) and later perennial strips (hedgerows of leucaena and pigeon pea) with crops planted parallel to contour lines. During the first four years of project implementation (during which incentives were provided for farmers and extension workers) the number of farmers adopting the promoted technologies increased at a steady rate, but when the general incentive scheme terminated in 1991, there was an immediate and sustained drop in interest in soil and water conservation technologies (see Figure). Many of the farmers interviewed by one of the authors in 1990/91 and again in 1994/95 expressed disillusionment with the recommended soil and water conservation practices (Enters, 1995).

When asked why they discontinued using the technologies they had initially adopted, farmers reported that the grass they had been encouraged to plant as an erosion control spread quickly into their fields and required increased labour inputs during the time of the year when labour was already in short supply. Weeding has long been recognized as an important determinant of crop yields in the tropics. The soil and water conservation technologies did not address this issue at all; in fact they exacerbated the weed problem. Therefore, it is not surprising that some villagers were angry about or afraid of the grass. Perhaps the most pertinent summary of the agricultural situation was made by one farmer (Enters, 1992):

> "Now there are too many people and the government does not allow us to cut any more trees to make new fields. Life was much easier for the older generation. But grass is certainly not the solution to the problems we are facing."

Population growth, opium suppression, the restrictions on shifting cultivation and the opening of the highlands to the lowland economy have produced a new set of needs, particularly the need for cash. Villagers were therefore more interested in alternative income-generating activities rather than attempts to improve subsistence production.

The authors argue that the main reasons for the disappointing results are to be found in the fact that the research did not address the right questions, i.e. those of the farmers. Moreover, we would argue that the extension process (a largely one-way, top-down exercise) aggravated the situation. A number of observations can be made to support this position (with respect to the Thai situation and more generally as well):

- Information on environmental impacts is often confused, and presumed cause-effect relationships are uncritically accepted even in the absence of scientific data. For example, it is common to hear affirmations such as "the diminishing fallow period, declining crop yields, increasing rice deficiency, poverty, soil erosion and deforestation will accelerate and lead to ecological and social disaster in the north, unless changes are made" (Hoey *et al*., 1987, cited in Hundloe, 1994). Such descriptions, although limited in scientific value, cry out for intervention; they are appealing to researchers, donor agencies and the international community (Enters, 1994), but perhaps not to the beneficiaries who do not perceive themselves to be sitting on top of a virtual time bomb.

- The perceived beneficiaries of research (in this case farmers) are often seen as part of the problem. They are viewed as conservative, reluctant to change and ignorant of the massive degradation that surrounds them. Viewed as helpless agents, their input in problem identification, analysis and solution is not sought. This is particularly the case where rigorous quantitative research is proposed. As a result, research is supply- instead of demand-driven (Nair, Enters and Payne, 1995).
- Researchers are frequently unaware of the local conditions, diverse circumstances, opportunities and constraints to which farmers respond.
- Control plots labelled as "farmers' practices" or "traditional practices" often assume incorrectly that local resource users have fixed, inflexible practices, an assumption that is even more erroneous in the face of productivity declines.

The only role extension workers played in the case described is that of uni-directional messengers carrying messages of technologies from the researchers to the target villages. Thus, messages, which from the perspective of many farmers had a questionable technical value, flowed one way only. In terms of results, fallow periods continue to be shortened and soil and water conservation as such remains a low priority for farmers.

FROM MESSENGER TO FACILITATOR

The situation described in the Thai example is not unique. The same principles and dilemmas underlie the general approach to research and extension in many other countries. Many recent case-studies highlight the urgent need for a change in the role and attitudes of researchers and extensionists (Clarke, 1994; Matose and Mukamari, 1993; Hagmann, 1993; Murwira, 1994; Göricke, 1993). In recent years, however, various alternative approaches have been initiated by governmental and non-governmental institutions. In Zimbabwe, for example, pilot activities with new approaches based on active farmer participation in research and extension have shown potential for lowering the barriers to the application of agricultural and forestry research results, increasing adoption rates and, thus, improving natural resource management and food security.

For example, the Conservation Tillage Project is being implemented by the Zimbabwe Department of Agricultural, Technical and Extension Service (AGRITEX), with support from the German Agency for Technical Cooperation (GTZ). The project started in 1988 with the aim of developing and testing conservation tillage systems. Over the course of the project, the elaboration of the research agenda was increasingly dominated by farmers and, as a result, the activities spread to other topics, including agronomic, biological and mechanical soil and water conservation techniques, agroforestry and other topics perceived as relevant by the farmers. The focus of the project turned strongly from research towards extension.

A participatory approach was developed and tested with individual farmers and communities. Incorporated in the approach are shifts in levels of decision-making and the recognition that the roles of the individual actors in conservation strategy development need to be redefined. Development is perceived more broadly and includes skill and socio-organizational development. In addition, incentive strategies are implemented only when needed and are not viewed as an automatic ingredient of every activity and project.

The concept of participatory innovation development and extension

The concept of participatory innovation development and extension is based on dialogue, farmer experimentation and strengthening of the organizational capacities of rural communities. Active farmer participation is the mainstay of the approach. This should not be mistaken for farmer participation in externally initiated activities (e.g. in supply-driven research projects); rather it means farmers identify problems themselves and subsequently initiate activities. They may call in support from other relevant actors, for example researchers, if necessary. A major and frequently underestimated result of the approach is an increase in farmer confidence. For the majority of the farmers, this is a precondition for becoming more innovative and organizing themselves better for more effective natural resource conservation and development.

Stimulation of farmer experimentation proves to be a useful element in combining new techniques with appropriate traditional technologies. It increases the ability to assess options and to develop alternatives appropriate for specific ecological, economic and socio-cultural environments. Ultimately, the aim is to transform a technology-oriented research and extension approach into an output-oriented system leading to sustainable resource use.

Leadership training and facilitating dialogue and communication in village workshops are elements which have shown great potential for improving cooperation between all involved in natural resource management, the sharing of knowledge and the participation of all gender and age groups in extension and rural development. Not to be under-estimated is also the positive effect of strengthening local institutions and building up confidence in farmer-to-farmer extension.

New role and approach of extension workers

The traditional role of extension workers was clear-cut and straightforward. As messengers they provided the link between research and the client. Many perceived themselves to be in a teacher/student or, worse, in a teacher/child rela-

tionship. A participatory approach needs more than a messenger or a teacher. That the conventional one-way flow of information in many ways explains the poor performance of agricultural and forestry projects is an accepted fact. But is it sufficient to replace it with a two-way flow in which the teachers have an additional group of students, i.e. the researchers, whom they inform why the meticulously designed technologies are of no interest to the beneficiaries? We would argue that the key to finding real solutions (not answers to problems perceived only by outsiders) and developing successful innovations (not a standard technical package) is a participatory process that focuses on local institutional strengthening, the identification of the needs and prioritization. Messengers or teachers, therefore, are not sufficient; initiating, supporting and maintaining a process of change requires facilitators.

The new extension workers' or facilitators' role is to provide farmers with background knowledge and technological options to stimulate discussions and encourage farmers to experiment with options and ideas. Extension must promote the sharing of experiences among farmers and also between farmers and other actors concerned with natural resource and rural development (e.g. researchers, policy-makers). In this way extension agents are not messengers themselves but they facilitate the flow of messages. They improve communication among the social actors of the development interface by strengthening local institutions. Over time the facilitators' role will be redefined and/or gradually taken over by community leaders.

CONCLUSION

In their new role, extension workers analyse problems with farmers and identify areas which require further research and input from technical specialists. A research agenda is drawn up on the basis of the farmers' problems and oriented towards appropriate solutions. Perhaps most crucial is recognition that farmers, extension workers and researchers each have unique areas of expertise which together, and only together, can provide the optimum response. One of the implications of this approach is that a much larger proportion of future research activities will need to be carried out at the on-farm level, facilitated by extension. This does not mean that there will be no place for formal research under strictly controlled conditions, but rather that this research must be linked to practical realities and needs.

Going new ways can be rewarding. Where farmers actively participate in research, adoption rates are increasing. Even more significantly, farmers have started to organize themselves and to set research agendas and targets. As a result, in some areas [of Zimbabwe] 80 percent of the farming households carry out soil and water conservation activities without receiving any incentives, and the knowledge about innovative techniques is spreading from farmer to farmer without the need for an external messenger.

These achievements illustrate that what is needed is a process in which research and extension are closely linked and in which beneficiaries become equal partners in research, dissemination and adoption. This requires a reorientation of research itself as well as a new role for extension workers. This will be a slow and long-term process which must be supported by intensive training and follow-up activities.

Resource conservation problems in most cases require more than just "superior" technologies or "improved" practices. Therefore, a facilitator is needed who can provide assistance on technical issues as well as direct social processes. This includes assistance in breaking down discouraging hierarchical structures; building up the confidence of participating farmers; and recognizing and supporting farmer-to-farmer extension.

In this way, extension is more than communicating information. It is constant interaction with the basic ingredients of identifying and analysing problems, sharing knowledge, developing solutions, disseminating results and initiating actions. ◆

Bibliography

Clarke, J., ed. 1994. *Building on indigenous natural resource management: forestry practices in Zimbabwe's communal lands.* Harare, Zimbabwe, National Forestry Commission.

Enters, T. 1992. Land degradation and resource conservation in the highlands of northern Thailand. The limits to economic evaluations. Department of Forestry, Australian National University, Canberra. (Ph.D. dissertation)

Enters, T. 1994. Now you see it, now you don't: the effects of the ecocrisis theory on research. Paper presented at the IUFRO, FORSPA, CIFOR, FAO/RAPA Workshop on The Barriers to the Application of Forestry Research Results, 24-28 October 1994, Bangkok.

Enters, T. 1995. The token line. Adoption and non-adoption of soil conservation practices in the highlands of northern Thailand. Paper presented at the International Workshop on Soil Conservation Extension: Concepts, Strategies, Implementation and Adoption, 4-11 June, Chiang Mai, Thailand.

Göricke, F. 1993. An outline of experiences with community-level planning and development in the framework of CARD Masvingo/Zimbabwe. Background paper prepared for the Arusha Conference on Assessment of New Approaches Towards Rural Development. CARD Programme, Masvingo, Zimbabwe.

Hagmann, J. 1993. Farmer participatory research in conservation tillage: approach, methods and experiences from an adap-tive trial programme in Zimbabwe. In *Proceedings of the Fourth Annual Scientific Conference of the SADC Land and Water Management Programme.* Gaborone, Botswana.

Henderson, G.S. & Rouysungnern, S. 1984. *Erosion and sedimentation in Thailand.* Bangkok, Research Section, Watershed Management Division, Royal Forest Department.

Hundloe, T. 1994. Conservation farming in northern Thailand. *In* D. James, ed. *The application of economic techniques in environmental impact assessment,* p. 143-181. Dordrecht, the Netherlands, Kluwer Academic.

Komkris, T. 1978. Forestry aspects of land use in areas of swidden cultivation. *In* P. Kunstadter, E.C. Chapman & S. Sabhasri, eds. *Farmers in the forest,* p. 61-70. Honolulu, The University Press of Hawaii.

Matose, F. & Mukamuri, B. 1993. Rural people's knowledge and extension practice: trees, people and communities in Zimbabwe's communal lands. In *IIED Sustainable Agricultural Programme Research Series,* 1(2), African Papers. London, IIED.

Murwira, K. 1994. Community-led initiatives. *Appropriate Technol.*, 21(3).

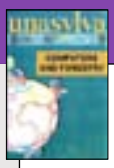
Nair, C.T.S., Enters, T. & Payne, B. 1995. *Report on the Workshop on The Barriers to the Application of Forestry Research Results.* CIFOR Occasional Paper No. 5. Bogor, Indonesia, Center for International Forestry Research.

Putjaroon, W. & Pongboon, K. 1987. Amount of runoff and soil losses from various land-use sampling plots in Sakolnakorn Province, Thailand. *In* R.H. Swanson, P.Y. Bernier & P.D. Woodard, eds. *Forest hydrology and watershed management*, p. 231-238. IAHS Publication, No. 167.

Salzer, W. 1987. The TG-HDP approach towards sustainable agriculture and soil and water conservation in the hills of northern Thailand. Internal Paper No. 80. Thai-German Highland Development Programme. Chiang Mai, Thailand.

Sombatpanit, S., Wunpiyarat, W., Srikhajon, M., Dhanyadee, P. & Tansiri, B. 1993. The role of soil conservation in agricultural sustainability on the sloping lands of Thailand. Paper presented at the International Workshop on Sustainable Agricultural Development: Concepts and Measures, at the Asian Institute of Technology, Bangkok, 14-17 December.

TDRI. 1994. Assessment of sustainable highland agricultural systems. Natural Resources and Environment Program, Thailand Development Research Institute, Bangkok. ◆



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The Internet and rural development: opportunities for forestry

D. Richardson

FAO

Rural and indigenous people represent the "last mile of connectivity" in both developing and developed countries

Considering the potential of the Internet with regard to forestry and rural development.

Don Richardson wrote this article as a professor in the Department of Rural Extension Studies at the University of Guelph, Canada.

There has been a rapid increase in the use of the Internet in developing countries, although this expansion is still largely an urban phenomenon. Rural communities represent the "last mile of connectivity" in both developing and developed countries with regard to access to Internet services and the telecommunication connections that help transmit those services. People in rural areas are generally unable to take advantage of the services available to their urban peers.

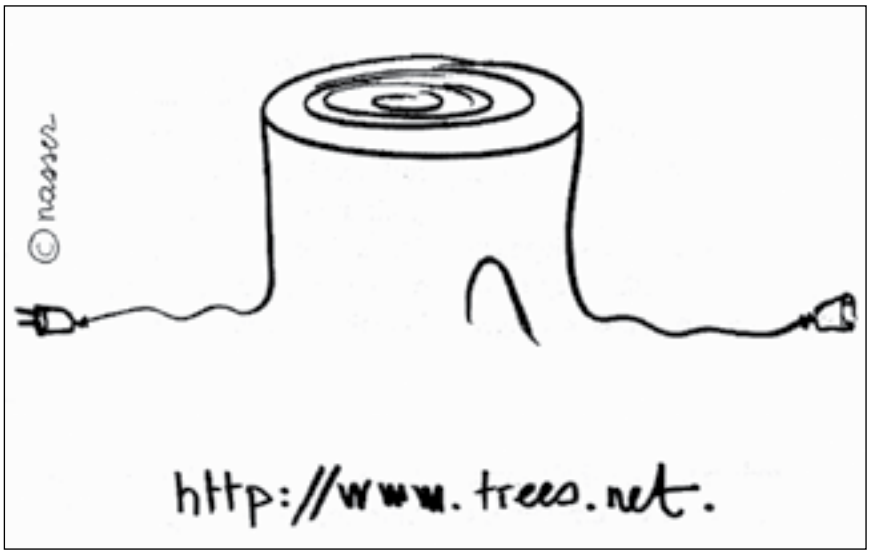
Internet initiatives for rural development need to be approached with a degree of caution. One cannot expect less privileged farmers and food-insecure residents of rural communities to list computers and digital telecommunication services as high-priority items for improving their lives. However, there are various intermediaries that serve these populations

Internet users have grown from an estimated 40 to 100 million users at the time this article was written – a decade ago – to perhaps 700 million today. With the persistence of the digital divide, has the potential foreseen ten years ago been realized?

Possible range of project activities and outputs

In the case of forest-based rural development activities, depending on local circumstances, the following range of outputs can be achieved through the use of Internet applications:

- **indigenously developed learning tools, learning games, learning networks**
- **interactive extension information networks**
- **local, regional and national market information networks**
- **distance learning programmes and networks**
- **participatory research and action networks**
- **interactive expert systems networks**
- **early warning system information dissemination and data gathering networks**
- **shared curriculum databases and curriculum development networks**
- **research sharing and information dissemination systems**
- **training tools**
- **small and medium enterprise development networks and marketing mechanisms**
- **rural media networks (e.g. rural radio, newsletters)**
- **indigenous knowledge networks**
- **disease and pest monitoring action networks (plant and animal)**



which, together with small and medium enterprises (SMEs) in rural areas, could take advantage of these technologies to improve their work, improve communication capacity, gain efficiencies and reduce telecommunication costs. With SMEs, intermediary organizations such as extension field offices, rural NGOs, health clinics, government satellite offices and church organizations can offer benefits in numerous ways. Strategies for improving access to the Internet and use for rural development will necessarily involve the full participation of intermediary organizations and other rural stakeholders. This article draws attention to the potential of the Internet for rural development initiatives and particularly those related to forestry.

Today we truly live in a global village, but it is a village with privileged "information haves" and many "information have-nots". To face the unprecedented challenges brought on by the changing global economy, dynamic political contexts, environmental degradation and demographic pressures, and to make critical decisions, people at all levels of society – especially the food-insecure and the organizations that serve and represent them – *must be able to access critical information and to communicate.* Improved communication and information access are directly related to social and economic development (Tallero and Gaudette, 1995).

The Internet is a multipurpose tool, a medium of communication and perhaps the most flexible medium currently available. It has the potential to be integrated within a wide variety of efforts that have objectives such as local participation, training, education, research (especially participatory research), technical support and institutional strengthening. Thus, endeavours that might find a role for Internet applications could range from training in forest harvesting to community forestry or the development of criteria and indicators for sustainable forest management.

A DECENTRALIZED "PEOPLE'S NETWORK"

The Internet today is a people's network. Anyone with basic computer equipment and a telephone line can connect to it, communicate through it, host information on it and look through it. Unlike many other media such as television and radio, every user of the medium can be an information producer and knowledge sharer. No one knows for sure how many people are using the Internet today, but estimates range from 40 million to 100 million people.

The Internet is cheap, powerful, decentralized and in the hands of civil society. The Internet has the power to cut across social and geographic distance and help

people find new ways of facilitating the flow of information and knowledge. Within bureaucratic organizations it has a way of levelling hierarchies, facilitating new communication patterns and helping enable activities that might not otherwise occur (Negroponte, 1995).

THE INTERNET IN SUPPORT OF SUSTAINABLE RURAL AND AGRICULTURAL DEVELOPMENT

With regard to Internet use in support of rural and agricultural development, applications fall into five main areas: economic development for agricultural producers, community development, research/education, SME development and media networks. The following sections explore these areas and, where possible, highlight their actual or potential application to forestry.

Applications in planning and market information for agricultural producers

When knowledge is harnessed by strong organizations of small producers, strategic planning can be used to provide members with lower-cost inputs, better storage facilities, improved transportation links and collective negotiations with buyers. The Internet is one tool that can enhance this flow of information. It is an inexpensive way to communicate and access global information. Local Internet services can be easily managed by well-organized local user groups and farmers' organizations. Information and analyses can be tailored to local, regional and national knowledge and communication needs and realities. When combined with national and global market information systems, and with the ability to communicate quickly with potential buyers and brokers, local Internet systems become valuable strategic planning and decision-making tools.

Community information centres and farmers' organizations can also gather information from the Internet and disseminate it via local radio stations, newspapers and other local information-sharing networks and tools. For example, daily market prices and agricultural news can be posted at cooperatives, local stores, transportation hubs, agricultural supply outlets and social gathering points. Simple newsletters can be developed using Internet information and distributed to members of farmers' organizations. When integrated with other media tools, the Internet can be a powerful information resource and research tool.

Community development applications

Internet services are also valuable when placed at the service of rural development-oriented organizations which act as local communication conduits or intermediaries. Along with providing improved market knowledge, they can also:

- develop locally appropriate applications and creative services;
- provide knowledge about successful development strategies;
- enable efficient regional, national and global organizational efforts (the use of the Internet as a global communication and organizing tool in Chiapas, Mexico, is an excellent example of the latter);
- improve access to a huge variety of information, training, research and educational resources (including distance education services) which are typically unavailable in rural and remote areas because of the costs associated with printed materials and books;
- enable rural young people to learn about computers and to have access to the technologies and information available to their urban peers;
- provide access to critical technical information for rural professionals such as physicians, health care workers, technicians and engineers, thereby providing further encouragement for these professionals to continue practising in rural and remote communities;
- be used as marketing tools to promote rural tourism and market the products of small secondary industries and home-based businesses;
- enable local NGOs to gain a global presence and make better contact with potential donors and supporters through the on-line publication of resources and information and through the use of electronic mail; and
- sensitize urban policy-makers to the realities and needs of rural populations.

Research/education applications

Within national, regional and international research communities, increased attention has been directed towards "participatory research" strategies (Chambers and Guijt, 1996; FAO, 1995a and 1995b). These strategies place farmers and rural residents at the centre of the research process and enable them to enrich their knowledge base and share it with one another as well as with field workers, researchers and decision-makers. Internet use among intermediary organizations and leaders involved in participatory research can provide a cost-effective method for documenting and sharing lessons learned and research results.

Internet use also has the potential to strengthen linkages between and among farmers' organizations, extension workers, researchers and policy-makers.

The cost of accessing printed academic materials within developing countries is usually so high that students and faculty members have great difficulty acquiring books and journals. Furthermore, the time required to obtain printed materials from overseas can be long enough to render some information outdated by the time it arrives. Via the Internet, any information published on-line can be accessed almost instantly and at a fraction of the cost of obtaining printed materials. Information on the Internet is easy to access and archival lists of

resources can be easily reviewed and assessed in remote locations.

Electronic distance education services are already in use in North America, Australia and Europe (particularly among people in rural areas), and with the continued growth of Internet access in developing countries there is a very good chance that similar services will develop a significant demand. Distance education (as well as traditional education) partnerships between universities in the North and the South (such as the University of Guelph's partnerships with universities in Cameroon and India to develop distance education extension worker training programmes) have proved to be beneficial to the institutions involved. With the assistance of Internet tools, these partnerships can be further strengthened and Internet learning resources can be cooperatively developed across oceans to be utilized by participants in developing nations. Of course, this process can work in the other direction too, to enable students in the North to learn more about the conditions, challenges, potentials and knowledge development of the South.

Overall, the Internet holds significant potential to enhance learning and research relationships among researchers, academics and students wherever they may be located. The list of potential applications is infinite and thousands of informal linkages of this sort take place every day in Internet discussion groups. Development agencies such as FAO can play a role in helping to formalize and provide credentials and diplomas for people who participate in specific electronic learning initiatives delivered via the Internet.

Small and medium enterprise development

Private sector businesses, large and small, are using the Internet to reach new markets, promote products and services globally and access critical business and financial information.

In many developing countries, the Internet is being used to promote national timber production activities, for example those of the Malaysian Timber Council and the Timber Export Development Board in Ghana.

The tourism sector has been quick to recognize the benefits of the Internet for advertising destinations, tours and holiday services. Of particular interest are the World Wide Web sites for "eco-tourism", game parks and adventure tours in areas of southern Africa where rural tourism is a growing industry. Tourism operators in rural and remote areas have a difficult time marketing their destinations through traditional media owing to production and distribution costs. The Internet now represents a very inexpensive way for them to showcase their sites to the world and interact directly with potential tourists.

News media networks

The news media in developing countries have also been at the forefront of developing Internet applications. For example, in Zambia, both national daily newspapers mirror their daily copy on the World Wide Web (http://www.zamnet.zm), making the local news accessible to expatriate Zambians around the world. E-mail discussion groups provide these expatriates with an opportunity to discuss the daily news with one another and with their Internet-connected peers in Zambia. A discussion group joined by the author generated a minimum of 30 e-mail messages per day! Such e-mail discussion groups for expatriates and nationals exist for virtually every developing country in the world and represent a relatively untapped resource for accessing the views, ideas and creativity of members of civil society with regard to development policy and initiatives.

In addition to the latter news and information applications, organizations such as Inter Press Service (IPS) Third World News Agency (http://www.ips.org) use the Internet to source news stories from local writers in developing countries and share those stories with international wire services such as Associated Press. IPS is also able to provide Internet feeds that enable African news media to have access to African news from around the continent. This is particularly relevant to rural radio stations and other rural newspaper and newsletter producers that would otherwise be unable to obtain the same news from other sources. IPS can also provide an outlet for rural news writers to share their stories regionally, nationally and globally. Similar Internet strategies for rural radio networks, which might also incorporate digital audio transmissions, may well emerge in the near future.

CONCLUSION

> "The information revolution offers Africa a dramatic opportunity to leapfrog into the future, breaking out of decades of stagnation or decline. Africa must seize this opportunity, quickly. If African countries cannot take advantage of the information revolution and surf this great wave of technological change, they may be crushed by it. In that case, they are likely to be even more marginalized and economically stagnant in the future than they are today."
>
> **World Bank (1996)**

The Internet is not a panacea for rural development, but it does bring new information resources and can open new communication channels for rural communities. It offers a means for bridging the gaps between development professionals and rural people by initiating interaction and dialogue alliances, interpersonal networks and cross-sectoral links between organizations. It can create mechanisms that enable the bottom-up articulation and sharing of local knowledge. Benefits include increased efficiency in the use of development resources, less duplication of activities, reduced communication costs and global access to information and human resources.

The Internet may help in meeting peoples' information and communication objectives in order to attain their development goals and objectives, but it must be integrated within human contexts and seen as a *communication process tool*, not simply a static "information technology" or unidirectional broadcast medium. Otherwise. Internet tools will be relegated to the junk heaps of inappropriate development technologies or dismissed because of previous failures to make the medium locally relevant and useful. If, for example, the information outputs (in accessible form) derived from highly technical forest resource assessment systems are not made available to the people who live in and around forest areas (in addition to policy-makers at national and international levels), then we are failing to ensure full leverage of the large infrastructural investments involved and assist people in making appropriate decisions based on such valuable information. Of course, the Internet is not the only communications tool that may be used, and radio and television may have equal or even greater potential, at least for the moment. We must avoid contributing to the gap between the information haves (experts, academics, researchers, policy-makers, etc.) and the information have-nots (usually the ultimate beneficiaries of development work) that can emerge when we create Internet applications to serve only privileged researchers and bureaucrats. In particular, we must strive to find ways to bring knowledge producers, such as researchers and policy-makers, closer (in the social as well as the geographical sense) to the other less recognized knowledge producers: the people who are the ultimate beneficiaries of their development programmes.

Early Internet users in developing countries have proved that they can develop excellent local services and locally appropriate knowledge resources. However, without support from development agencies, there is a risk that such efforts will never meet the needs of people in rural communities.

Given FAO's mandate to help improve the lives of rural populations and foster sustainable agricultural development, FAO has an important and historic role to play in insuring that the benefits of Internet and information and communication technologies reach rural and agricultural stakeholders. Several development agencies are currently assisting in the expansion of indigenously managed Internet services in developing countries. FAO pilot projects, linked to indigenous rural and agriculture organizations, can help ensure that rural communities remain part of regional and national Internet initiatives.

Adopting a proactive strategy and acting to bring the Internet to rural and agricultural communities in developing countries will help enable rural people to face the unprecedented challenges brought on by the changing global economy, political changes, environmental degradation and demographic pressures. To deal with these challenges and to make critical decisions people at all levels of society, and especially the food-insecure and the organizations that serve and represent them, must be able to access critical information and communicate. Improved communication and access to information are directly related to social and economic development (Tallero and Gaudette, 1995).

The time to act in support of Internet knowledge and communication systems in developing countries is now. Today we truly live in a global village, but it is a village with privileged "information haves" and many "information have-nots". With the new technologies available to us, we have an opportunity to change this. ◆

Bibliography

Chambers, R. & Guijt, I. 1996. *"PRA –five years later: Where are we now?"* World Wide Web publication of the Forest Trees and People Network of the International Development Research Centre (http://www.idrc.ca), the Swedish University of Agricultural Sciences, Uppsala, Sweden (http://www.slu.se/) and FAO (http://www.fao.org/forestry).

FAO. 1995a. *Farmer-first approaches to communication: a case study from the Philippines.* Rome.

FAO. 1995b. *Understanding farmers' communication networks: an experience in the Philippines.* Rome.

Negroponte, N. 1995. *Being digital*. London, Hodder & Stoughton.

Tallero, E. & Gaudette, P. 1995. *Harnessing information for development: a proposal for a World Bank group vision and strategy.* Washington, DC, World Bank.

World Bank. 1996. *Increasing Internet connectivity in sub-Saharan Africa.* Washington, DC. ◆

from No. 194, 1998

Accommodating conflicting interests in forestry – concepts emerging from pluralism

J. Anderson, J. Clément and L.V. Crowder

Using pluralism for a better understanding of the dynamics of sustainable forestry and rural development.

One of the most-cited articles from *Unasylva* deals with the then-new term "pluralism", which recognizes that in forest management there may be many groups with an interest in the forest but with conflicting – yet valid – views.

From being dominated by a single technical authority (although sometimes admitting the existence of "partners"), forestry and rural development are evolving in a direction where values and objectives appear to be "plural, conditional, incompatible and incommensurate" (Daniels and Walker, 1997) (see examples in Box).

WHAT IS PLURALISM?

Pluralism has longstanding philosophical and political roots even though the term is fairly recent (Clément, 1997). At its

Changing values and objectives in forestry development

- **Despite comprehensive public consultation procedures and approaches, the majority of management plans developed by the United States Forest Service for the national forest system are being contested in the courts by a range of non-governmental organizations (NGOs) and citizen groups (Daniels and Walker, 1997).**
- **In Africa, a growing number of studies show that forest service personnel and local groups have radically different perceptions, values and objectives in forest management (Sulieman, 1996; Sow and Anderson, 1996; Weirsum, 1997) and that exclusive management by a single entity (i.e. the national forest service or the local community) has not assured sustainable management (Dubois, 1997; Vira, 1997; Babin, Bertrand and Antona, 1997).**
- **In Central and Eastern Europe, the image of the "forester" in the region has changed from that of an "all-powerful government official giving orders" to a professional civil servant being pressed with conflicting demands from all sides by private owners, political parties, policy-makers, local government, NGOs and others (Begus and Veselic, 1997).**
- **In India, the forest industry's plans to establish plantations to meet the growing demand for industrial wood has met resistance from NGOs and local communities. A special independent committee has been set up under a former director of the Forest Service to address conflicting concerns of villagers, NGOs and the forest industry. A critical question is how to create and manage a "platform" or a forum for negotiation for multiple stakeholders (Mukerji, 1997).**
- **National and international NGOs are taking over responsibility for the management of some natural resources such as parks and protected areas. International NGOs have taken proactive steps not just to influence global forest policy, but to formulate it; for example, in the WWF/IUCN Forests For Life programme, where protected areas and independent certification are targeted (WWF International and IUCN, 1998).**

When this article was published, **Jon Anderson** was Forestry Extension Officer and **Jean Clément** was Director of the Forest Resources Division, FAO Forestry Department, Rome. **Loy Van Crowder** was Senior Officer, Communication for Development, Research Extension and Training Division, Sustainable Development Department, FAO, Rome. Anderson is now with the United States Agency for International Development (USAID). Clément passed away in 2003 (see *Unasylva* No. 213, p. 63). Crowder is still with FAO, in the Research and Extension Unit of the Natural Resources Management and Environment Department.


FAO

Participants at the FAO Workshop on Pluralism and Sustainable Forestry for Rural Development, December 1997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core, the concept of pluralism recognizes the inevitable existence of differing, often conflicting, positions on any question of substance, from politics to ecosystem management (Rescher, 1993; Clément, 1997). Pluralism describes situations where distinct groups are actively autonomous and independent, but often interdependent, with legitimate claims and different positions on critical substantive issues. These differences are based on separate values, perceptions, objectives and knowledge. It describes the dynamic interplay between different ideologies, interests and organizations. When applied conceptually to forestry and rural development, pluralism may improve the understanding of certain organizational situations and improve the assessment and use of techniques and methods for sustainable forest management.

Forestry and rural development are increasingly characterized by different types of organizations and groups which, although concerned with the same resources, often act independently and have different and sometimes conflicting perceptions, values, objectives and even knowledge systems. Moreover, these groups are all demanding a legitimate role in decision-making processes concerning natural resource management. These differences often seem to defy traditional attempts at consensus building and agreement.

Pluralism is sometimes understood to be synonymous with diversity or is used to describe the existence of numerous groups. The existence of many organizations in rural or forestry extension activities does not necessarily reflect a pluralistic situation, since these groups may in fact not be independent and autonomous.

Pluralism can usefully be considered in contrast to two other seemingly opposing views. One view assumes that there is one and only one reasonable, rational system of sustainable forestry and rural development. This is the assumption

behind in the "expert authority", such as a government forest service, imposing its conception of natural resource management. The other view asserts that all values are situational, that they are contextually defined and socially constructed. In any given situation, therefore, a particular value or value system may take precedence over others. Both views can be criticized as not fully operational or analytical frameworks; the former because it is too dogmatic and cannot easily accommodate a wide variety of beliefs and preferences, the latter because it provides no evaluative criteria and therefore risks anarchy (Daniels and Walker, 1997). In contrast, pluralism recognizes that, although there is no single, absolute technical solution to any natural resource management problem and there are multiple values and objectives, accountability is still required. It also rejects the idea that differing positions are always and solely the result of ignorance and of specific interests.

PLURALISM WITHIN THE CONTEXT OF FORESTRY AND RURAL DEVELOPMENT

There are a number of reasons why pluralism should be considered within the context of sustainable forestry and rural development. Most important, new groups and fora have now either emerged or are better recognized. International recognition of the role of different major groups in sustainable development is growing, with UNCED (1992) being perhaps the most obvious recent example. However, UNCED did more to describe categories of actors than it did to acknowledge the dynamics of autonomous and independent groups and changing decision-making processes. Some groups are pre-emptively taking on roles traditionally assigned to governments. NGOs are influencing and perhaps even "making" international and national policies and are managing natural resource systems (e.g. parks) in some countries. National Forest Programmes and the Intergovernmental Forum on Forests are examples of existing and emerging platforms of multiple natural resource management stakeholders.

A number of political, social and economic trends are reinforcing the emergence of autonomous actors and groups and thus the interest in a pluralistic approach to understanding of natural resource management:

Shifting patterns in ownership of the forest/natural resource base. Forest ownership patterns are shifting in some regions – notably Central and Eastern Europe, the Commonwealth of Independent States and parts of Asia – from a large single owner (the state, with fairly uniform objectives) to literally hundreds of thousands of smaller owners with different objectives. In Central and Eastern Europe alone, more than 1 million new forest owners have emerged since 1990 (FAO, 1997). In many cases, these new owners are forming independent groups and associations.

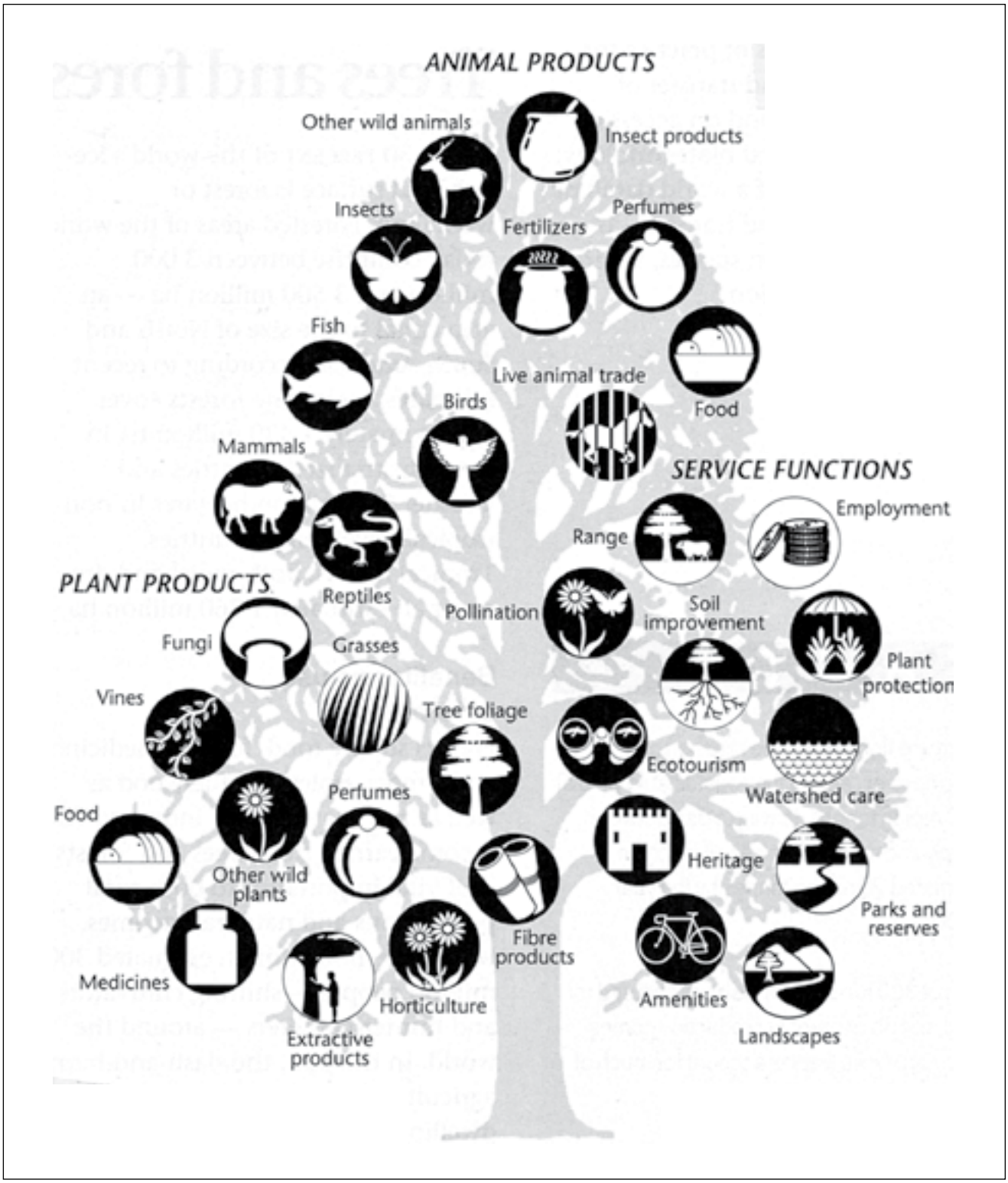
Decentralization. An increasing number of local political and administrative powers are emerging that are less dependent on central control. The results of this process have been mixed. For example, in Bolivia, through recent legislative reform municipalities now play a much greater role in decision-making about the use of locally generated financial resources, which has a direct effect on sustainable forest management (Kaimowitz, 1997). In India, on the other hand, decentralization seems to have led to competition between sectors of government (technical and administrative branches), leading to confusion (and sometimes conflict) about who has the authority to grant "community forests".

Democratization and multiparty politics. The decline of centrally planned, one-party states is allowing for the emergence of numerous political parties with different policies and objectives – sometimes with a strong interest in the environment.

J.M. MICAUD/FAO

Loading industrial timber as part of an FAO project, designed to improve the livelihoods of local people in Peru

FIGURE
The range of products and services supplied by the forest ecoystem leads to inherent conflicts among users and interest groups



Down-sizing responsibilities. Governments everywhere are under financial pressure to down-size and to retain control of only basic functions such as policy-making, planning, legislation, law enforcement and monitoring. This results in the delegation of other functions to NGOs, private sector entities or others.

Demographic transitions. The world's population continues to become more urbanized, and employment opportunities are shifting from the rural areas to the urban informal sector. Thus perceptions, interests and objectives in forest management are changing.

Separation of functions. The difficulty for a single natural resource management institution to reconcile and integrate the apparent contradictions between different functions (e.g. conservation and production or implementation and monitoring) and also the inconsistencies implied by an organization that is both "judge" and "jury" has led, in some cases, to the separation of functions by institutional reform and the breakup of organizations.

The motivation to explore the possible contribution of pluralism to natural resource management also comes from a dissatisfaction with the present state of affairs. Exclusive management by "single entities", whether government, private, NGO or local community, has frequently been inadequate:

- Government control over forest resources in many cases has not led to their sustainable management, as attested to by the classified forests in Africa that exist only on paper.
- Private forest holdings and concessions have sometimes been degraded and mismanaged and have sacrificed sustainability to short-term profits.
- NGOs directly involved in natural resource management systems, particularly in running parks and protected areas, have clashed with both competing local interests and governments.

Turning forest management over to rural people's organizations and local communities has often been constrained and not entirely successful. "Even when their role is enhanced, community organizations can still be constrained by legal structure, local and regional government authorities, a lack of technological tools and capital and local interests not associated with the community" (IRG, 1997). The heterogeneity of communities and the importance of intervillage links are often overlooked. Management by local groups alone, without any support from other organizations, does not in itself assure sustainable management.

Participation and pluralism

Governments (or any other dominant single entity) often try to involve additional groups in natural resource management and to introduce participatory processes, especially in the face of political and social pressure, austerity measures, decentralization and privatization and sometimes because of the recognition of past failures and examples of successful participatory management by other organizations. However, the success of *some* "participatory approaches" has been limited and the sporadic failure of certain public participation/consultation processes can be illustrated by an example from the United States:

"The public involvement mechanisms adopted by the Forest Service have not altered the basic relationship between the agency and public constituencies .... Continued conflict between the Forest Service and public constituencies over national forest management suggests that these public mechanisms are not effective .... A more fundamental change in approach – a new political form that enables national forest management to become truly participatory – is needed .... The failure results from the Forest Service's adoption of a 'benevolent technocracy' relationship with local communities in which it tries to manage forests and forest-related development for them rather than establishing responsive and responsible partnerships with them" (Henderson and Krahl, 1996).

In some critiques of the Joint Forest Management examples from India, it is suggested that local organizations or committees are often little more than a proxy for the Forest Service, i.e. they are not autonomous and independent, and the Forest Service is still controlling aspects such as the distribution of benefits (Hildyard *et al.*, 1997). Contradictions also arise when governments try to create or "reach out to" and strengthen partners through technical training, such as in nursery techniques, once again leading to proxies to meet government objectives, not empowerment or a "levelling of the playing field".

Even when the desire for participation is genuine, a process limited to a partnership between government and local communities may be insufficient to assure sustainable forest management and rural development. A range of organizations are often required, with no single organization or group controlling all aspects of the natural resource management arrangement. For instance, some analysis has pointed to the need for at least three types of organization – government services, local groups and communities, together with an intermediary (often an NGO), in the development process (Roling, 1988).

Is consensus possible or even necessary?

When applied to natural resource management, the logic in pluralism suggests that consensus on questions of substance, such as natural resource management for rural development, is highly unlikely or partial and temporary at best. Some attempts to achieve consensus actually subvert the participatory process. In some cases the government forest services have formed village forestry committees which are neither independent nor autonomous – little more than local manifestations of

the state. "Consensus" is achieved through the imposition of the view of the forest service as a kind of "coercive harmony" (Hildyard *et al.*, 1997).

Other views of and approaches to participation seem to seek consensus through "outsiders" losing their identity in "insider" structures and priorities. A kind of "the local group is always right" consensus emerges. Outsiders seek consensus by seeking to become like insiders.

Both these forms of consensus, and perhaps consensus in general, should be viewed with scepticism. However, progress can be made without consensus. Views, values, perceptions and objectives are likely to be different and remain so, but this is not an insurmountable barrier to communication, negotiation and the setting of standards and accountability (Rescher, 1993). Techniques for managing in a pluralistic environment have been developed, and they tend to be respectful of each group's identity and objectives while being less intent on consensus.

The pluralist concept applied

A pluralist approach to a complex natural resource management issue would not apply narrow scientific approaches until a single "right answer" emerged, nor would it acquiesce to the competing special interests, political claims by assuming that "whatever the groups decide to do is fine". Rather, it would look at competing values and interests as expanding the range of possibilities for natural resource management. In natural resource management and sustainable rural development, there are also limits to the natural world that define what is possible and what is not (Binkley, 1996). However, notions of limits depend on what features of the natural world are viewed as important or on the disciplinary models one constructs. This gives rise to the possibility (more likely the probability) that there will be competing notions about which issues and resource thresholds represent constraints.

Some other key concepts of pluralism as applied to natural resource management include the following points:

There are no single, absolute, universal and permanent solutions for any non-trivial natural resource problem. For any given land unit there is no single, absolute, sustainable management/land use scenario. There are numerous, if not infinite, "sustainable scenarios". "While physical laws place constraints on the social construction of nature, the bounds are not so tight as to allow for a single, objectively knowable perspective. There are many alternative management plans that are consistent with available scientific evidence" (Binkley, 1996).

A separation of powers and a system of checks and balances are needed to avoid the inefficiencies and abuses of monopoly in management. When several autonomous and independent organizations are involved, errors and mistakes by any of them are more easily identified and corrections made. What is important is that pluralism accepts "bounded conflict" or "restrained dissonance" as not only inevitable but potentially useful (Lee, 1993; Rescher, 1993). Conflict arises because of the plural values (among which there may be conflict), multiple parties (whose desires cannot all be met simultaneously) and limits of the natural world (which sets the bounds to what is feasible). The only ways in which conflict could be eliminated would be: i) to converge on a single social belief and policy goal towards nature, consumption, population and sustainability; or, alternatively, ii) to find an infinite amount of natural resources so that nothing in nature is limiting. Since neither of these options is possible, a different operational framework is needed. The task, therefore, is to learn to work with multiple perspectives and possibilities, and not attempt either to shirk from or acquiesce to them (Vira, 1997).

Equity among groups in decision-making power is far from realization but this should not preclude attempts to achieve equitable processes, nor detract from its value as an important goal.

Conflicts are inevitable and *cannot* be (permanently) resolved. At best they can be temporarily managed. While specific disputes may be resolved, many natural resource management and rural development situations are characterized by a complex interaction among social, political, cultural, economic and scientific aspects that defies either quick or enduring resolution. The more appropriate task from a pluralist perspective, then, is to manage conflict situations rather than to attempt to resolve them. Indeed, many complex natural resource situations can be managed well, so specific disputes that arise within them do not become destructive, and may in fact become constructive (Vira, 1997). However, conflict management is a partial approach since it treats problems mainly as they arise and is essentially reactive. It is difficult to do natural resource planning and set up management systems in the face of open conflict.

NEXT STEPS – PROACTIVE APPROACHES TO PLURALISM?

An increasingly complex organizational environment with more autonomous and interdependent players means that a certain amount of pluralism already exists. Pluralism acknowledges a growing reality at the local, national and international levels. Put simply, "pluralism may be messy but it helps bring us closer to the reality of the field" (Garces, personal communication, 1997). This acknowledgement has broad ramifications in terms of sustainable forestry and rural development policy, management, approaches and techniques. Acknowledging pluralism means developing ways to accommodate it so that different groups can collaborate and build dynamic institutional frameworks for sustainable forestry.

Acknowledging the existence of pluralism is not the same as promoting it. It is reasonable to ask whether it should

be promoted. In many cases, it appears that pluralism merits promotion as part of the natural resource management system. More work needs to be done so that proactive approaches to sustainable forestry and rural development in pluralistic environments can be refined and implemented. There is some urgency to improve proactive approaches since some present trends are "likely to have contradictory effects on the sustainability of forest resources: sometimes giving local communities tools needed to protect their resources, on other occasions empowering groups involved in forest-degrading activities" (Kaimowitz, 1997).

CONCLUSION

This article has discussed what pluralism is, why it is potentially important, how it can be used for a better understanding of dynamics of sustainable forestry and rural development and what operational tools exist that might be particularly well equipped to deal with the seemingly growing set of pluralistic situations. The Box gives a brief summary of important aspects of pluralism in sustainable forestry and rural development.

Proactive recognition of pluralism and its potentials calls for prudence and caution – it would be unwise to promote pluralism simply for pluralism's sake. A careful assessment is needed of situations (human as well as biophysical dimensions) to determine whether a better understanding of the pluralistic dynamics and the application of appropriate tools could improve the situation as well as whether, in the longer term, a pluralistic framework might be more sustainable.

From an institutional perspective, the promotion of pluralism in forestry and rural development cannot be achieved solely through decentralization, privatization, participation or other processes that are currently high on the development agenda. The solutions needed are of a more subtle and complex nature. There are many different examples of successful experiences to draw on – rural fuelwood markets, resource management contracts, territorial charters, codes of conduct – using varied organizational mechanisms.

The fundamental question is whether pluralism has practical significance for sustainable forestry and rural development, and whether it can offer concrete tools and methods which contribute to sustainable forestry and rural development. ◆

Key concepts for pluralism in sustainable forestry and rural development

- **Different groups have and always will have different experiences, positions, opinions and objectives on sustainable forest management and rural development.**
- **Groups are autonomous and independent; there is no single, absolute and permanent solution to any substantive natural resource management problem – for any given land unit there is no single, absolute, sustainable management land use scenario (there are numerous "sustainable scenarios").**
- **No group/organization can claim a superior or absolute scenario.**
- **Sustainable forestry and rural development decision-making is no longer the sole mandate of expert authorities.**
- **A system of organizational checks and balances is central for avoiding errors of a narrow single entity management system – this is the positive aspect of "bounded conflict".**
- **Conflicts are inevitable and cannot be resolved but managed.**
- **Equity in decision-making is a distant but worthy ideal.**
- **Platforms, mediators and facilitators are often needed to provide the conditions for negotiation and cooperation needed for sustainable forest management.**
- **Communication is essential and helps participants understand their differences better.**
- **Consensus is unlikely but progress can be achieved without it.**
- **Approaches to sustainable forest management that aim at consensus are often misguided and unsustainable.**
- **Proactive approaches and new processes of sustainable forest management decision-making in pluralistic environments are emerging – more experience is needed.**

Bibliography

Babin, D., Bertrand, A. & Antona, M. 1997. Patrimonial mediation and management subsidiarity. Paper prepared for the Workshop on Pluralism and Sustainable Forestry and Rural Development, FAO, Rome, December 1997.

Bebbington, A., Kopp, A. & Rubinoff, D. 1997. From chaos to strength? Social capital, rural people's organizations and sustainable rural development. Paper prepared for the Workshop on Pluralism and Sustainable Forestry and Rural Development, FAO, Rome, December 1997.

Begus, J. & Veselic, Z. 1997. Forestry in the environment of political transition – example of Slovenia. Paper prepared for the Workshop on Pluralism and Sustainable Forestry and Rural Development, FAO, Rome, December 1997.

Binkley, C. 1996. Forestry in a post-modern world, Part II. *Branch Lines* (Newsletter of the Faculty of Forestry, University of British Colombia, Vancouver, Canada).

Clément, J. 1997. Political and institutional aspects of pluralism in forestry. Paper prepared for the Workshop on Pluralism and Sustainable Forestry and Rural Development, FAO, Rome, December 1997.

Daniels, S. & Walker, G. 1997. Rethinking public participation in natural resource management: concepts from pluralism and five emerging approaches. Paper prepared for the Workshop on Pluralism and Sustainable Forestry and Rural Development, FAO, Rome, December 1997.

Dubois, O. 1997. Assessing local resilience and getting roles right in collaborative forest management: some current issues and a potential tool, with special reference to sub-Saharan Africa. Paper prepared for the Workshop on Pluralism and Sustainable Forestry and Rural Development, FAO, Rome, December 1997.

FAO. 1997. *Issues and opportunities in the evolution of private forestry and forestry extension in several countries with economies in transition of Central and Eastern Europe.* Rome.

Henderson, D. & Krahl, L. 1996. Public management of federal forest land in the United States. *Unasylva*, 47(184): 55-61.

Hildyard, N., Hegde, P., Wolvekamp. P. & Reddy, S. 1997. Same platform: different train; pluralism, participation and power. Paper prepared for the Workshop on Pluralism and Sustainable Forestry and Rural Development, FAO, Rome, December 1997.

IRG. 1997. The community and beyond: whither the model for local resource management? Announcement of a colloquy sponsored by the International Resources Group, Ltd.

Kaimowitz, D. 1997. Forest management and municipal government in lowland Bolivia. *CIFOR News*, 14 (March).

Lee, Kai. 1993. *Compass and gyroscope: integrating science and politics for the environment*. Washington, DC, Island Press.

Mukerji, A.K. 1997. Industries as partners for sustainable forestry in India – issues and options. Paper prepared for the Workshop on Pluralism and Sustainable Forestry and Rural Development, FAO, Rome, December 1997.

Rescher, N. 1993. *Pluralism: against the demand for consensus*. Oxford, UK, Clarendon Press.

Roling, N. 1988. *Extension science: information systems in agricultural development*. Cambridge, UK, Cambridge University Press.

Sow, M. & Anderson, J. 1996. Perceptions and classifications of woodland by Malinke villagers near Bamako, Mali. *Unasylva*, 47 (186): 22-27.

Sulieman, M.S. 1996. *Changing forest management strategies in Sudan – a challenge for forestry educational systems.* The Hague, CIP-Geggevens Koninklijke Bibliotheek.

Vira, B. 1997. Analytical tools for assessing institutional pluralism in forestry. Paper prepared for the Workshop on Pluralism and Sustainable Forestry and Rural Development, FAO, Rome, December 1997.

Wiersum, F. 1997. Normative pluriformity in forest management: professional and community perspectives. Paper prepared for the Workshop on Pluralism and Sustainable Forestry and Rural Development, FAO, Rome, December 1997.

WWF International & IUCN. 1998. Forests for Life Home page, <www.panda.org/forests4life> ◆

from No. 203, 2000

Excerpted from:

The influence of research and publications on conventional wisdom and policies affecting forests

M.J. Spilsbury and D. Kaimowitz

An analysis based on a survey of forestry experts suggests that research influences policy in an indirect way.

Michael J. Spilsbury and **David Kaimowitz** were both working at the Center for International Forestry Research (CIFOR) in Jakarta, Indonesia, when they wrote this article. The following year Kaimowitz was appointed CIFOR Director-General, a post he held until 2006. Spilsbury is now with the United Nations Environment Programme (UNEP).

Funding agencies expect policy researchers to show that their efforts have a measurable impact. This poses a considerable challenge. It was traditionally thought that research influences policy directly and that specific policies can be traced back to particular research findings. However, many analysts have now come to regard the link between research and policy as more diffuse: research induces changes in "conventional wisdom" (the set of dominant paradigms at a given moment regarding the desired ends of policy and the means of achieving them) and "policy narratives" (simplifying assumptions about the problem to be addressed and the approach to be taken), which in turn influence policy outcomes.

Given the bewildering array of factors that influence policy-makers' decisions, it would be naïve to overestimate the role of knowledge acquisition in that process. A role exists nonetheless.

Between December 1997 and March 1998, the authors asked forest policy experts by e-mail which publications influenced international and national debates on policies that affect forests. The survey elicited 162 replies.

THE POLICY-MAKING PROCESS AND RESEARCH UTILIZATION

> "Dost thou not know, my son, with how little wisdom the world is governed"
>
> **Count Oxenstierna, letter to his son, 1648**
>
> **In J.F. Lundblad, *Svensk plutarik* (1826)**

Research often affects policy through circuitous and diffuse paths. Weiss (1977) argues that policy-makers use research more to help them define problems, think about issues and provide new perspectives than to solve specific problems. Research findings are just one of policy-makers' many sources of information.

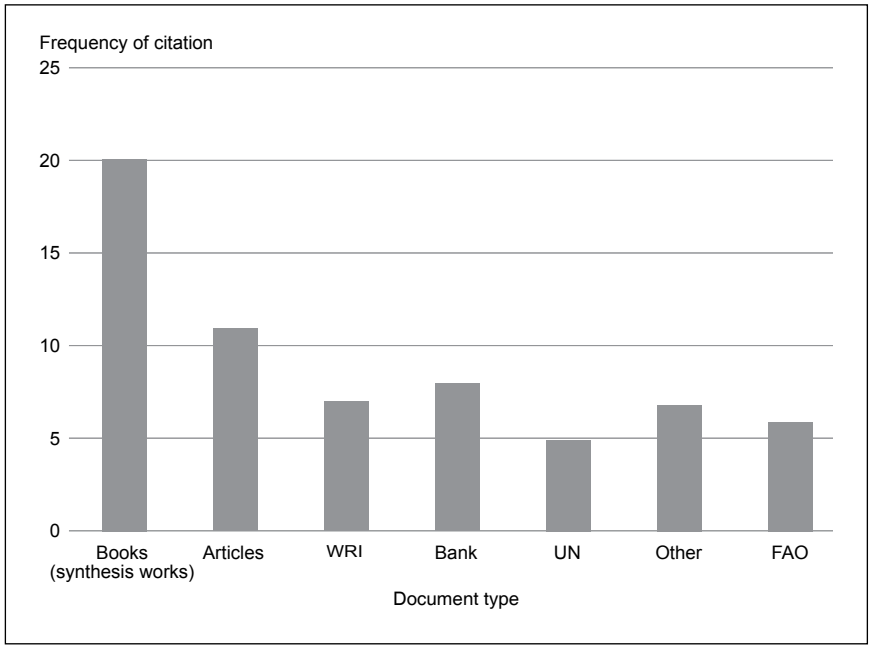
Policy-makers use research not only as an input into decision-making, but also as a political tool to justify decisions made for non-scientific reasons (Boehmer-Christiansen, 1995).

PUBLICATIONS THAT HELPED FORM CONVENTIONAL WISDOM

Survey methodology and sampling

Since the impact of research *per se* is abstract and difficult to measure, a survey was carried out to explore the influence of publications, which are loosely interpreted as a reflection of research. The survey, initiated in December 1997, sought to determine which publications forestry policy experts have considered influential in international and national

This article examines the extent to which seminal forestry publications "weave knowledge into development" by shaping conventional wisdom which in turn influences international or national forest policies. *Unasylva* does this too, by disseminating experience and best practices that then enter the mainstream of accepted knowledge.



Frequency of citation, by document type, for documents cited three or more times

debates regarding forest policies. The survey was distributed through the Forest Policy Experts (POLEX) electronic mailing list, managed by the Center for International Forestry Research (CIFOR). The POLEX list consists of individuals considered to be opinion leaders in forest policy issues. Recipients were asked to list:

- three articles, reports or documents that they believed to have had a significant influence on international debates concerning policies towards forests in the past 20 years;
- three articles, reports or documents that they believed to have had a significant influence on national debates (or a specific national debate) concerning policies towards forests in the past 20 years.

The role of publications in influencing debates was stressed rather than their role in modifying specific policies because the intention was to identify publications that had an impact on conventional wisdom and policy narratives in a broad sense.

Survey results: what was influential?

The most influential publications were mostly semi-popular books, general articles in prestigious non-disciplinary journals and institutional documents (see Figure). The Table on the following page lists the most-mentioned publications.

The responses make it clear that three institutions have dominated the debates regarding policies affecting forests over the past 30 years: FAO, the World Bank and WRI. Approximately one-third of all respondents mentioned at least one document associated with FAO or the World Bank. An even higher number (64 respondents) mentioned at least one publication associated with WRI. In the case of WRI, the results were greatly affected by the large number of people (34) who mentioned Repetto and Gillis' book, *Public policy and the misuse of forest resources* (1988). Even so, 34 respondents (21 percent) mentioned at least one WRI-related publication besides that book.

The major role of the World Bank and FAO in defining conventional wisdom can be explained in part by the critical mass of intellectual resources these institutions command and in part by the fact that they can promote their ideas by funding initiatives supported by their perspectives.

The survey results showed a troublesome dominance of authors from the United States and Europe. Of the 39 authors and co-authors of documents cited by five respondents or more, not one was from Africa, Asia or Latin America, even though the majority of the literature mentioned focused on tropical forests. The results may partially reflect the low representation from those continents among the individuals sampled, but that is probably only part of the story.

How did the publications influence the debates and policy?

The survey responses provide little evidence that the documents that respondents considered influential directly affected policies. In most instances, it is likely that the publications have influenced general conventional wisdom and policy narratives in international policy, academic and funding circles, and that the influence has eventually filtered down to policy-makers in specific countries.

Nevertheless, at the national level, many respondents did claim that World Bank and government reports and Tropical Forest Action Plans directly influenced policies. This is logical since these documents are associated with groups directly involved in bringing about policy change. It was probably not the documents *per se* that had the impact, but rather the processes leading up to the documents or following their creation, which resulted in agreements on what needed to be done.

Survey respondents also mentioned that some issues became prominent as a result of the actions of popular movements, specific events or the efforts of journalists. Research on these issues sometimes

reflects "jumping on the bandwagon" to gain research funding and command policy-makers' attention.

It is not possible from the survey results to make a distinction between issues and arguments that become prominent because of certain publications and those that gained momentum for other reasons but later became associated in experts' minds with a given set of publications.

Many respondents stressed that the fact that a publication was influential did not necessarily imply that it was good. Several commented that certain influential pieces were much weaker than others available on the same topic. The influential pieces were apparently marketed better, i.e. given a journalistic treatment, placed in widely read outlets, promoted by public figures or movements or connected with prominent institutions or policy change processes.

A few respondents even claimed that influential publications often gave incorrect or misleading messages, either by oversimplifying issues and exaggerating threats and opportunities to reach a wider audience or by bending the facts to support their particular agendas. Work that is later criticized or discredited can nevertheless be extremely influential in raising issues, shifting scientific debate and shaping policy outcomes.

FROM EVENTS AND PUBLICATIONS TO CONVENTIONAL WISDOM AND POLICY

> "It is the customary fate of new truths to begin as heresies and end as superstitions"
>
> **T.H. Huxley, "The coming of age of the *Origin of species*"**
>
> **In *Science and culture and other essays* (1881)**

A comparison of the chronology of influential publications cited in the survey with key events and social trends mentioned in histories of forest policy debates (Humphreys, 1996; Kolk, 1996; Shepherd *et al.*, 1998) revealed suggestive links in the evolution of policy narratives related to forests.

For example, Eckholm's book *The other energy crisis: firewood* put the fuelwood crisis on the map in 1975. FAO picked this up in 1978 with its map of the fuelwood situation in developing countries. In 1980, FAO's assessment of global forest cover helped convince donors and others of the importance of tropical deforestation and the fuelwood crisis. Fuelwood remained a prominent issue until several critical publications in the late 1980s effectively removed it from the international debate.

Another illustration: from the late 1970s to the mid-1980s, several works by Myers, including "The hamburger connection: how Central America's forests became North America's hamburgers" (in *Ambio*, 1981) and *The primary source* (1984), highlighted the gravity of the tropical forest crisis and the importance of biodiversity. In the late 1980s, a flurry of publications and activities related to biodiversity, including a 1988 United States National Academy of Sciences book edited by Wilson, preceded the signing of the Convention on Biological Diversity in 1992.

Over the past 20 years, policies and projects in many countries – particularly the smaller and poorer countries that depend on foreign support – have reflected similar shifts in conventional wisdom. The spread of ideas provoked and mirrored changes in priorities and positions in the World Bank, FAO and the main bilateral aid agencies. These agencies, in turn, provided developing country policy-makers with new ideas and financial incentives to accept them. In addition, a relatively small cadre of consultants went from country to country broadcasting the conventional wisdom of the moment and designing and implementing projects based on it.

In most cases, there was probably a lag of several years between the "launching" of new policy narratives in well-

Documents cited as being influential by five or more survey respondents

Authors and year	Document	Number of citations
Repetto, R. & Gillis, M. (1988)	*Public policy and the misuse of forest resources*. New York, Cambridge University Press	34
Peters, C.M., Gentry, A.H. & Mendelsohn, R.O. (1989)	Valuation of an Amazonian rainforest. *Nature*, 339(29): 655-656	22
Poore, D., Burgess, P., Palmer, J., Rietbergen, S. & Synnott, T. (1989)	*No timber without trees: sustainability in the tropical forests*. London, Earthscan Publications	22
UN Conference on Environment and Development (UNCED) (1992)	*Agenda 21: Programme of action for sustainable development*. New York, UN	17
FAO (1985)	*Tropical Forest Action Plan (TFAP): a call for action*. Rome	15
World Commission on Environment and Development (Brundtland Commission) (1987)	*Our common future*. Oxford, UK, Oxford University Press	13
UNCED (1992)	*Non-legally binding authoritative statement of principles for a global consensus on the management of all types of forests* (the "Forest Principles"). New York, UN	11
Westoby, J. (1978, 1987)	World Forestry Congress presentation, *The purpose of forests* (1978); *The purpose of forests – follies of development*. Oxford, UK, Blackwell (1987)	11

publicized events or prominent publications and the filtering down of these ideas into changes in conventional wisdom, policy and funding.

CONCLUSIONS

It was difficult to identify publications that directly influenced policies towards forests solely by the force of their arguments. Although certain publications have been influential, specific policies cannot usually be attributed to them. Still, policy research does seem to enhance policy actors' awareness and to shape conventional wisdom.

Some documents were found to have directly influenced policies at the national level; however, it was probably not the documents *per se* that had the impact, but rather the processes accompanying their creation. Research that targets or associates itself with major policy processes or powerful organizations has a better chance of having an impact and being recognized.

Being "right" does not seem to be either a necessary or sufficient condition for having an impact. Some documents have been both influential and wrong. Work that is later criticized or discredited by scientific peers can nevertheless be extremely important in raising issues, shifting scientific debate and shaping policy outcomes.

Credibility is at least as important to the impact of policy research as "being right". Credibility seems to be closely linked to the reputations and track records of the authors, the prestige of the publishers and the influence of the organizations that sponsor the research and/or promote the findings. Unfortunately, the process by which credibility is acquired has given a rather small group of Northern policy analysts and a few large organizations an inordinate amount of influence, potentially stifling the effective input of analysts and institutions in developing countries.

Research that tells policy-makers and opinion leaders what they want to hear has a better chance of being influential than work that goes against the tide. Conventional wisdom and policy narratives can be successfully challenged and debunked, but this is easier when the prevailing political, social, economic and scientific winds are blowing in the same direction.

Policy researchers can increase their impact not only by providing good answers to the right questions, but also by supplying these messages to the right (most influential) people at the right time and in an appropriate format. The most influential researchers and institutions will be those who effectively build "coalitions" to support their viewpoints in the policy arena and succeed in associating their work with well-funded initiatives.

Impact-oriented researchers and institutions must pay attention, not only to the development of the "research product", but also to the "market" in which that product must compete. The findings from this survey highlight some important aspects of the research market. Researchers and institutions wishing to enhance their influence must constantly appraise the demand for their research products and identify opportunities for their work to gain prominence. Surveys such as the one presented here have an important role in that appraisal. ◆

Bibliography

Boehmer-Christiansen, S.A. 1995. Britain and the International Panel on Climate Change: the impacts of scientific advice on global warming, Part I: integrated policy analysis and the global dimension. *Environ. Pol.*, 4(1): 1-18.

Humphreys, D. 1996. *Forest politics: the evolution of international cooperation*. London, Earthscan Publications.

Kolk, A. 1996. *Forests in international environmental politics: international organisations, NGOs and the Brazilian Amazon*. Utrecht, the Netherlands, International Books.

Shepherd, G., Brown, D., Richards, M. & Schreckenberg, K. 1998. *EU forestry sourcebook*. London, Overseas Development Institute.

Weiss, C. 1977. Research for policy's sake: the enlightenment function of social research. *Policy Anal.*, 3: 531-545. ◆

from No. 202, 2000

Forestry and sustainable livelihoods[1]

K. Warner

What part can forests and forestry play in reducing poverty?

FAO/CH10407/R. FAIDUTTI

People living in forest environments, such as these women carrying eucalyptus leaves for use as fuel in Ethiopia, draw heavily on forest products for their livelihood

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The adoption of the International Development Target of halving global poverty by the year 2015 has served to reaffirm the mandates of multilateral and bilateral agencies and international centres. There is general agreement that this should be the major global development goal. Certainly one cannot ask for a more noble goal, or a more ambitious one.

For those working in forestry, the question raised is a critical one: what part can forests (and forestry) play in reducing poverty?[2] This question requires a new perspective on forests and their use, in which success is measured not only by the amount of forest products harvested, export figures or revenue generated, but also by the contribution of forests in alleviating poverty. It requires more attention to identifying the overall contribution of forests, and of the goods and services they provide, to the livelihoods of the poor, and then the development of strategies for maintaining or enhancing this contribution.

Development of the concept of livelihoods, particularly in relation to people who depend on the forest for food, employment, income or subsistence. The implications for sustainable forest management are critical.

[1] This paper owes a great deal to several recent papers focusing on this topic: Shepherd, Arnold and Bass, 1999; Byron and Arnold, 1999; Arnold, 1998.

[2] The following section owes a great deal to Shepherd, Arnold and Bass, 1999.

THE CONCEPT OF SUSTAINABLE LIVELIHOODS

Poverty is commonly determined based on thresholds of income or consumption. These criteria, while useful for national and international statistics, fail to capture the local complexity and dynamism of poverty. They also fail to take account of current and potential resources.

Another commonly used measure of poverty is food security – or lack of it. Food insecurity exists when people lack access to sufficient amounts of food and are therefore not consuming the food required for normal growth and development. This may be because of lack of access to food – because of unavailability, insufficient purchasing power, inappropriate distribution or inadequate utilization at the household level. Further analysis can be used to determine what factors place people at risk of becoming food insecure, as well as those factors that affect their ability to cope.

But poverty is not only based on income and/or food availability. A current approach that attempts to go beyond these factors and to include multidimensional characteristics and causes is that of sustainable livelihoods. A livelihood comprises the capabilities, assets and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks, and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base (Carney, 1998).[3]

The assets that are the building blocks of livelihoods are not only natural, physical and financial capital, but also social and human capital (kinship and networks, and nutrition and health). A range of assets is needed to achieve positive livelihood outcomes: no single category of assets sufficiently provides all the many and varied livelihood outcomes that people seek. The access of poor people to any of the categories of assets tends to be limited. Those with more assets have a greater range of options and an ability to shift emphasis in their livelihood strategies. The ability to move out of poverty is critically dependent on access to assets.

Production and sale of forest products can be an important source of livelihood, as in this small-scale rural basket industry in Malawi

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CONTRIBUTIONS OF FORESTS TO SUSTAINABLE LIVELIHOODS

Arnold (1998), in examining the contribution of forests to sustainable livelihoods, defines forests "to include all resources that can produce forest products. These can comprise woodland, scrubland, bush fallow and farm bush, and trees on farm, as well as forests". Arnold's definition focuses not on tenure or tree cover as the basis for defining a forest, but on the potential for producing products. Moreover, the contribution of forests is measured not only by the products they provide, but also by the non-tangible services they offer.

Forests are important natural capital. Past development efforts have primarily focused on building natural capital, without paying equal attention to how these assets, such as forests, combine with other assets to sustain livelihoods, especially among the poor. This oversight has resulted in gaps in understanding the contribution of forest products to sustainable livelihoods (DFID, 1999).

The total contribution of forests and trees to livelihoods is difficult to quantify. A significant proportion of forest products are consumed by those who collect them, with the amount collected varying acording to seasonality, access and options (alternatives). Most of the available information is descriptive, and often extremely situation specific (although Arnold [1998] cites some exceptions, e.g. Townson, 1995; Arnold *et al.*, 1994). Few studies quantify the part of household inputs, labour allocation, incomes and costs attributable to forest product activities. While studies on fuelwood or specific forest products have been conducted, censuses and surveys do not usually include information on household-level use or activities for a more complete range of forest products (Byron and Arnold, 1999).

Nonetheless, the general contributions of forests to livelihood outcomes can be identified (Arnold, 1998).

Increased income

Although income alone is insufficient as a criterion of poverty, increased income is clearly relevant to the economic sustainability of the household.

Earnings from forest products are often important as a complement to other

[3] While the Department for International Development (DFID) definition is being used in this paper, it should be noted that similar approaches are being used by a number of agencies including CARE, the United Nations Development Programme (UNDP), Oxfam and FAO.

income. Very large numbers of households generate some of their income from selling forest products, often on a part-time basis when farm production is not enough to provide food self-sufficiency all the year round. Much forest-based income-generating activity is seasonal: some products can only be gathered at certain times of year, demand or labour availability may fluctuate seasonally and income from forest products may contribute to the purchase of farm inputs or food between harvests. Income from forest products is often used to obtain inputs for other activities that contribute to livelihoods: to purchase seeds, hire labour for cultivation or generate working capital for trading activities (e.g. Leach and Fairhead, 1994, cited in Byron and Arnold, 1999).

The rural poor often produce, process and sell forest products (e.g. making mats and baskets and selling fuelwood) in the absence of other employment opportunities, often as a part-time activity within farming households.

Improved food security

Food security is a key element of livelihood. Forests are the source of a variety of foods that supplement and complement what is obtained from agriculture, woodfuels with which to cook food and boil water, and a wide range of traditional medicines and other hygiene products. Probably the majority of rural households in developing countries, and a large proportion of urban households, depend on plant and animal products of forests to meet some part of their nutritional, cooking and/or health needs (Byron and Arnold, 1999).

Where fuelwood is the only source of fuel for cooking, it is essential to nutrition and disease prevention, as cooking is necessary to make many foods digestable, to kill pathogenic microorganisms and to remove parasites.

Forests also contribute to livelihoods by providing materials for construction, baskets, storage structures, agricultural implements, boats and hunting and fishing gear. They provide inputs for farm systems such as fodder and mulch, contribute to soil nutrient cycling, help conserve soil and water and provide shelter and shade for crops and animals.

Reduced vulnerability

Poor people often live precariously, with no cushion against adversity. Forest and tree stocks have an important role as a reserve or safety net, providing

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Cooking over a wood fire in Panama – where fuelwood is the only source of fuel for cooking, it is essential to nutrition and disease prevention

FAO/19903/G. GREPIN

In the Sundarbans mangrove forest, Bangladesh, boats built from local mangrove wood are used for fishing and for transport of food and forest products

both subsistence and income in times of crop failure, shortfall, unemployment or other emergency or hardship, or to meet exceptional needs. Forest foods are most extensively used to help meet dietary shortfalls during particular seasons in the year. Energy-rich forest foods such as roots, tubers, rhizomes and nuts are especially important in emergencies such as floods, famines, droughts and wars.

More sustainable use of the natural resource base

Sustainable use of natural resources is critical for sustainable livelihoods. More sustainable use of natural resources has a direct impact on the improvement of natural capital. All people affect the environment, but the poor tend to be the most vulnerable to the effects of environmental degradation (Watson *et al.*, 1998).

It is a myth that poverty prevents people from investing in the environment. Numerous experiences now demonstrate that when incentives are favourable, even poorer groups can mobilize enormous resources, particularly labour. Another myth is that poor people lack the technical knowledge for resource management. There is a growing awareness that poorer groups have an enormous store of what is termed indigenous or local technical knowledge (Ambler, 1999, cited in DFID, 2000).

Increased well-being

In addition to income and what money can buy, forests provide non-material goods that contribute to livelihoods by enhancing social and human capital. Sense of well-being is affected by numerous factors including self-esteem, sense of control and inclusion, health status, access to services and political enfranchisement. Forestry initiatives that support access to resources, participatory decision-making and equity assist in increasing well-being, especially that of the poor.

ROLE OF FOREST-PEOPLE RELATIONSHIPS

It has recently been estimated that one quarter of the world's poor depend directly or indirectly on forests for their livelihood (World Bank, 2000). The nature of the dependence varies (Shepherd, Arnold and Bass, 1999), as is shown by the following examples.

Main source of livelihood. People living in forest environments and practising hunting, collecting and swidden agriculture (shifting cultivation) draw heavily on forest products, not only for subsistence but also for income from forest products. Forest-related income also includes that obtained by selling crops or livestock for which forest nutrients or fodder were essential (Shepherd, Arnold and Bass, 1999).

While some hunter-collector populations have retained a self-reliant and subsistence way of life (Grenand and Grenand, 1996, cited in Byron and Arnold, 1999), most are increasingly becoming involved with outside markets and goods. However, the level of forest dependency among these peoples remains high, as does the cultural significance of the forest to them.

Swiddeners who practise a sustainable long-term fallow system are a much larger group of the forest dependent. However, the encroachment of migrant settlers into the forest, commercial logging concessions and government pressure to settle are forcing a shift to shorter fallow, settlement and less direct dependency on forests.

Herders of the African Sahel, although often overlooked in this category, are likewise forest dependent, as their animals – camels, cattle, sheep and goats – browse trees rather than grazing for much of the year, particularly during the dry season (Shepherd, Arnold and Bass, 1999).

Filling the gaps. Communities draw on off-farm forest or woodland for inputs that cannot be produced on-farm or that can be more efficiently supplied from off-farm resources. Foods from the forest provide for those who do not produce sufficient food from fields and gardens and cannot afford to buy food from the market. Reliance on forest products to fill gaps and complement other sources of subsistence inputs and income is likely to increase, as has already been noted, when crop yields have been poor and other sources of income are not available.

Where access to forests has been relatively unrestricted, forest foods and income from forest products are often particularly important for poorer groups within the community. Although the wealthier in a community, with more resources to devote to forest product gathering and production, are often the heaviest users, the poor usually derive a greater share of their overall needs from forest products and activities.

Ease of entry and proximity to widely dispersed rural markets enable very large numbers of people to generate some income from forest products. Forest products can therefore be very important to those who are unable to obtain sufficient (or any) income from agriculture or wage employment, and to those who lack other options.

Because of the accessibility of the resource, women are often more reliant than men on forest products, obtaining from them income needed to feed and clothe the family, as well as fuel for cooking (e.g. Hopkins, Scherr and Gruhn, 1994, cited in Byron and Arnold, 1999). In cultures where women and girls suffer from intrahousehold discrimination in food distribution, the contribution of forest foods can be very important (Shepherd, Arnold and Bass, 1999).

Commercial forest products. In much of the world, most employment in forest industries is in very small enterprises, often composed only of a few family members, rather than in the formal sector. For instance, a survey in Zimbabwe

estimated that in 1991, 237 000 persons were employed in small woodworking, carving, fuelwood and cane and grass product enterprises, compared with a reported 16 000 employed in forestry and forest industries (Arnold *et al.*, 1994, cited in Byron and Arnold, 1999).

Where larger, modern forest industries have become established, they can provide wage employment for local people who can thus become less reliant on more arduous and less rewarding forest product and shifting cultivation activities. Many forest industry jobs, however, tend to go to outsiders because of the skills required. In addition, employment in logging and primary processing can often be relatively short term. The temporary employment and income these industries provide needs to be set against their possible disruption of existing livelihood systems in forest areas. Moreover, in communities dependent on forest industries, closure of the industry can lead to a sharp decline in local livelihoods.

LOOKING TOWARDS 2015[4]

> *"Take care of the poor, and the rich will take of themselves."*
>
> Shepherd, Arnold and Bass, 1999

Forest reliance is dynamic: it is likely to change over time, in particular environmental, economic, cultural and political contexts. Some populations or households are likely to move away from their present levels of use of forests or forest products. Others will have a continuing need to draw on forests. Yet others are likely to depend on them even more in the future.

For some, movement away from forest use

The trend is for those who are wholly dependent on forests to become less so; the forest will increasingly complement other livelihood activities. Those who currently depend on forests to complement agriculture, livestock, trading and wages will continue to do so, although the level of dependency and the dependency on specific products may change in response to availability of other resources and opportunities.

For others, a need to be able to continue drawing on forests

Reliance on access to nearby forests or woodland is likely to continue, and in some situations even to increase, when smaller farm size or declining farm productivity reduces food self-sufficiency, sometimes to the point where people have to sell products that they previously collected for their own use.

It is the poor who benefit most from being able to continue to have access to forest products, but they may be faced with a diminishing resource (because of factors such as population growth or restrictions on access to resources) and a declining capacity to exploit it. The current pattern of forest product activities by people unable to obtain any or sufficient income from agriculture or wage employment is likely to continue. At the same time, increasing pressures to seek wage employment to meet income needs are likely to leave them less time to exploit labour-intensive forest product opportunities. However, the poor will still need to look to off-farm resources to help supplement what they can produce on-farm. The role of the forest as a buffer in times of hardship is particularly important.

The poor are likely to find it more difficult than other people to benefit from potential opportunities related to the increasing commercialization of forest products. Often when products become commercially attractive, the poor lose access as products come under the control of the more powerful who are able to take advantage of the new market opportunities.

From forest to farm

In many places, the focus of supply of some forest products is shifting from the forest to the farm. Those who have access to land and sufficient resources to work it are becoming increasingly reliant on on-farm cultivation of trees (Arnold and Dewees, 1995, cited in Byron and Arnold, 1999).

Because trees require lower inputs of labour to establish and maintain than most other crops, tree crops are often adopted as a response to increasing shortages of farm labour. (Consequently, an improvement in the functioning of labour and other factors could reverse the trend.) In other situations poor farmers favour trees as a low-cost means of enhancing site productivity (e.g. through home gardens, shade and shelterbelts). Sometimes such resources can be created from a forest rather than planted trees, e.g. rubber and fruit gardens in Indonesia (Michon and de Foresta, 1995).

However, farm trees can provide only some of the products and services that people previously obtained from forests. Moreover, on-farm tree growing is not an option for landless households and others among the poor. These groups suffer greater impacts of reduced access to forest products.

WHAT IS NEEDED TO INCREASE THE CONTRIBUTION OF FORESTS TO THE POOR?

> *"The more we understand the risk-reducing, security-increasing quality of forests, and their complementarity to a very wide range of rural livelihoods, the more we understand the fundamental nature of the need of the poor for them."*
>
> Shepherd, Arnold and Bass, 1999

The implication of what is currently known about forests' contribution to the poor is that if forests are to have a greater role in the future, the following interventions or approaches should be supported.

[4] This section owes a great deal to Byron and Arnold, 1999.

People-centred approach

Where forests continue to be central to livelihood systems, local people are or should be the main stakeholders. Meeting their needs on a sustainable basis should be the principal objective of forest management, and this should be reflected in control and tenure arrangements (Peluso and Padoch, 1996). A detailed assessment needs to be prepared by, or at least with, the people concerned, to identify the complete range of relationships between the people and the forests that they use and/or manage, the current limitations to their livelihoods and the potentials and desire for change (Byron and Arnold, 1999). Participatory forest management experiences in Nepal, the Gambia and India, for example, demonstrate that this approach is practicable and effective.

In many situations the greatest need may be for a policy and legal framework that legitimizes the participation by poor user groups in comanagement of the resource and provides mechanisms to put this into practice. Where local control and management capabilities are weak or have become eroded or broken down, external assistance is likely to be needed to strengthen and monitor resource sharing and management mechanisms. Interventions should pay attention to equity considerations both between and within stakeholder groups, to rebuilding social capital and minimizing sources of conflict and to minimizing the transaction costs to user groups.

Secure access to forest resources

Where forest products have an important supplementary and safety net role, users need security of access to the resources (Byron and Arnold, 1999).

Where communal practices and systems of forest management and control continue to function viably, policies are needed that recognize these local rights, and legal and regulatory support is needed to protect them (Byron and Arnold, 1999). Common property regimes are not the same as open access. A properly managed common property resource may be viewed as shared private property, confined to members of a defined user group. Frequently, factors that cause the breakdown of a common property regime would also result in degradation of the resource if it were managed by the State (Shepherd, Arnold and Bass, 1999).

Because they are unable to monitor effectively what happens in forest areas, many governments have set in place forest and environmental policies and regulations designed to limit rather than encourage production and sale of forest products. These can include restrictions on private harvesting and trade of wood products and requirements to sell other forest products to State marketing boards (e.g. in parts of India). Unless such constraints are removed, there is little incentive for people to involve themselves in sustainable forest management (see above) (Dewees and Scherr, 1996, cited in Arnold, 1998).

Tree planting and management incentives

Where forest products have an important role but are more effectively supplied from non-forest sources, forest management and policy may need to be geared towards supporting agroforestry. Although providing incentives for tree planting has been the main form of intervention in the past, income from tree growing is more likely to be increased by providing producers with better access to markets. Priority often needs to be given to changing the policies and practices that create market restrictions and that depress market prices for forest or tree products.

These constraints commonly include lack of market information, poorly functioning trading systems for small producers, fuelwood prices that are depressed by subsidies to alternative fuels and competition from subsidized supplies from State forests and plantations. There is a danger that, by hindering farmer access to tree product markets, governments may be interfering with the shift from a subsistence to a market economy (Dewees and Scherr, 1996, cited in Arnold, 1998).

Improving opportunities

Small enterprise surveys consistently show that forest product activities rank among the three largest sources of employment in rural manufacturing and trading (Fisseha, 1987). The rural poor, particularly the landless who depend on common property regimes, will need help in exploiting opportunities in these areas. Producers and prospective producers may require improved access to credit, skills, marketing services, etc. However, the needs and opportunities differ depending on the target group. New entrants driven by supply side forces – that is people searching for activities that can sustain their livelihoods – do not have the same needs as those responding to market opportunities (Arnold, 1998).

Some products have large, diversified and stable markets, while others face highly volatile markets or demand that is seasonal and subject to sharp price fluctuations. Some products for industrial markets, such as babassu oilseed from the Amazon, are susceptible to major changes in market requirements and shifts to domesticated or synthetic sources of supply (e.g. May *et al.*, 1985, cited in Byron and Arnold, 1999).

Product expansion without attention to management, which will lead to depletion of the raw material resource, as happened for example with baskets in Botswana (Terry, 1984, cited in Arnold, 1998), should not be encouraged. Sustainable livelihoods are dependent on a sustainably managed resource base. Support for the development of participatory assessment, monitoring and evaluation of forest resources is needed.

Domestic markets for forest products may provide more stable avenues for

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Domestic markets for forest products – such as those in this market in Ouagadougou, Burkina Faso – may provide relatively stable avenues for development

development. The large component of forest product activities in the rural sector reflects the size of rural markets for these products. Where transport infrastructures are relatively poor, these products are more effectively supplied locally (FAO, 1987). Many products that were not previously sold in rural areas, such as fuelwood and forest fruits, have become increasingly commercialized. Most growth, however, is usually associated with expansion of urban demand.

Some forest products used domestically, however, are considered inferior and are consumed less as incomes rise. For example, forest foods may be displaced by purchased foods, and competition from factory-made alternatives may increase as improved transport infrastructure opens up rural areas to outside supplies.

New options

Forestry resources can contribute to achieving sustainable livelihoods and reducing poverty. However, it is essential to be realistic about what can be achieved. In the short term, there may be no alternative to minimal-return forest product activities for many. New options, which are quite likely to be outside forestry, need to be developed to help people move out of forest product activities of declining importance and those that can offer no more than marginal, unsustainable livelihoods. Providing support to such activities once higher-return or less arduous alternatives emerge could impede the emergence of better livelihood systems. The challenge will be to help people move into more rewarding fields of endeavour rather than seeking to raise their productivity in forest activities of low potential. Care needs to be taken, however, to ensure that alternative activities indeed offer better future growth prospects.

"Some of those who are moving away from stagnant minimal levels of livelihood, as better alternatives emerge and their incomes rise, will continue to need the forest as a buffer to fall back on temporarily in times of hardship. An important challenge is likely to be learning how to manage forests both for growth, and also as a safety net."

Byron and Arnold, 1999 ◆

Bibliography

Ambler, J. 1999. *Attacking poverty while protecting the environment: towards win-win policy options*. Background technical note. United Nations Development Programme/European Commission poverty and environment initiative.

Arnold, J.E.M. 1998. Forestry and sustainable rural livelihoods. *In* D. Carney, ed. *Sustainable rural livelihoods: what contribution can we make?* London, UK, Department for International Development.

Arnold, J.E.M. & Dewees, R.A., eds. 1995. *Tree management in farmer strategies: responses to agricultural intensification*. Oxford, UK, Oxford University Press. (Also published as *Farms, trees and farmers: responses to agricultural intensification*. 1997. London, UK, Earthscan Publications.)

Arnold, J.E.M., Liedholm, C., Mead, D. & Townson, I.M. 1994. *Structure and growth of small enterprises using forest products in southern and eastern Africa*. OFI Occasional Paper No. 47. Oxford, UK, Oxford Forestry Institute, and GEMINI Working Paper No. 48. Growth and Equity through Microenterprise Investments and Institutions (GEMINI) Project, Bethesda, Maryland, USA.

Byron, N. & Arnold, J.E.M. 1999. What futures for the people of the tropical forests? *World Development*, 27(5): 789-805.

Carney, D. 1998. Implementing the sustainable livelihoods approach. *In* D. Carney, ed. *Sustainable rural livelihoods: what contribution can we make?* London, UK, Department for International Development.

Dewees, P.A. & Scherr, S.J. 1996. *Policies and markets for non-timber tree products*. EPTD Discussion Paper No. 16. Washington,

DC, International Food Policy Research Institute.

DFID (Department for International Development). 1999. *Sustainable guidance sheets: framework*. London, UK, Department for International Development.

DFID. 2000. *Strategies for achieving the international development targets: environmental sustainability and eliminating poverty*. Consultation document. London, UK, Department for International Development.

FAO. 1987. *Small-scale forest-based processing enterprises*. FAO Forestry Paper No. 79. Rome.

Fisseha, Y. 1987. Basic features of rural small-scale forest-based processing enterprises in developing countries. In *Small-scale forest-based processing enterprises*. FAO Forestry Paper No. 79. Rome, FAO.

Grenand, P. & Grenand, F. 1996. Living in abundance. The forest of the Wayampi (Amerindians from French Guiana). *In* M. Ruiz Pérez and J.E.M. Arnold, eds. *Current issues in nontimber forest products research*, p. 177-196. Bogor, Indonesia, CIFOR-ODA.

Hopkins, J.C., Scherr, S.J. & Gruhn, P. 1994. *Food security and the commons: evidence from Niger*. Draft report to USAID Niger, Washington, DC, IFPRI.

Leach, M. & Fairhead, J. 1994. *The forest islands of Kissidougou: social dynamics of environmental change in West Africa's forest-savannah mosaic*. Report to ESCOR, Overseas Development Administration (ODA), London, UK.

May, P.H., Anderson, A.B., Balick, M.J. & Unruh, J. 1985. Babaçu palm in the agroforestry systems of Brazil's Mid-North region. *Agroforestry Systems*, 3: 275-295.

Michon, G. & de Foresta, H. 1995. The Indonesian Agro-Forest Model: forest resource management and biodiversity conservation. *In* P. Halladay and D.A. Gilmour, eds. *Conserving biodiversity outside protected areas: the role of traditional agro-ecosystems*. Gland, Switzerland, lUCN Conservation Programme, IUCN.

Peluso, N.L. & Padoch, C. 1996. Changing resource rights in managed forests of West Kalimantan. *In* C.Padoch and N.L. Peluso, eds. *Borneo in transition: people, forests, conservation and development*. Singapore, Oxford University.

Shepherd, G., Arnold, J.E.M. & Bass, S. 1999. *Forests and sustainable livelihoods*. Background document, World Bank Forest Policy Implementation Review and Strategy. Internet document: http://wbln0018.worldbank.org/essd/forestpol-e.nsf/MainView (under "other relevant stakeholder documents"). (Draft)

Terry, M.E. 1984. *Botswanacraft and Hambukushu basketry: the effects of a major marketing operation on a group of African people, their traditional craft, and the natural resources*. Report to the Botswanacraft Marketing Company, Estha, Botswana.

Townson, I.M. 1995. Patterns of non-timber forest products enterprise activity in the forest zone of southern Ghana. Draft report to the ODA Forestry Research Programme, London, UK.

Watson, R.T., Dixon, J.A., Hamburg, S.P., Janetos, A.C. & Moss, R.H., eds. 1998. *Protecting our planet, securing our future – linkages among global environmental issues and human needs*. Nairobi, Kenya and Washington, DC, USA, United Nations Environment Programme (UNEP), United States National Aeronautics and Space Administration (NASA) and World Bank.

World Bank. 2000. *World Bank reviews global forest strategy*. News Release No. 2000/193/S. http://wbln0018.worldbank.org/news/pressrelease.nsf ◆

from No. 221, 2005

Excerpted from:

Towards development of the Chilean basket willow sector

M.I. Abalos Romero

*Researchers in Chile worked with producers of basket willow (*Salix viminalis*) and its products – furniture and handicrafts – to revitalize a declining sector through improved quality and market development.*

J. SVENSSON

Manufacturing processes used for basket willow furniture have been updated to promote improved quality and design; shown, a roadside furniture market in Chimbarongo

The suitability of flexible shoots or switches of *Salix viminalis* for making handicraft items was discovered in the small town of Chimbarongo, 200 km from Santiago, in the early twentieth century. People began to cultivate the species and artisans were trained to produce furniture that reached the capital and elsewhere in the country. In Chile, activities related to the cultivation and manufacture of basket willow products have remained concentrated in the Chimbarongo area.

By the end of the 1990s, 223 ha were under *S. viminalis* cultivation in Chimbarongo, divided among 88 plantations, most of them belonging to small-scale producers. About 1 200 workshops were producing a wide range of willow articles, most of which were sold on the local market. However, producers and intermediaries had begun to export a large amount of basket willow (800 tonnes of dry material per year, valuing US$750 000), so that the local artisans lacked the raw material needed for their products.

Moreover, other materials such as wood, leather and plastic were beginning to replace willow in the manufacture of furniture, packaging and other household articles. The quality of willow products was insufficient to compete on better markets and designs were old-fashioned. Thus the demand for the Chimbarongo artisans' work declined. The result was a slump in craftwork in Chimbarongo,

An article that literally "weaves knowledge into development" – relating experiences in strengthening the basket willow weaving industry for enhanced rural development.

Marta I. Abalos Romero wrote this article as Research Scientist in charge of the project "Integrated development of willow cultivation and industrialization", Chilean Forest Research Institute (INFOR-MINAGRI), Central-Northern Office, Santiago, Chile.

M. ABALOS

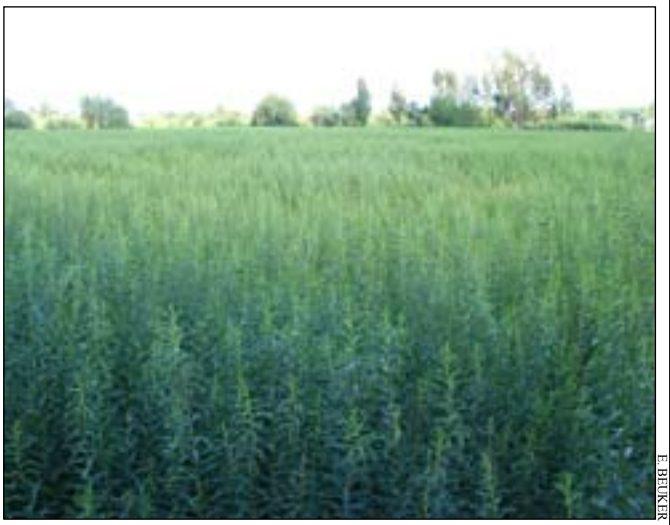
Cuttings are taken from one-year-old willow saplings for planting between June and August

reducing some 4 000 people connected with the sector to subsistence standards of living.

At the same time, in contrast with the situation in Chimbarongo, appreciation of natural products and craftwork has increased globally, as seen in the large trade in products made of natural fibres. For example, large volumes of products made from rattan – a similar plant fibre which can be used to produce similar items – are exported from Asia to markets in Europe, North America and even Chile, where they are much in demand among high-income consumers.

Therefore the Chilean Forest Research Institute (Instituto de Investigación Forestal de Chile, INFOR), in collaboration with universities and other national institutions with funding from the Fund for the Promotion of Scientific and Technological Development (Fondo de Fomento al Desarrollo Científico y Tecnológico, FONDEF), carried out a project from 1997 to 2003 to promote the development of the Chilean basket willow sector. The focus was on improving product quality, developing the domestic market and increasing exports of raw material and

Field of **Salix viminalis** *aged one year*



E. BEUKER

Basket willow switches are harvested in autumn and winter, when the plants have shed their leaves

M. ABALOS

Harvested switches are traditionally stored in pools of water until they start to put out shoots in the spring; then the bark is stripped by hand with knives

D. KAJBA

M. ABALOS

Larger-scale producers use electric machines to strip the bark

M. ABALOS

Switches are dried after stripping

M. ABALOS

Sorting and bundling of switches according to length, diameter and defects

products, especially furniture. The project involved the whole sector, from production to small-scale craftwork to basket willow industry (see Figure).

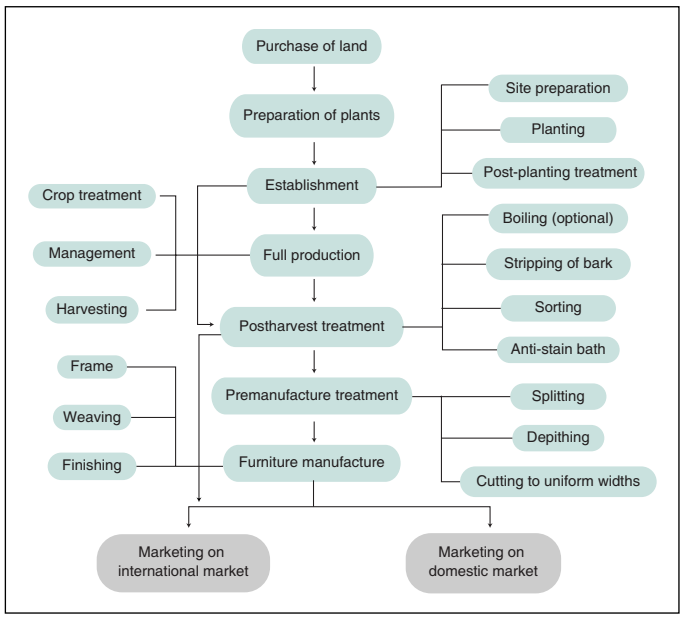
One myth

The Chimbarongo artisans shared an ingrained belief that it takes many years to train an artisan and that only men have the necessary skill and dexterity to learn the craft. This belief was preventing the involvement of women and the extension of skills to other parts of the country.

The strong hold of this myth among the Chimbarongo artisans governed their working conditions, as well as prices, delivery times, working hours and types of product, thus preventing the implementation of projects put forward by businesses that were attracted by the unique qualities of basket willow and came to settle in Chimbarongo.

Transfer of skills was needed to stimulate competition and to generate new opportunities for rural populations in other places where basket willow cultivation had proved successful. The project therefore sponsored courses in the rural areas where basket willow trials had been set up, and about 120 people from those areas were trained in basket willow manufacturing techniques. The learning period turned out to be short (two or three months); people obtained further experience on the job and were thus able to improve the quality of their output.

Most of the beneficiaries of these courses were women, who wanted to contribute to their families' income and improve their role in the community, and were thus very keen to learn. The results showed that women had considerable capacity for working in basket willow, an activity that is also viewed positively because it allows them to generate income while still caring for their home and children. In due course female artisans formed organized groups, for whom workshops on the production and marketing of their output were then held with the support of the local government.



Stages in basket willow production in Chile

M. ABALOS

Training courses in basket willow manufacturing techniques were attended mainly by women, who had traditionally been excluded from the craft

Another myth: absent market

In the late 1990s, as a result of the stagnation of the basket willow sector in Chimbarongo, products – mainly basketwork – were being sold on the domestic market at very low prices, leading to a belief that basket willow was little appreciated in the country.

A market survey carried out by the project among medium and high socioeconomic groups in the country's largest consumer centre, Santiago, revealed that of 300 households, almost half had some type of basket willow furniture. The survey also revealed that 34 percent of these households used basket willow furniture in their second homes in the country or at the sea, and that in these cases its presence rose. However, consumers were dissatisfied with quality, uninspiring designs and substandard finishing. They said that if the quality were improved, the demand would grow, since such furniture fits in well in various areas of the home and goes with many styles of décor.

At the same time, market surveys carried out in Europe and Central America revealed considerable interest in Chilean basket willow products, especially furniture. However, if the demand was to be met, the quality needed to be improved and quantities needed to be increased to balance the high transport costs. These findings indicated the need to attract investments and to develop production in such a way as to combine artisanal work with the tools of business management.

As a result of these findings, the project initiated work to improve the manufacturing processes used for basket willow products, particularly furniture. It promoted the use of screws instead of the traditional nails, as well as the use of iron in the structure and the improvement of joints, assembly and finishing. The development of new designs was also promoted.

Courses and technical assistance were provided regarding quality control. A technological tour was organized for a group of artisans, giving them an opportunity to visit rattan furniture production centres in Asia and major showrooms and trade fairs in Europe and Central America, so that they could see for themselves the production systems adopted, the quality of the products, and current fashions and trends.

With a view to improving furniture design, the project established collaboration with the design schools of the country's main universities, which included work with basket willow in their workshops, setting up partnerships among designers, artisans and furniture companies, and creating new applications for the material. The designs were later shown at the first basket-willow furniture fair.

This learning process for both technical experts and artisans led to the formulation of two quality standards by the Standards Institute of Chile: Standard 2039 of 1998 on "Basket willow, physical features and categories of quality for raw material", which established the classification and physical features that basket willow must comply with as raw material for the furniture industry and wickerwork; and Standard 2532 of 2000 on "Requirements and quality to be met by basket willow furniture".

CONCLUSION

Expansion of the basket willow sector offers potential economic, social and environmental benefits. Seven years' work by INFOR with artisans and rural communities has clearly upgraded an activity that was in decline and has improved knowledge of cultivation and production of basket willow. ◆

FAO Committee on Forestry – continuing to grow

The eighteenth session of the Committee on Forestry (COFO), the most important FAO statutory body in forestry, was held at FAO headquarters in Rome, Italy, from 12 to 16 March 2007. Judged a great success, the meeting attracted almost 600 participants from governments, intergovernmental organizations and non-governmental organizations.

The biennial sessions of COFO bring together heads of forestry services and other senior government officials to identify emerging policy and technical issues, seek solutions and advise FAO and others on appropriate actions to take. COFO reports to the Council of FAO. Participation in COFO is open to all FAO member countries.

In addition to decisions relating to FAO's programme of work, delegates addressed substantive issues such as forests and energy, forest protection, community-based sustainable forest management and progress towards sustainable forest management. FAO also presented the *State of the World's Forests 2007* (see "Books" section of this issue), analysing progress towards sustainable forest management.

Enriching the meeting were a wide range of side events, information sessions and in-session seminars featuring numerous partners along with FAO. Subjects covered included national forest programmes and poverty alleviation, fire management, forest health, forest tenure, small- and medium-scale forest enterprises, watershed management, the interface between forestry and agriculture, and reducing carbon dioxide emissions from deforestation.

Other attractions included an atrium exhibit displaying the work of FAO and other forest-related organizations, a poster exhibit summarizing the work of 88 FAO forestry projects, a forestry photo display drawn from an international contest sponsored by FAO (see p. 94) and a display of rare forestry books dating back to the eighteenth century. At the opening reception, an international children's choir sang about trees and forests.

In welcoming remarks the first day, FAO Deputy Director-General David Harcharik reviewed the good and the bad news – that forest area is stable or increasing in 57 countries, but that forest area declined in 83 countries in the first five years of the new millennium. "Climate change is creating conditions that increase the threats to forest health in many ecosystems, especially fragile boreal forests", he said. "And external forces – including poverty and underdevelopment, expanding populations

Visitors to the COFO atrium exhibit; rare forestry books on display in the David Lubin Memorial Library; forestry photo contest; and posters depicting FAO projects

FAO/G. NAPOLITANO

Weaving knowledge into development

As emblems of the slogan "Weaving knowledge into development", FAO distributed handicraft items made from non-wood forest products to COFO delegates: document folders woven from bamboo by a village cooperative in the Lao People's Democratic Republic (left photo), and cords for meeting passes hand-woven by Guatemalan villagers and vibrantly coloured with natural dyes derived from forest plants (right photo). An FAO project has been assisting such small village enterprises to develop their businesses and market their products, thus assisting livelihoods and promoting better management of the resources. The colourful woven cords enlivening delegates' attire throughout the week were a vivid reminder of how knowledge and skills handed down from generation to generation can contribute to local economic development.

FAO/S. GROUWELS

ISD/D. BIRCHALL

and difficult economic conditions – are putting pressure on forests that are often beyond the capability of forest managers to control. In fact, the countries that are facing the most serious challenges in achieving sustainable forest management are those with the highest rates of poverty and civil conflict."

Substantive agenda items

As noted by Harcharik in his opening speech, wood has always been the leading source of energy in many countries, but biofuel alternatives to fossil fuels are now being sought at a much more aggressive pace than in the past – which calls for attention to economic and environmental dimensions of wood energy. The COFO session on forests and energy emphasized the need for comprehensive and integrated national bioenergy strategies and integration of wood energy issues in national forest programmes or other forest strategies; for analysis of the social, economic and environmental impacts of changes in the use of wood for energy generation; and for dialogue at the national and regional levels to help increase institutional and technical capacity related to the sustainable production and consumption of bioenergy, including wood energy.

Harcharik also noted the timeliness of addressing forest protection, pointing out that there is strong evidence that the increasing severity of forest fires and pest infestations in some countries is related to global warming. "The health of many forests is more than ever threatened by insects, disease and fire", he noted. "Poor forest health, in turn, poses a direct threat to biodiversity as well as to many other goods and services provided by forests and is good reason for COFO to take a new look at forest protection, perhaps by considering a more integrated, long-term and strategic approach." The session on forest protection emphasized exchange of information and experiences on wildfires, pests and invasive species through networking, capacity building and international cooperation.

A session on community-based sustainable forest management, entitled "Putting forests to work at the local level" emphasized the importance of establishing secure forest tenure, transparent and simple legal procedures, incentives aimed at economic sustainability, development of community-based enterprises, capacity-building in local communities and conflict prevention among stakeholders. Discussions noted that property rights and community landownership have lagged behind other reforms in forest governance.

FAO presented voluntary guidelines on responsible management of planted forests and on fire management which had been developed through a multistakeholder process. The

Winning entries

Autumn fall
Csaba Jekkel, Hungary (winner)

Near Biala Podlaska
Wojciech Gil, Poland

COFO 2007 Forestry Photo Contest

Branches reflected on the Danube River
Czimbal Gyula, Hungary

In an arid desert
Alireza Shahriar, Islamic Republic of Iran

committee welcomed the guidelines and recommended that members and forestry stakeholders make use of them. COFO also recommended that the guidelines be maintained as living documents, to be updated and improved by incorporating feedback from implementation at the country level. The committee invited FAO to strengthen the implementation of guidelines for reduced-impact forest harvesting, and to prepare additional voluntary guidelines for arid and semi-arid zone forests and for trees outside forests, through a similar process.

Other recommendations concerned the development, promotion and implementation of management tools to bridge the gap between policy and actions at all levels, with an emphasis on intersectoral and landscape approaches; continued support to national forest programmes (including continued collaboration with the National Forest Programme Facility); and continued promotion of best practices to improve law compliance in the forest sector. COFO recommended that FAO, in collaboration with the United Nations Framework for the Convention on Climate Change (UNFCCC), assist in capacity-building to develop and implement climate change mitigation and adaptation measures, including reduction of emissions from deforestation. The committee emphasized FAO's role as a knowledge and communication centre for forestry that should stress information and analysis in support of sustainable forest management. The committee also supported further strengthening of the Regional Forestry Commissions.

Special event

The day before the official start of COFO, delegates were welcomed by FAO Director-General Jacques Diouf to a Special Event on Climate Change, at which Nigerian President Olusegun Obasanjo delivered the keynote address. Presenters noted that deforestation accounts for 18 percent of greenhouse gas emissions causing climate change, stressed interlinkages between forests, climate change, biodiversity and watershed management, and examined climate change impacts on agriculture and forestry, including pest and disease migration and increased forest fire risk. That afternoon, a Forum on Forests and Energy reviewed bioenergy derived from wood, noting that half of all trees harvested are burned, and that new technologies can increase energy efficiency. The forum also noted that forest industries have a role in addressing climate change through sustainable forest management, recycling and the substitution of wood for more energy-intensive materials such as steel and concrete.

Satisfied participants

The *Earth Negotiations Bulletin* (see www.iisd.ca) reported that "the eighteenth session of FAO's Committee on Forestry may be recorded in the annals of history as one of its most successful forest-related meetings. The meeting was superbly organized, disciplined but broadly participatory and accommodating, richly informative and always running on time. Delegates found the massive exchange of information gratifying. ... Some veteran participants described COFO18 as the most substantive forest policy meeting in years." ENB also praised the exchange of substantive technical information, freedom from political constraints and controversy, and information intensity.

The final report is available at ftp://ftp.fao.org/docrep/fao/meeting/012/j9643e.pdf

Alliance for action launched at international fire conference

Fire is an important tool in agriculture and ecosystem maintenance. Wildfires, however, which are frequently the result of negligence or arson, destroy millions of hectares of forests and woodlands, resulting in loss of human and animal life and immense economic damage. Fires are increasing as a result of climate change, and they are affecting larger areas and becoming more severe in several regions. National and international fire management policies, developed through cooperation with all stakeholders, are essential for the protection of landscapes, ecosystems, people and property.

Since the late 1980s, a series of international conferences has brought together technical fire management experts and the authorities concerned with policy and national practices in wildland fire management. The most recent, the fourth International Wildland Fire Conference, was held in Seville, Spain from 14 to 17 May 2007 and was attended by more than 1 500 participants. It was held under the auspices of the United Nations International Strategy for Disaster Reduction (UNISDR), FAO and the European Commission, and hosted by the Government of Spain and the Regional Government of Andalusia.

The meeting addressed the full range of fire management activities including monitoring, early warning, preparedness, prevention, suppression and restoration. It looked at the state of the art in fire science, fire management and fire management training.

FAO and its partners presented an update on a global strategy to enhance international cooperation in fire management, being developed at the request of the Ministerial Meeting on Forests held at FAO in 2005. The strategy, elaborated through a participatory process, includes a recently published global assessment of fire management (see "Books" section of this issue); a review of international cooperation; and Fire Management Voluntary Guidelines (available at www.fao.org/docrep/009/j9255e/j9255e00.htm).

A Fire Management Actions Alliance was launched at the conference to promote, implement and update the voluntary guidelines and to enhance international cooperation in fire management at all levels. Initially 35 partners – national agencies, universities and international organizations – joined the alliance.

The meeting also set forth recommendations to promote:

- global resource sharing to assist countries with fire management planning activities;
- development of regional strategies for fire management;
- research to address the consequences of climatic, land use and land cover, and socio-economic changes on fire regimes;
- the UNISDR global and regional Wildland Fire Networks.

South Africa offered to hold the next conference, tentatively planned for 2011.

The Conference Statement can be found at: www.fire.uni-freiburg.de/sevilla-2007/Conference-Statement-en.pdf

Second outlook study for Asia and the Pacific

In recent years, unprecedented economic, social and environmental change in the Asia and the Pacific region has significantly altered the way its forests are regarded and used. To examine the implications of these changes for forestry and to support policy review and reform, the Asia-Pacific Forestry Commission (APFC), in partnership with member countries and other international organizations, has launched the second Asia-Pacific Forestry Sector Outlook Study (APFSOS II).

APFC sponsored the first APFSOS – a projection to the year 2010 – from 1996 to 1998. Since then, the study has served as a benchmark for other regions; FAO, in partnership with countries, has now carried out similar studies for Africa, Europe, Latin America and the Caribbean, and West and Central Asia. These outlook studies have an invaluable role in delineating the links between the future of forests and other domains, and helping to steer strategic planning and policy and project design related to sustainable forest management.

In April 2006, the twenty-first session of APFC recommended that the first outlook study be revisited and extended to the year 2020. APFSOS II is a wide-ranging initiative to gather information, review trends, and examine choices for action and their likely outcomes. Its specific objectives are:

- to identify emerging socio-economic changes that have an impact on forests and forestry;
- to analyse probable scenarios for forestry developments to 2020;
- to identify priorities and strategies to address emerging opportunities and challenges.

APFSOS will help countries place their own policy objectives in a regional and global context, to facilitate better national policies and planning.

The study commenced in October 2006 and is expected to be completed by December 2008. Country papers are being prepared through national focal points between March and October 2007. At the same time, selected authors and partners are preparing thematic studies on a dozen topics of crucial interest to the development of forestry in the region. Workshops were held in February 2007 to brief the national focal points on how to develop the country papers and outlook scenarios. A Scientific Committee has been established to provide overall technical guidance.

The process will culminate in a regional conference entitled "The Future of Forests in Asia and the Pacific: Outlook for 2020" to be held in Chiang Mai, Thailand from 16 to 18 October 2007. Diverse stakeholders will share their views on emerging changes, probable scenarios and their implications for forests and forestry in the region.

The study team has launched a newsletter to inform partners of progress and share information. To subscribe or to obtain more information, contact:

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Towards a better understanding of forest tenure issues

Deforestation and forest degradation resulting from population growth, agricultural expansion, increasing demand for wood products, illegal logging, industrial development, unsustainable commercial trade of non-wood forest products and rapid economic growth have triggered debate not only on the effectiveness of public-sector forest management but also on forest resource tenure and institutional arrangements. Over the past 20 years, many countries have increased efforts to empower local communities, to decentralize and devolve decision-making and to increase private-sector involvement in forest management. However, tenure issues are still a root cause of poor performance in the forestry sector.

To improve understanding of the nature and implications of forest tenure, FAO organized a technical meeting at its headquarters in Rome from 12 to 14 February 2007.

The meeting, entitled "Understanding forest tenure", sought to define strategies for supporting forest tenure diversification which could not only enhance sustainable forest management, but also support forest-based poverty alleviation.

Presentations on major forest tenure trends at the regional level, in South and Southeast Asia, Africa and Europe, served as a basis for identifying best practices in forest tenure diversification. Non-governmental and civil-society organizations also presented their perspectives.

Working groups identified the main actors for forest tenure diversification. They also identified key principles for forest tenure reform, common messages based on these principles, and means of disseminating the messages to raise awareness of forest tenure issues and influence and engage main actors and policy-makers.

Finally, the participants identified strategies and actions for future

work in this area, including possible collaborative activities and synergies.

The meeting was attended by more than 30 representatives of government institutions, research and development organizations, FAO, other UN agencies, non-governmental organizations and other international organizations that have practical experience with issues related to forest tenure and in particular with forest tenure diversification.

Short course for forest policy-makers

Enhanced capacity for forest policy analysis, development and implementation was one of the key needs identified by countries at the twenty-first session of the Asia-Pacific Forestry Commission in April 2006. In response to the delegates' recommendation that FAO assist in this area, FAO's Regional Office for Asia and the Pacific developed the first "Executive Education – Forest Policy Short Course", which was held from 22 April to 4 May 2007 in Nonthaburi, Thailand. The course was organized in collaboration with the National Forest Programme Facility, the International Tropical Timber Organization (ITTO), the United States Forest Service, the Thailand Environment Institute (TEI) and the Economy and Environment Program for Southeast Asia (EEPSEA).

The course brought together experienced international foresters, forest policy-makers and professional educators. The course facilitators integrated topics related to analytical and communication skills with an in-depth exploration of the economic, environmental and social issues that make forestry a uniquely challenging area for effective policy-making and implementation.

The 18 participants attending the first course originated from Cambodia, China, Indonesia, Malaysia, Palau, the Philippines, Thailand, Timor-Leste, Viet Nam and the Land Resources Division of the Secretariat of the Pacific Community, based in Suva, Fiji. The core group consisted of mid- to upper-level forestry professionals playing important roles in all or part of the policy process.

Overall, participants viewed the course as successful. Their recommendations will be taken on board to encourage the active engagement of participants in discussions and group work and to increase the effectiveness of future courses. It is hoped that the initiative will serve as a model for other regions.

Countries adopt non-legally binding instrument

Delegates to the seventh session of the United Nations Forum on Forests (UNFF-7) successfully negotiated a non-legally binding instrument for sustainable forest management and UNFF's Multi-Year Programme of Work for 2007 to 2015. Nearly 600 participants attended the session, which was held at UN headquarters in New York from 16 to 27 April 2007. Consensus was reached on previously controversial issues such as inclusion of good governance as a prerequisite for the achievement of sustainable forest management. However, discussion on how to finance sustainable forest management was deferred to UNFF-8.

During the meeting, delegates also participated in multistakeholder dialogues with major groups (e.g. youth, women, small forest owners, non-governmental organizations, indigenous peoples, scientific communities and labour). A panel discussion was held with member organizations of the Collaborative Partnership on Forests (CPF), addressing ways to enhance cooperation. UNFF also launched preparations for the 2011 International Year of Forests.

Negotiations for the new instrument centred on a draft text put forward by an ad hoc expert group which met in December 2006. The instrument will be submitted through the Economic and Social Council (ECOSOC) for adoption by the UN General Assembly later in 2007. For all practical purposes it can be concluded operational.

The purposes of the instrument are to enhance the contribution of forests to the achievement of internationally agreed development goals, including the Millennium Development Goals (MDGs); to provide a framework for national action and international cooperation; and to strengthen political commitment and action for effective implementation of sustainable forest management for all types of forests and for achieving four shared Global Objectives on Forests agreed by UNFF in 2006. These are summarized as:

- to reverse the loss of forest cover worldwide through sustainable forest management and increase efforts to prevent forest degradation;
- to enhance forest-based economic, social and environmental benefits, including by improving the livelihoods of forest dependent people;
- to increase significantly the area of protected and sustainably managed forests, as well as the proportion of forest products from sustainably managed forests;
- to reverse the decline in official development assistance (ODA) for sustainable forest management and mobilize significantly increased additional financial resources.

In the preamble, Member States reaffirm their commitment to the United Nations Conference on Environment and Development (UNCED) Declaration on Environment and Development, the Forest Principles, the MDGs, and the four Global Objectives on Forests, including to make progress towards their achievement by 2015.

The text recognizes that each State is responsible for the sustainable management of its forests and for the enforcement of is forest-related laws and calls for the transparent involvement of local communities, forest owners and other relevant stakeholders in forest decision-making processes that affect them.

The text also states that countries should monitor and assess progress towards achieving the purpose of the instrument. UNFF will address the implementation of the instrument within the context of its Multi-Year Programme of Work. Countries should submit voluntary progress reports, as resources allow, as part of their regular reporting to UNFF.

Summary from the non-legally binding instrument: Actions that Member States should undertake through national policies and measures

- Develop and implement national forest programmes and integrate them in poverty reduction strategies
- Use the seven thematic elements of sustainable forest management
- Promote efficient production and processing of forest products
- Support traditional forest-related knowledge and fair and equitable sharing of benefits
- Develop financial strategies and create enabling environments for investment in sustainable forest management
- Encourage valuation of forest goods and services and reflection of values in markets
- Strengthen forest legislation and forest law enforcement and promote good governance
- Address threats to forest health and vitality
- Create and maintain networks of protected forest areas and assess their effectiveness
- Strengthen the contribution of science and research to forest policies and programmes
- Strengthen access to education, training and extension
- Strengthen public awareness of the importance of forests
- Enhance cooperation, partnerships and cross-sectoral integration of forest strategies
- Enhance access to forest resources and markets to support livelihoods and income diversification from forest management

Multi-Year Programme of Work

The session concluded that hereafter UNFF will meet every two years instead of annually. The next three sessions will be focused on achieving the four global objectives and implementing the non-legally binding instrument. Upcoming sessions will consider the following themes:

- UNFF-8: Forests in a changing environment and means of implementation for sustainable forest management;
- UNFF-9: Forests for people, livelihoods and poverty eradication;
- UNFF-10: Forests and economic development;
- UNFF-11: Forests: progress, challenges and the way forward for the international arrangment on forests.

Within these themes, each session will also address means of implementation and forest law enforcement and governance. Future sessions will have regional and subregional inputs; multistakeholder dialogues and participation; and panels with CPF members. Emerging issues may also be included. The focus is expected to be more on exchange of experiences than on negotiating text.

High-level ministerial segments are planned for 2011 and 2015. UNFF may convene ad hoc expert group meetings, and welcomes country-, organization- and region-led initiatives focused on issues in the Programme of Work.

Regarding means of implementation of sustainable forest management, the non-legally binding instrument and the global objectives, the meeting recognized that a detailed approach to forest financing could not be agreed at UNFF-7. It was decided instead to consider a global financial mechanism, portfolio approach or forest financing framework at UNFF-8. The forum will propose to ECOSOC that an open-ended ad hoc expert group be convened to develop proposals in this regard.

All in all, UNFF-7 succeeded in fulfilling its objectives and has ensured the forum's future until at least 2015. The success in negotiating the instrument – and perhaps even more, the agreement on the Multi-Year Programme of Work – reaffirms the importance of keeping forests and sustainable forest management on the UN agenda, urges priority to forest issues on the national development agendas and emphasizes national forest programmes.

UNFF-8 will be held from 20 April to 1 May 2009.

The report of the meeting and the text of the non-legally binding instrument are available on the UNFF Web site: www.un.org/esa/forests

New ITTO Executive Director elected

Emmanuel Ze Meka of Cameroon has been elected Executive Director of the International Tropical Timber Organization (ITTO). The election was the most important agenda item at the forty-second session of the International Tropical Timber Council, the governing body of ITTO, held from 7 to 12 May 2007 in Port Moresby, Papua New Guinea. Ze Meka identified his four priorities as greater social responsibility, including equity in benefit sharing and good governance; poverty alleviation and global partnership for development; increased industrial competitiveness through value addition, technological advances, capacity building, and overcoming tariffs and non-tariff barriers; and reducing deforestation and increasing forest cover to combat climate change.

ITTO, headquartered in Yokohama, Japan, provides a framework for member countries to discuss and develop policies on issues relating to international trade in and use of tropical timber and the sustainable management of its resource base. The ITTO also administers assistance for related projects. ITTO has 60 members which are divided into two caucuses: producer countries (33 members, including the European Community) and consumer countries (27 members). ITTO's membership represents 90 percent of world trade in tropical timber and 80 percent of the world's tropical forests.

Six candidates were in the running for Executive Director, from Cameroon, Germany, Indonesia, the Philippines, Switzerland and the United States. Although some present pointed out that the leader of ITTO should not be classified as a "producer" or "consumer", the election nevertheless divided consumer and producer groups. An impasse between the two caucuses was finally resolved by the gracious withdrawal of the other leading contender, the German candidate Jürgen Blaser. This made way for the election of Ze Meka by consensus.

Other issues on the agenda concerned operational, project and policy work, including:

- the annual review and assessment of the international tropical timber situation;
- new listing proposals under the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), and the relationship between ITTO and CITES;
- forest law enforcement and governance in the context of sustainable timber production and trade;
- the ITTO Objective 2000;
- ITTO guidelines for the restoration, management and rehabilitation of degraded and secondary tropical forests;
- civil society and private-sector partnerships for sustainable forest management;
- forest-related developments in the United Nations Framework Convention on Climate Change (UNFCCC).

UNEP Champions of the Earth include defender of Brazilian forests

Seven Champions of the Earth were honoured by the United Nations Environment Programme (UNEP) during an awards ceremony in Singapore on 19 April 2007. The award, established in 2004, recognizes prominent and inspirational environmental leaders from each region of the world.

Marina Silva of Brazil was recognized for her tireless fight to protect the Amazon tropical forest while taking into account the perspectives of people who use the resources in their daily lives. Silva has championed the objectives of the Convention on Biological Diversity concerning conservation, sustainable use and equitable sharing of the benefits of biodiversity. As a member of Brazil's senate, she has successfully legislated tropical forest conservation, defended people against poverty and protected their way of life. As the Brazilian Minister for Environment since 2003, she has helped stem deforestation by implementing a cross-sectoral approach to environmental issues.

Al Gore of the United States was honoured for making environmental protection a pillar of his public service and for educating the world on the dangers posed by rising greenhouse gas emissions. During his 16-year career in the United States Congress, he led efforts to clean up toxic dumps and held the first hearing on global climate change. As Vice-President, Gore expended great efforts to protect habitat across the United States and expand national parks and wildlife refuges. He also helped negotiate and draft the Kyoto Protocol. Since the conclusion of his public service he has continued to work on behalf of the environment, including through the critically acclaimed documentary *An Inconvenient Truth.*

Cherif Rahmani, Minister for Environment of Algeria, President of the foundation Déserts du Monde and Honorary Spokesperson of the United Nations International Year of Deserts and Desertification, was honoured for advancing environmental law in his country and for his contributions in addressing desertification.

His Royal Highness Prince Hassan Bin Talal of Jordan received the award for his efforts on behalf of transboundary collaboration to protect the environment and his holistic approach to environmental issues. As founder of a number of Jordanian and international environmental institutions and as President of Jordan's Higher Council for Science and Technology, he has focused on enhancing the quality of life in dryland areas and on environmental management and protection, especially water quality management.

Elisea "Bebet" Gillera Gozun of the Philippines was honoured for her leadership of several projects to reduce pollution by industrial effluents and to monitor environmental performance of industries. By winning the trust of business leaders, non-governmental organizations and political decision-makers, she successfully pushed for the introduction of community-based waste recovery, recycling and reuse in the Philippines.

Finally, Viveka Bohn of Sweden, head of the Swedish project secretariat for the World Summit on Sustainable Development and co-chair of the Marrakech process, was recognized for her role in multilateral negotiations and her leadership in global efforts to ensure chemical safety.

In addition, a special prize was awarded to Jacques Rogge and the International Olympic Committee for providing greater resources to sustainable development and for introducing stringent environmental requirements for cities bidding to host Olympic Games.

UNEP invites nominations of individuals who have made a significant and recognized contribution globally, regionally and beyond, to the protection and sustainable management of the Earth's environment and natural resources. No monetary reward is attached to the prize.

International Day for Biological Diversity

"Biodiversity and Climate Change" was the theme of the 2007 International Day for Biological Diversity, celebrated 22 May with leadership by the Convention on Biological Diversity (CBD).

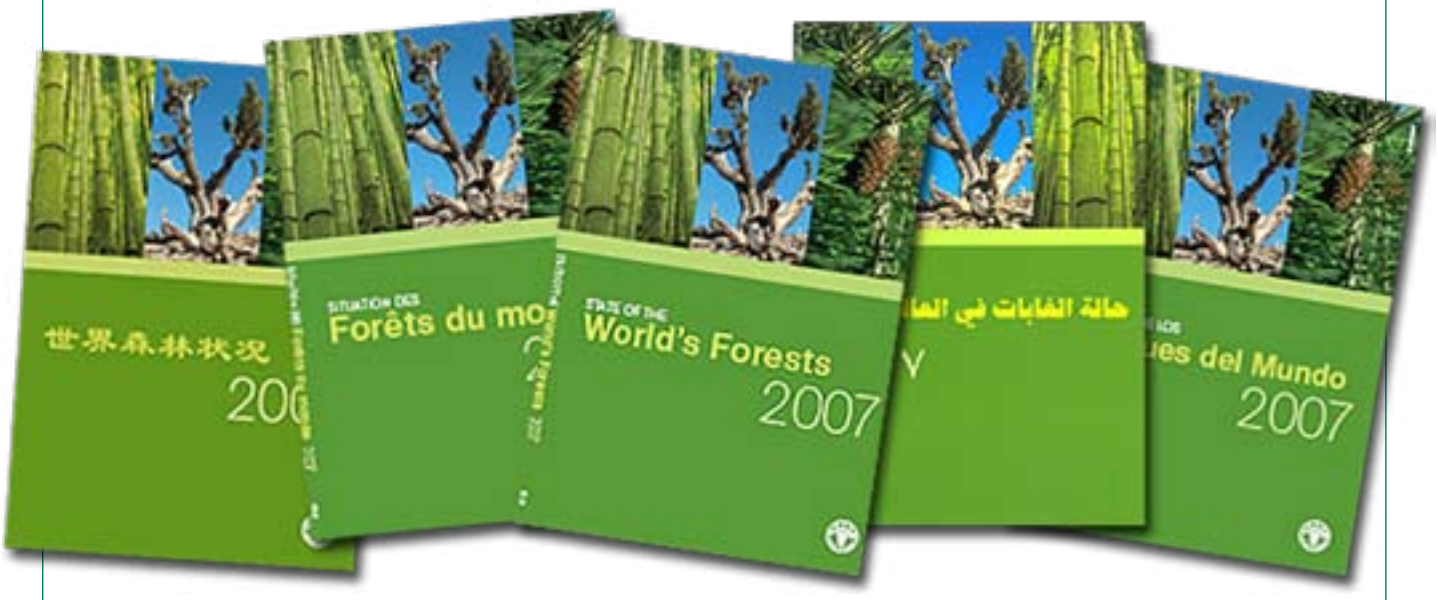
The theme raised awareness not only that biodiversity loss will accelerate as a result of climate change, but also that biodiversity can help defend against the impacts of climate change. The interrelationship of biodiversity and climate change was echoed in comments by the heads of CBD and the United Nations Framework Convention on Climate Change (UNFCCC), who noted that the stemming of biodiversity loss needs to be part of climate change adaptation strategies, and that the CBD should continue to contribute actively to further work on impacts, vulnerability and adaptation to climate change.

To mark the day, the CBD Secretariat, in partnership with the City of Montreal, sponsored a High-Level Event at the Montreal Botanical Garden. The day-long conference looked at evolution in biodiversity and climate change issues since the signing of the Convention on Biological Diversity and the United Nations Framework Convention on Climate Change 15 years ago.

Also in Montreal, CBD co-sponsored a Public Conference on Climate Change and Biodiversity, attended by more than 1 000 people. It featured Jean Lemire, a biologist, filmmaker and expedition leader, whose pictures and video footage exhibited the magnitude of climate change in the Antarctic region and its serious impact on Antarctic wildlife.

Celebrations were organized or promotions carried out by 38 countries, the European Community and a number of partner organizations.

BOOKS



Latest edition of FAO's flagship publication on forests

State of the World's Forests 2007. 2007. Rome, FAO. ISBN 978-92-5-105586-1.

FAO's biennial *State of the World's Forests* series offers a global perspective on the forest sector, including its environmental, economic and social dimensions. The seventh edition examines progress towards sustainable forest management. It has a new structure and look – with many more graphics than in the past.

The analysis reveals that some countries and some regions are making more progress than others. Most countries in Europe and North America have succeeded in reversing centuries of deforestation and are now showing a net increase in forest area. Most developing countries, especially those in tropical areas, continue to experience high rates of deforestation and forest degradation. The countries that face the most serious challenges in achieving sustainable forest management are, by and large, the countries with the highest rates of poverty and civil conflict.

Part I reviews progress region by region. Each regional summary is structured according to the seven thematic elements of sustainable forest management agreed by international fora as a framework for sustainable forest management: extent of forest resources; biological diversity; forest health and vitality; productive functions of forest resources; protective functions of forest resources; socio-economic functions; and legal, policy and institutional framework. The regional reports synthesize the most current information available, including data gathered by FAO for the Global Forest Resources Assessment 2005 (FRA 2005) (which was, in turn, based on country reports submitted to FAO and the contributions of over 800 people, including 172 national correspondents), the FAOSTAT online database (compiling economic information provided by countries) and recent FAO regional forestry sector outlook studies, as well as input from FAO partners.

Part II presents selected issues in the forest sector. In a few pages each, FAO specialists present the state of knowledge or latest activities on 18 topics of interest to forestry – including climate change, forest landscape restoration, forest tenure, invasive species, wildlife management and wood energy, to name just a few.

State of the World's Forests 2007 will be a useful reference for policy-makers, foresters, academics and all readers concerned with the major issues affecting the forest sector today.

The publication is available online at: www.fao.org/docrep/009/a0773e/a0773e00.htm

Worldwide assessment of fire management

Fire management – global assessment 2006. 2007. FAO Forestry Paper No. 151. Rome, FAO. ISBN 978-92-5-105666-0.

Fire management is an essential part of sustainable forest management. Fires in forests, woodlands and rangelands, and in the interfaces between agriculture and forestry and between wildland and residential or urban areas, are a major threat to human life, health and livelihoods, to economic development and to the environment. Evidence suggests that climate change and the increasing spread of urban development into rural areas could greatly increase this threat.

This publication complements the Global Forest Resources Assessment 2005 (FRA 2005) as an in-depth thematic study on the incidence, impact and management of forest fires in all regions of the world. It was developed from 12 regional papers prepared within the framework of the Global Wildland Fire Network of the United Nations International Strategy for Disaster Reduction.

It comprises both regional summaries and a global analysis. It provides the best estimate of the global fire situation to date and gives a good indication of the scale of the impact of vegetation fires on society, the economy and the environment.

"Fire management" is defined as involving protection (early warning), preparedness, prevention, response and suppression, restoration/rehabilitation and monitoring. The report recognizes that not all fires are destructive. Indeed, some ecosystems require fire to induce regeneration and to maintain or enhance biodiversity, agricultural productivity and the carrying capacity of pastoral systems. The study also finds that people are the overwhelming cause of fires in every region, for a wide range of reasons.

The report estimates from satellite data that about 350 million hectares were affected by vegetation fires worldwide in 2000. Most of the area burned was in sub-Saharan Africa, much of it forest and woodland. However, the report notes that the lack of long-term, consistent data makes it impossible to identify trends in the global number of fires or the area burned. The study highlights the challenges of gathering reliable and current information on fire.

The report indicates that many countries expend considerable resources in fire detection and suppression, primarily through human resources on the ground, but increasingly through satellite systems and aerial firefighting. However, the use of expensive suppression measures may divert funds and personnel from preventive measures which can avert catastrophic fire outbreaks in the first place.

Thus much more must be done to help the general public and policy-makers understand the magnitude of this threat and take long-term preventive action. Collection of information at the country level is urgent in order to quantify the impact and scale of the problem, detect trends and raise awareness. Political commitment is essential to prevent unplanned fires from continuing to have negative impacts on forests and livelihoods around the world.

This global assessment will be of interest not only to fire specialists, but also to policy-makers, forest managers and those involved in collecting reliable and current information on fire in different types of vegetation. It is an important contribution to FAO's efforts to enhance international cooperation in fire management.

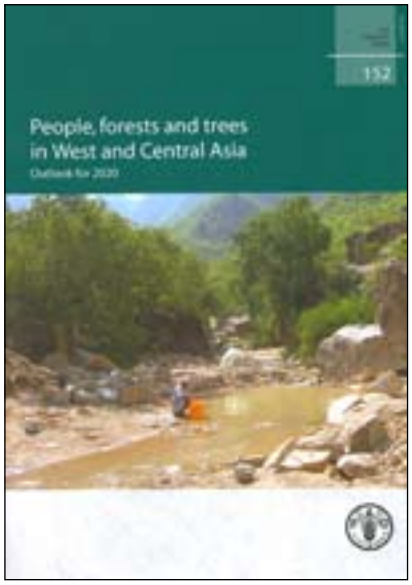
The report is available online at: www.fao.org/docrep/009/a0969e/a0969e00.htm

Future role of forests and trees in West and Central Asia

People, forests and trees in West and Central Asia – Outlook for 2020. 2007. FAO Forestry Paper No. 152. Rome, FAO. ISBN 978-92-5-105671-4.

Most countries in West and Central Asia are making substantial efforts to improve the management of their forest and tree resources, with governments, the private sector, communities, farmers and civil society organizations all playing a role. However, they face many challenges. This publication, the main report of the Forestry Outlook Study for West and Central Asia (FOWECA), provides a long-term perspective of changes that can be expected in the forest sector. The study covered 23 countries in West Asia, Central Asia and the southern Caucasus and was implemented in partnership with them.

The report outlines the likely developments in and beyond the sector, including broader regional and global issues which need to be taken into account in developing national forest policies and programmes. It then discusses what needs to be done to enhance



Updated CD-ROM: *Unasylva* 1947–2006

FAO produced the first CD-ROM containing the complete contents of *Unasylva* in 2001; it covered issues through the year 2000. Owing to popular demand, it has been out of stock for some time. This updated CD-ROM package, published in celebration of the journal's sixtieth anniversary, contains the entire collection of *Unasylva* from 1947 through 2006 on three CD-ROMs containing separate English, French and Spanish editions.

A sophisticated free-text search enables readers to seek information published through the years on any forest-related subject.

To request a copy, send an e-mail to: unasylva@fao.org

the contribution of forests and trees to society. The report focuses particularly on probable development scenarios, their implications for society in terms of the availability of goods and services, and the priorities and strategies that may be pursued to improve the situation.

Unfavourable environmental conditions limit the ability of the region to produce wood to meet its growing demand. The report points out that imports of wood and wood products, valued at about US$12.7 billion in 2005, are likely to double in the next 15 years if current trends in income and demographics persist. The report also notes the growing demand for woodfuel, especially charcoal, despite the availability of fossil fuels.

The study concludes that arresting desertification, protecting watersheds and improving vegetation, especially in urban centres, will remain the most important functions of forests and trees in the region. Because of low forest cover and a high state of degradation of vegetation, increased efforts to enhance the environmental services provided by forests and trees are required urgently. Rapid urbanization will necessitate significant investments in urban greening to improve the quality of life. Policies need to be updated and institutions strengthened. Stability and peace are also critical; conflicts and instability are major factors adversely affecting conservation and management of forests and woodlands in the region.

The report emphasizes the need for intercountry collaboration to address many of the common issues, including watershed degradation, desertification, forest fires and pests and diseases.

FAO undertakes global and regional forest sector outlook studies at regular intervals to provide and analyse future scenarios. These studies help to improve the formulation and implementation of forest policy. This analysis will be of particular interest to planners, investors and decision-makers at the regional, subregional and national levels.

The report is also available in Arabic and Russian. The online version can be found at: www.fao.org/docrep/009/a0981e/a0981e00.htm

Neoliberalism and the failure to halt deforestation

Logjam: deforestation and the crisis of global governance. D. Humphreys. 2006. London, UK & Sterling, Virginia, USA, Earthscan. ISBN 978-1-84407-301-6.

On one level, *Logjam* is a comprehensive overview of the major international processes that are attempting to address the problem of tropical deforestation. The author, David Humphreys, a British professor, starts with a tour through the international forest dialogue and notes its failure to address deforestation on a global scale. Regarding the United Nations Forum on Forests (UNFF), he concludes, "The UNFF has developed a peculiar type of disconnected politics. The various pieces do not connect to yield a coherent whole."

Humphreys devotes chapters to various initiatives in what he

calls "the international forests regime" – i.e. certification, policies to counter illegal logging, and the World Bank's forests strategy. As a historical chronicle, *Logjam* provides a useful overview of processes that at times seem to have little in common except their apparent inability to halt tropical deforestation.

It is on the second level that the book is more likely to elicit debate. The overarching intellectual theme of *Logjam* is the failure of "neoliberalism" as a political or economic system. Neoliberalism, Humphreys notes, "emphasizes the primacy of the individual, and holds that the collective common good will be maximized if people and firms are free to pursue their own interests in the marketplace". According to Humphreys, "Neoliberal policies have failed to halt deforestation as they have both failed to address its root causes and, by supporting the expansion of global capital, have promoted further deforestation".

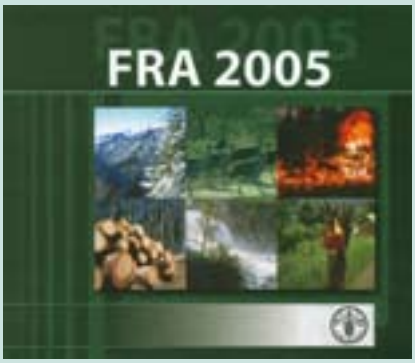
The author claims that deforestation is the result of the crises of global capitalism and the "globalization of corporate power". Certification schemes have little impact because they are based on neoliberal premises. Privatization is a ruse for corporate exploitation. Voluntary corporate social responsibility is a "contradiction in terms" because corporations by definition have no social responsibility.

The solution proposed by Humphreys is a "democratic post-neoliberal politics" where civil society has more power than private corporations. "To accept the values and agenda of a neoliberal capitalist order, knowing that this system has driven deforestation and other environmental and social problems … would be both an abrogation of responsibility and a failure of imagination."

The most noticeable omission of *Logjam* is the failure to note that deforestation has essentially been halted in countries where private forest ownership is highest, where private corporations and neoliberal institutions are the most developed, and where neoliberal policies are the most dominant.

Nor does the author recognize that much of the deforestation in the world's poorest countries is caused not by multinational companies, but rather by poor rural people seeking fuelwood and farmland. There is scant mention of the obvious but perhaps inconvenient linkages between economic development and the ability of a nation to effectively halt deforestation.

Despite these oversights, *Logjam* is an important contribution to the growing literature about forest governance. The Earthscan Forestry Library series, edited by Jeffrey Sayer, continues to play an important role in this regard.



FRA 2005 CD-ROM

The Global Forest Resources Assessment 2005 (FRA 2005), the most comprehensive in FAO's series of such assessments to date, covered 229 countries and areas for the period 1990 to 2005. The main report was published in early 2006 as FAO Forestry Paper No. 147, *Global Forest Resources Assessment 2005 – Progress towards sustainable forest management* (see "Books" section of Unasylva No. 223). It evaluated the status, trends and information availability for more than 40 variables and analysed progress towards sustainable forest management.

FAO has recently released a multilingual CD-ROM containing not only the main report in six languages (English, French, Spanish, Arabic, Chinese and Russian), but also a flyer with the key findings, the 229 country reports, global result tables in Excel format, maps, graphs and a PowerPoint presentation.

Copies can be requested by sending an e-mail to: fra@fao.org

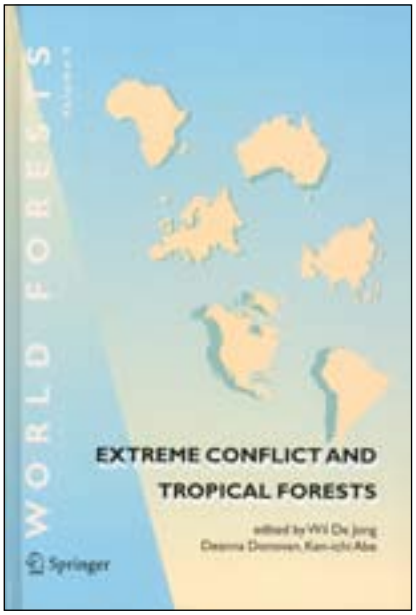
How to implement forest landscape restoration

The forest landscape restoration handbook. J. Rietbergen-McCracken, S. Maginnis & A. Sarre, eds. 2007. London, UK & Sterling, Virginia, USA, Earthscan. ISBN 978-1-84407-369-6.

When ecosystem services are disabled through forest loss and degradation, planting trees is not enough; a landscape approach is essential. Forest landscape restoration is defined as "a process that aims to regain ecological integrity and enhance human well being in deforested or degraded forest landscapes". This concept, developed in 2001 through collaboration among a range of international forestry institutions, differs from earlier restoration concepts in that:

- it takes a landscape view;
- it demands both improved ecological integrity and enhanced human well-being (the "double filter" condition);
- it is a collaborative process;
- it does not insist on returning forest landscapes to their original state;
- it can be applied to secondary forests and agricultural lands, not only to primary forests.

The main endeavour is not to re-establish pristine forest, but



to make the landscape more resilient, thereby keeping future management options open while at the same time supporting communities as they continue to derive benefits from the land.

The forest landscape restoration handbook, authored and edited by world authorities in the field from institutions such as the International Tropical Timber Organization (ITTO) and the World Conservation Union (IUCN), is the first practical hands-on guide to the approach. Its aim is to help forest restoration practitioners understand the forest landscape restoration concept, appreciate its benefits and implement it.

The book includes a detailed description of the approach, numerous practical strategies and case studies, a helpful glossary and references for further reading.

A key message stated by the authors is that forest landscape restoration can be initiated through many entry points at various levels of planning and resource allocation. However, there is no fixed recipe for success; there needs to be a perfect balance of planning, resource allocation and implementation.

This easy-to-read handbook, another useful addition to the Earthscan Forestry Library (see above), provides insightful reading for policy-makers, forest managers, students, non-governmental organizations, the private sector and government planning officers involved in forest management.

Human and environmental security in forest areas

Extreme conflict and tropical forests. W. De Jong, D. Donovan & K. Abe, eds. 2007. World Forests Vol. 5. Dordrecht, the Netherlands, Springer. ISBN 978-1-4020-5461-7.

In recent years the international community has been devoting significant attention to the role of governance issues in global environmental decline. This collection of essays, authored by both natural and social scientists, provides a timely insight into a related subject: the relationships between extreme conflict, international trade in forest products and the social, economic and environmental condition of tropical forests and their human communities.

Extreme conflict and tropical forests explores causes and consequences of conflict in tropical forest areas. Some chapters focus more on why forested areas are often particularly prone to violence. Others investigate the environmental and social impacts of extreme conflict.

Case studies describe consequences of conflict in Cambodia, West Africa, Nicaragua and the Lao People's Democratic Republic. One chapter addresses the environmental damage resulting from the cultivation of illegal drug crops in Colombia. Another examines the environmental and public health consequences of the decade-long defoliation campaign carried out during the Viet Nam war. Particular attention is focused on "conflict timber" – the financing of violent conflict through the exploitation of natural resources, specifically through trading or taxing of wood by armed groups at some point in the chain of custody.

The final chapter, by Jeffrey McNeely, examines the potential of peace parks – protected areas along national borders – as a possible solution for improving human security and biodiversity conservation in conflict areas.

With implications for specific aspects of security, environment, development, forest policy and international relations, this book will be of interest to policy-makers, researchers, students and development cooperation experts, and will also provide useful background for forestry practitioners.

How public libraries can support development

Biblioteca pública y desarrollo económico. V. Ferreira dos Santos. 2007. Buenos Aires, Argentina, Alfagrama Ediciones. ISBN 978-987-1305-22-3.

In recent years, debate has arisen over the place of the library in the modern knowledge and information society, and the need for a new model. This book, based on the author's doctoral research, proposes that the public library can have an important role in local economic development by serving as an information centre not only for citizens, but also for small companies, entrepreneurs and community organizations.

It evaluates the possibility of establishing such information services in public libraries in Brazil and Spain, with reference to other libraries that already provide them. The libraries are analysed in terms of financial, human and technological resources, infrastructure, products and services offered to users.

Libraries certainly play a key role in "weaving knowledge into development". This book will be of interest to librarians, information managers and development workers in both developing and developed countries. The author is Librarian of the Forestry Library at FAO headquarters in Rome.