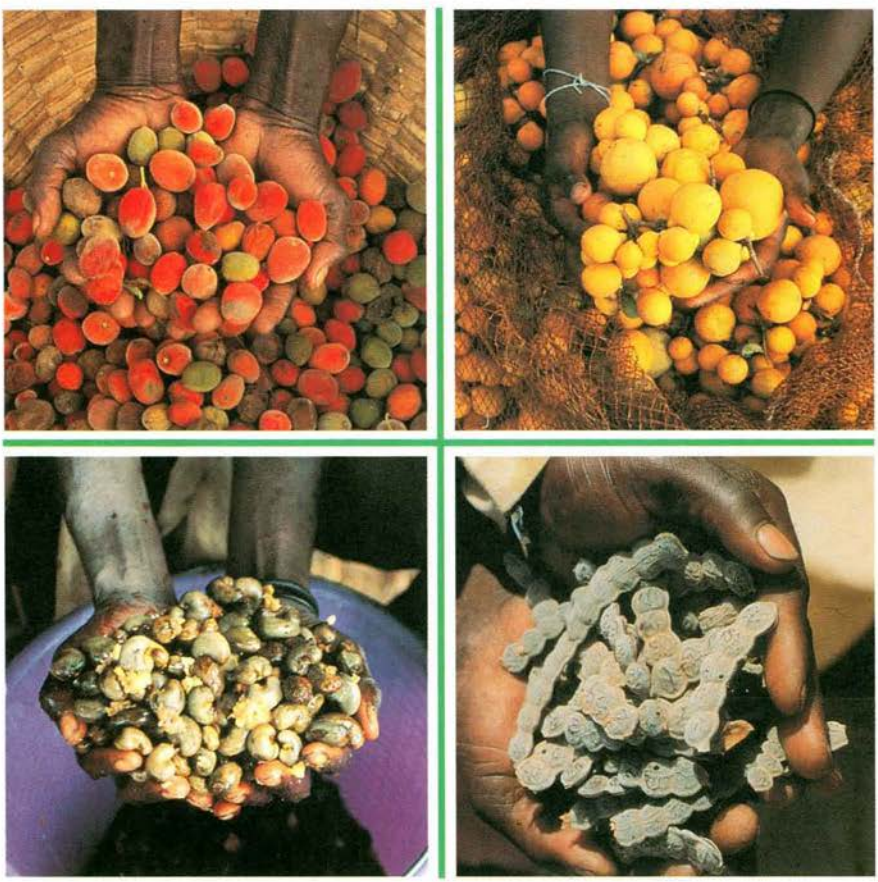
FAO FORESTRY DEPARTMENT

FORESTRY TOPICS REPORT No. 4

MORE THAN WOOD

Special options on multiple use of forests



FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

SUMMARY

This report describes and discusses the use and development of products other than wood derived from forests and forest lands, in the overall context of multiple-use forestry for sustainable development. It presents a wide range of examples of these non-wood forest products in terms of their use and potential as sources of self-sufficient and sustained livelihoods for low-income rural communities, their commercial and industrial applications and their value in local or distant marketplaces.

Drawing on this analysis, a strategic framework is proposed by FAO for future action to boost sustainable development of these products worldwide, as an integral factor in mainstream development plans and programmes affecting the world's forests, forest lands and people living in forest vicinities.

ACKNOWLEDGEMENTS
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Development of this report was coordinated by M.A. Trossero and C.D. Léger of the Forest Products Division, who thank the many colleagues and consultants who contributed their ideas and comments to it.

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FOREWORD

It has never been more urgent to realise the full potential of forestry for sustainable development both in terms of meeting immediate and future needs of increasing populations, and of the continuity of the natural resource base itself. Achievement of this goal requires a comprehensive approach in which the totality of the contributions of forest resources to society is fully appreciated and wisely utilized.

In modern times, forests have been seen essentially as a source of one product: timber. However, forests also provide a multiplicity of other products and benefits such as foods, medicinal products, materials for handicrafts, spices, resins, gums, latexes and wildlife. For example, forest-derived medicinal materials alone support a US$43 billion pharmaceutical industry. Other than timber trees, forest species also represent a wild gene-pool, which are a safety net for narrowly based industrial agriculture. In both developed and developing countries, the utilization of such non-wood forest products (NWFP) can extend the range of benefits from the forest and so provide further justification for their conservation. In low-income countries, enterprises based on NWFP are generally more accessible to disadvantaged groups and women, they diversify opportunities for gainful employment and income generation and therefore hold potential for rural poverty alleviation.

Non-wood products have mostly been neglected or overlooked by planners, partly because their value is often greatest within relatively restricted local economies and partly because they are often outside established marketing channels. These products rarely feature in statistics and are hardly studied; consequently, we have only limited knowledge of their productivity, developmental potential or management regimes for sustainability. Forests which yield little timber are often considered worthless and are soon converted to alternative land uses. Yet it has become apparent that with responsible use and proper husbandry, the non-wood forest products, hitherto largely confined to subsistence use, can also support remunerative enterprises which increase the contribution of forestry to development. Our task is to help to make this happen in a sound, sustainable manner and to bring NWFP into the mainstream of modern economies while retaining their accessibility to traditional societies.

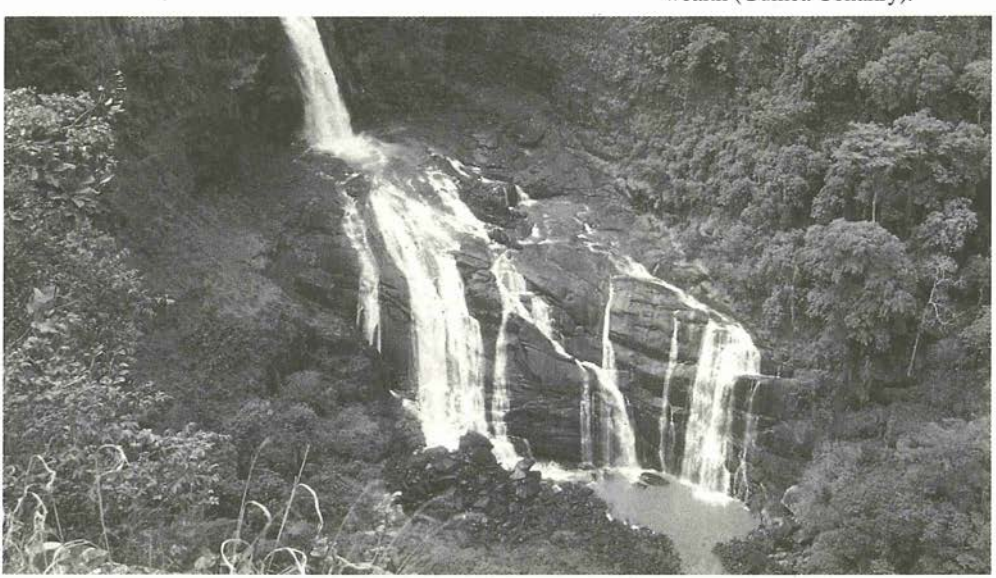
The Food and Agriculture Organization (FAO) has prepared this booklet to present examples of the wise use of NWFP and to illustrate their importance in diverse circumstances. FAO proposes a strategy for promoting the development of non-wood forest products. Central to the

success of the approach would be the need to increase knowledge among policy-makers of the potential of these products, to indicate which NWFP have growth potential, to encourage the application of greater technical and marketing assistance programmes to such high-potential products, and to disseminate information on opportunities with a view to capturing entrepreneurial interest. FAO believes that success will require effective partnerships between local people, governments, NGOs and the commercial private sector.

This report is action-oriented and provides a framework for medium- and long-term endeavour. Of particular importance, it sets out a number of crucial immediate objectives which must be achieved to clear the way for future success. Both the topic and the approach are particularly appropriate in the wake of recent international commitment to sustainable development made at the 1992 UN Conference on Environment and Development.

Edouard Saouma
Director-General

Forest landscape in Fouta Djallon. The forest represents wealth (Guinea Conakry).



Roberto Faiduti

KEY ISSUES

ADVANTAGES OF VERSATILE FORESTRY

An earlier report in this series (Forests, Trees and People) examined forests as multi-purpose providers of better livelihoods and prospects for communities in low-income rural areas. It drew attention not only to more obvious forest products such as timber, fuelwood or charcoal but also to often overlooked forest produce other than wood. This natural bounty includes fruits, fibres, oils, gums, funghi, 'bush meat', medicines and a host of other goods and benefits.

National authorities should ensure '...sustainable management of all forest ecosystems and woodlands ... giving particular attention to human needs for economic and ecological services, wood-based energy, agroforestry [and] non-timber products...'
Agenda 21, Chapter 11

In many cases, the importance of these outputs to local or even national economies can equal or sometimes surpass that of wood or wood products, yet their worth and potential are rarely quantified and hardly ever factored into investment, development or management schemes at any level.

The present report focuses entirely on these outputs and their promise as positive factors in future development action. It spotlights their social, economic and environmental importance, especially in view of recent international commitments to sustainable development agreed at the 1992 UN Conference on Environment and Development, which highlighted necessary points for concerted action in Agenda 21.

Free access to non-wood products is often essential to millions of people in rural areas, especially women and all members of indigenous, migrant or landless groups, whose choices in life would be desperately few without them. As well as catering to dietary, medical and other pressing needs, they can be traded on local markets, creating steady or seasonal employment for many who otherwise have no prospect of jobs or income.

Outside the local community and economy, some of them command high value as speciality goods in the urban marketplace or even in world trade, creating wealth that can (in principle at least) be re-invested in new or improved development infrastructure at every level.

From a resource manager's point of view, non-wood forest products offer scope for innovative variations on the standard repertoire of forestry, agriculture and forest industry practice. They can make integrated approaches to land use, such as agroforestry, still more versatile. They can make sustainable forestry practices easier to promote by enhancing the value and fringe benefits of standing forests, so deflecting local pressures to over-harvest the timber component.

As well as supplying diverse economic and social

benefits, non-wood forest products are a vital influence on living world concerns. At the level of primary environmental care, they can relieve human pressure on natural ecosystems by enabling people to use forests and woodlands sustainably (that is, without depleting their regenerative capacity), while still obtaining secure livelihoods.

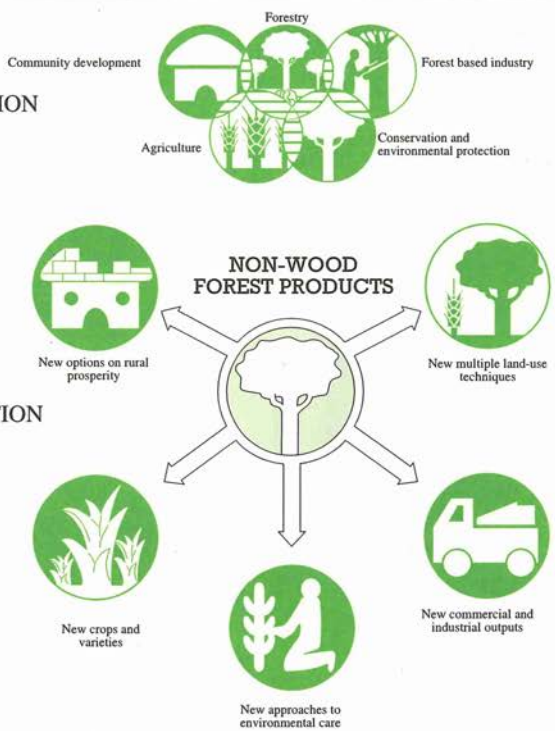
By providing economic incentives to conserve natural biomass they bolster larger scale action to protect watersheds or prevent soil erosion. They also provide an extra line of defence against global trends like adverse climate change or general loss of biodiversity (genes, species and ecosystems).

Most of today's staple food crops and many standard industrial, commercial and pharmaceutical products originated as non-wood forest products. Doubtless some of tomorrow's staple products will also emerge from this sector, which represents the 'investment account' of our stakeholding in the forest gene bank, while regular forestry or agriculture are its 'current account'.

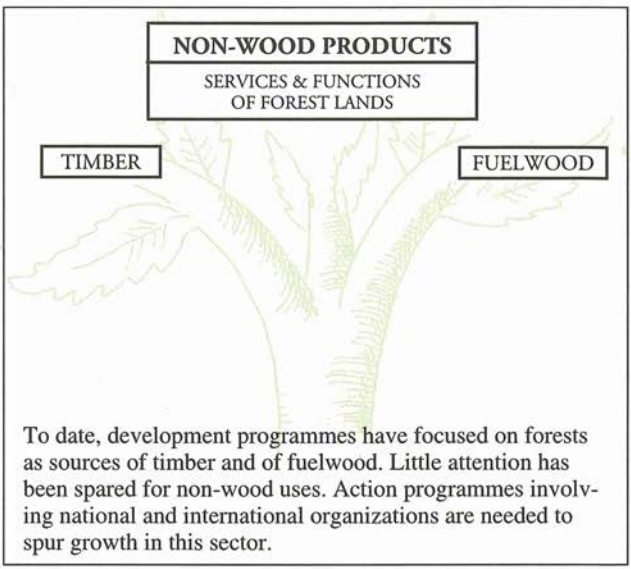
DEFINITIONS

Non-wood forest products can be defined as all goods for commercial, industrial or subsistence use derived from forests and their biomass, which can be sustainably extracted from a forest ecosystem in quantities and ways that do not downgrade the plant community's basic reproductive functions. 'Forests' embraces the global range of vegetation types where woody plants normally predominate.

Changing perceptions

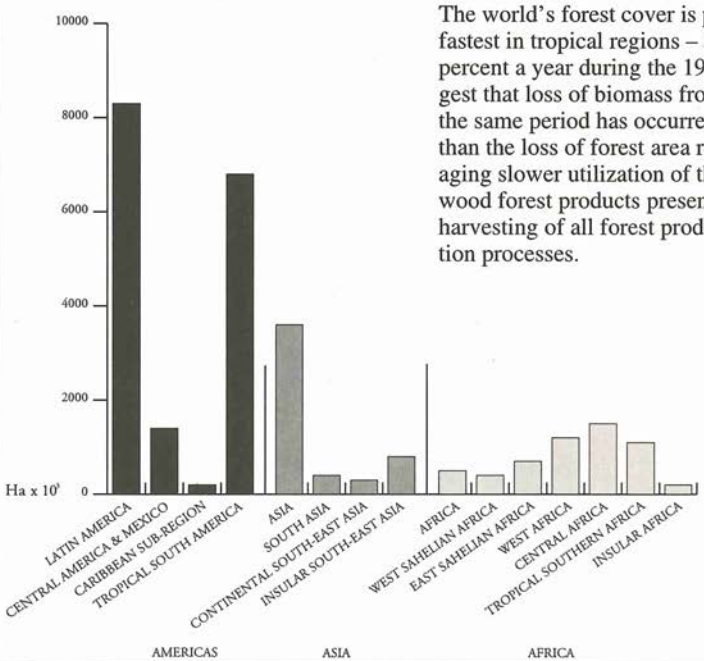


Non-wood forest products are increasingly seen as a distinctive source of sustainable development innovations (below) rather than (above) as a 'grey area' of minor by-products overshadowed by more widely recognized uses.



To date, development programmes have focused on forests as sources of timber and of fuelwood. Little attention has been spared for non-wood uses. Action programmes involving national and international organizations are needed to spur growth in this sector.

Forest area and rate of deforestation in tropical regions



The world's forest cover is presently shrinking fastest in tropical regions – at an average rate of 0.9 percent a year during the 1980s. FAO studies suggest that loss of biomass from tropical forests over the same period has occurred at an even higher rate than the loss of forest area revealed here. By encouraging slower utilization of the timber resource, non-wood forest products present opportunities to match harvesting of all forest products to natural regeneration processes.

Source: FRA 1990 FAO

TOMORROW'S NEEDS – TOMORROW'S FORESTS

Sustainable forestry will rely increasingly on growth in the use of non-wood forest products alongside timber, fuelwood and other wood products. Such growth will probably continue to depend largely on market forces and natural opportunities coupled with the basic requirements of rural communities and their ability to innovate. However urgent, environmental protection and conservation concerns cannot be relied on by themselves to award non-wood forest products top priority on the 'shopping list' of development investment, still less in the survival strategems of needy people.

FAO sees market development harnessed to sustainable forestry as the most worthwhile recipe for more and better use of non-wood forest products in the future. In this perspective, non-wood forest products are not thought of as alternatives to conventional forestry, but as offering potential for multiple-use of forest resources (including conventional forestry) to meet the diverse and changing needs of people in a diverse and changing environment.

Examples mentioned in this booklet show the broad range of these options. They are not all drawn from developing regions; societies profit from non-wood forest products (or suffer from their depletion) wherever forests and woodlands occur.

Putting non-wood forest products in the centre of the picture prompts the question: What kind of forests and woodlands will be needed in the future, to take lasting advantage of these choices and benefits and to protect the interests of users who lack other opportunities?

Urgent and decisive action is needed to conserve and maintain genes, species and ecosystems, with a view to the sustainable management and use of biological resources... The participation and support of local communities are elements essential to the success of such an approach.
Agenda 21, Chapter 15

PRIORITIES

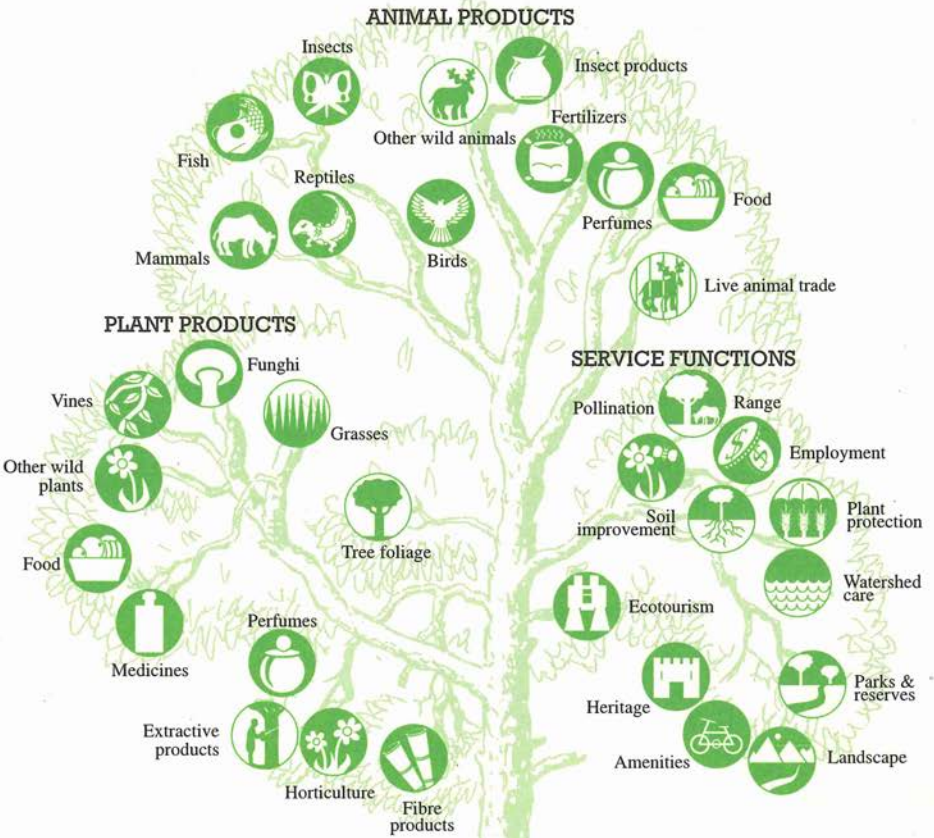
Sustainable development in general aims to create chains of mutual social, economic and environmental benefits at local, intermediate and global levels. Benefits of sustainable development at local level should include the provision of basic needs such as food, water, shelter and health.

The use of non-wood forest products can aid this quest by multiplying opportunities for entrepreneurship, new sources of income and new markets as well as aiding survival and self-sufficiency.

Ideally, poor communities in forest lands should rank foremost among the intended beneficiaries of non-wood forest product development. That does not, however, mean that the needs of these groups can be expected to overrule the play of market forces or the finite carrying capacity of natural ecosystems.

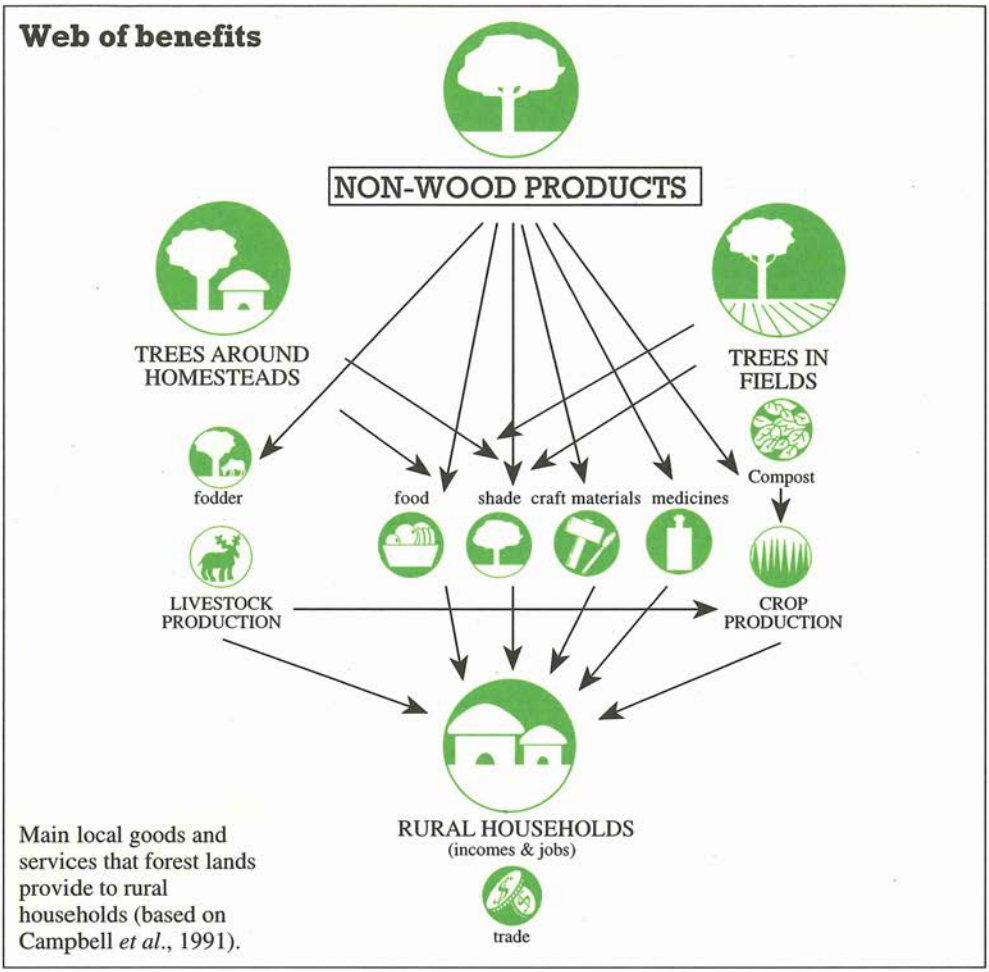
Consumers and traders in distant markets and urban

The NWFP horizon



Non-wood forest products can be classified by source (plant, animal and so on) or by uses, for instance as food, medicines or fibres. This overview symbolizes their great diversity. Vital services such as soil conservation, biodiversity, climate regulation, watershed protection, and so on, are also shown here, though not discussed in depth in this report.

centres may also hold a stake in the development of non-wood forest products, as may national exchequers and transnational corporations. It is important, however, that a significant part of revenues from such products is re-invested in improving and renewing the products at their source,



Main local goods and services that forest lands provide to rural households (based on Campbell *et al.*, 1991).

as well as in safeguarding the interests of local communities in whose custody forest lands and resources lie.

OBSTACLES TO DEVELOPING NON-WOOD PRODUCTS

Flawed perceptions on the part of national authorities and forest resource managers regarding the value and potential of non-wood forest products, must count among the most serious obstacles to more and better use of these diverse resources. Even in international circles the attitude persists that their development is a matter of low priority that must wait until other, more 'serious' land use questions are settled.

... there is almost everywhere a lack of hard facts, figures and published science-based information about the extraction, use, profitability and potential of non-wood forest products. This makes it still harder to integrate their use into development schemes...

The same attitude is often mirrored in international agencies or research and development institutes. Some technologists distrust the subject because it hinges on societal factors that can only be usefully discussed in non-technical terms. Some planners and developers have a prejudice against the very idea of 'wild' products because they do not all fit into conventional categories or formal markets, or because they seem to have a retrograde or archaic 'back-to-nature' aspect. On the trade side, major exporters of these products are often cautious about releasing data about quantities and revenue, which they regard as 'trade secrets'.

Partly because of these attitudes, there is almost everywhere a lack of hard facts, figures and published science-based information about the extraction, use, profitability and potential of non-wood forest products. This makes it still harder to integrate their use into development schemes at their outset. Project appraisal techniques exist which take proper account of these products and similar unconventional factors, by building on information provided by local user groups. But these techniques are not widely appreciated or applied by researchers, extension workers and their trainers.

Development can also falter for lack of experienced indigenous users, for example in forested resettlement areas or recently settled peri-urban 'green belts'. In such cases, the wisdom to benefit from NWFP is not inherent and must be acquired secondhand by would-be users.

As already noted, difficulties in securing steady supplies of non-wood forest products can also be impediments to growth in their market use alongside timber and other, more standardized wood products. Their highly local or seasonal occurrence can lead to difficulties in harvesting, storage and delivery. Droughts, frosts or floods may make supplies of the more climate-dependent types of product far harder to sustain than timber.

Commercial non-wood products may also be difficult or costly to transport to the point of sale. Transport costs can amount to as much as 40-50 percent of the overhead involved in trading in forest products, and non-wood products are no exception.

Access and ownership complications can be added to these practical problems. The right to non-wood forest resources and their benefits is rarely specified in detail in forestry concessions, permits or land deeds. Even on acknowledged common land, local traditions can complicate their use. Women, who in many cases and localities form the major user group, are often denied access to the forest because of government legislation which allows the

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Transport to urban or distant marketplaces can exceed the prices of merchandises in local places. The product pictured here is wild fruit from Sagba senegalensis (Guinea Bissau).

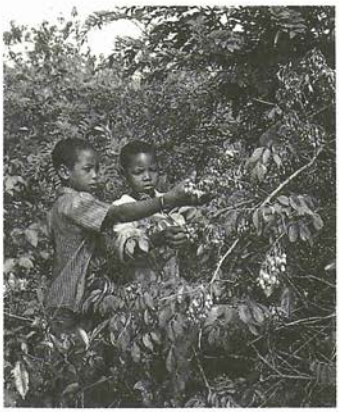
collection of products for subsistence, but not for commercial purposes.

On the demand side, rapid fluctuations in market requirements or consumer fashion can multiply the risks surrounding development of non-wood forest products. General lack of market research, marketing information systems and commercial know-how often mean that entrepreneurs get no early warning of new or changing market needs and trends. Products which may be ideally suited for trade may remain in obscurity while those which have provided steady rewards in the past may suddenly lose their market, leaving many who depended on their trade in ruin.

Like any other land use, the gathering and utilization of non-wood forest products can give rise to competition and conflict. There may be competition with foresters who wish to harvest timber, or between conservation and utilization interests for the wildlife resource. At communal level, conflicts may also arise between indigenous and migrant users or between groups seeking to use the resource in different ways.

The use of non-wood forest products can also have environmental drawbacks. In most instances, it can be justified as a relatively benign use of wild species and ecosystems, but over-exploitation, degradation and even depletion of forests can result if extraction practices are not sustainable.

These drawbacks and obstacles to using and developing non-wood forest products are not, however, greatly different in degree from the problems that have confronted other land uses or commodity sectors in the past. The international community can do much to help countries and neighbourhoods conquer these impediments and realize the non-wood potential of their forests and forest lands.



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Children gathering the fruit of Santaloides afzelii for food (Guinea).

PRODUCT FILE – MAINLY FOR SELF-SUFFICIENCY

The examples that follow are divided into those products whose use is mainly or most significantly for subsistence and those that are sought-after mainly for trade use. In practice, most classes of non-wood forest products often serve both commercial and non-commercial uses. The pattern of use is, moreover, liable to change quite rapidly in response, for example, to changing market demand or seasonal fluctuations in supply.

FOREST FARMING AND FOOD PRODUCTS

Foods derived from forests and trees may not be consumed in great quantities in comparison to main food staples but they add variety to diets, improve the palatability of staple foods and provide essential vitamins, protein and calories. They are also used extensively as snack foods eaten, for example, while working in the fields or herding livestock.

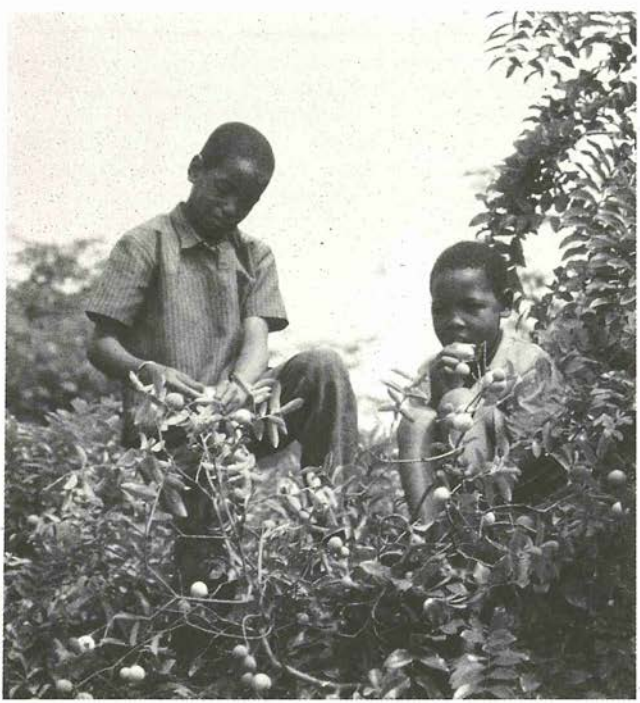
Forest foods can offer vital insurance against malnutrition or famine during times of seasonal food shortage or emergencies such as droughts, floods or wars. While forest gathering activities are not restricted to groups that are poor, landless or nomadic, these are the groups most likely to be affected by reductions in the availability of such foods as the forest resource is reduced, degraded or closed to access as a result of privatization or nationalization.

Forest foods also have substantial market potential. Some, such as the brazil nut, are collected virtually entirely in the wild. Others that are easier to take into cultivation may have a short-lived existence as emerging non-wood forest products before they are adopted as farm or plantation crops.

In some countries, fashion and tradition can still strongly influence consumer choice in favour of authentic fruits and other foods from the wild. Forest fruits that have come to new prominence in the world trade in recent decades (often as health or diet foods) include avocado pears, mangoes and guavas. Market forces have galvanized production of these fruits, formerly wild or semi-cultivated forest products, on plantation or orchard scale in their countries of origin and their introduction into the agriculture of other countries. Value continues to reside, however, in the varieties left behind in the wild, as they can form an important genetic resource for improving the cultivated stock.

Joint investigations piloted by IBPGR and IUCN in Kutai National Park, Kalimantan, Indonesia have confirmed that the area is an important centre of genetic variation for several important tropical fruit trees, including mango, breadfruit and durian. Of 16 species of mango in East Kalimantan Province, 13 are edible. Most of these edible species have been brought under semi-cultivation and these, together with their wild relatives, represent a unique gene-pool which is closely linked to traditional lifestyles in the area, particularly those of the local Dayak people, whose knowledge of the diversity and growing requirements of the mango stock is unsurpassed.

A scheme is now under way to conserve the genetic resource and guard the local knowledge of Dayak people from loss, as part of plans to manage a buffer zone around the park perimeter. Large numbers of migrant people have been resettled in Kalimantan from Java. Lacking intimate knowledge of local resources, their farming and fuelwood-gathering activities pose an inevitable threat to the forest's continuing scope to harbour useful genetic material.



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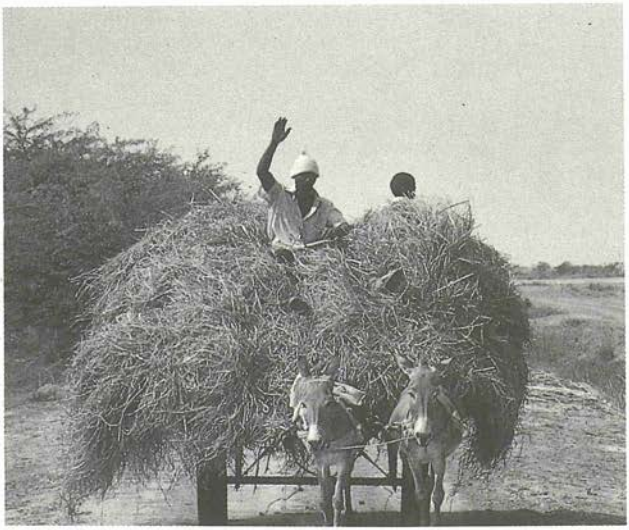
Children gathering and eating the fruit of the Landolphia heudelotii liana (Guinea Conakry).



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Transport of fodder for livestock (Senegal).

HEALTH AND HARVEST – MEDICINE AND RELATED PRODUCTS

Among the best-known of non-wood forest products are medicinal substances like the anti-malarial drug quinine or the oral contraceptive ethenyl oestradiol, both derived from rainforest plants. Though today's sophisticated pharmaceutical and bio-engineering industries have a ready capacity to synthesize most naturally occurring substances, including the aforementioned examples, it is widely recognized that modern medical science still has much to learn and gain from the forest and from the 'folk medicine' of forest-dwelling people.

Even today, the active ingredients in 25 percent of all prescription drugs come directly from medicinal plants (though not all of these grow in forest habitats) and the estimated global value of plant-based drugs is US$43 billion a year. The anti-cancer drug vincristine contains naturally occurring alkaloids from the rosy periwinkle of Madagascar (***Catharanthus roseus***), which cannot be produced in the laboratory without supplies of the plant itself. Other plants and plant extracts are still being exported for drug manufacture in highly lucrative commercial quantities from Madagascar. The periwinkle is now widely cultivated and processed on its native island, as part of an overall attempt to add value to medical plant exports at source.

Another significant use of forest chemicals is in cosmetics and perfumery. Not all the substances that are used in these trades are plant-derived: for example, the sweet-smelling secretions of the anal gland of musk deer are

important stock items of perfumery. Though the value of trade in forest-based substances for cosmetics and perfumery is undoubtedly high, these are among the most secretive of trades and very few hard facts are ever disclosed about the volume or value of the goods involved.

Though still a highly controversial issue, the notion of medically or commercially useful plant genes as 'intellectual property' to be protected by law is taking firm hold among many forest-owning countries. Costa Rica embarked in 1989 on a cooperative venture with a consortium of research foundations, development banks and commercial interests, to search the estimated 500 000 or more species of plants, insects and micro-organisms harboured in the country's forests, for possible medical uses. The scheme, which forms part of a national scheme to classify and catalogue Costa Rica's entire fauna and flora, has built-in guarantees of appropriate royalty payments in return for the use of any plant drug that may be commercialized as a result of the venture.

Remedies for diseases that currently baffle the world's medical researchers, such as cancer or AIDS, are being actively sought by botanists and pharmacologists in woodlands, forests and other wild plant habitats around the world. The local knowledge of indigenous peoples, who are expert 'librarians' of the medicinal properties of the plant and other natural life that occurs in their neighbourhoods, has frequently provided vital clues to new 'breakthrough' drugs. There is no reason to suppose that this process will not continue as long as there are forests, forest lands and forest users.

There has been a surge of interest in recent decades in ethnobiology, ethnobotany and other interdisciplinary fields of research that take traditional knowledge and culture as starting-points in the search for new medicines. What is not generally realized, however, is that the reason why traditional medical knowledge is so extensive is that it exercises a virtual global monopoly over medical practice.

Folk medicine is the standard source of medical treatment for at least three-quarters of the world's people: some analysts set the figure as high as 90 percent. 'Western' or technological medicine is readily available only to one person in four or five, worldwide.

Systems of 'folk' or 'alternative' medicine take many different forms but nearly all are based largely on plant extracts. India has more than 2000 known medicinal plants, Malaysia around 1000, Brazil at least 3000. These numbers probably fall far short of the true totals because they refer only to remedies that feature in published records. Because they are not formally recognized or regulated by

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Industrial transformation of Shea butter nuts *(Butyrospernum parkii)* into various cosmetic products (Burkina Faso).

Most investment in modern biotechnology has been in highly industrialized countries. Biotechnology offers new opportunities for global partnerships between these countries – rich in technological expertise – and developing countries which are rich in biological resources. The traditional methods and knowledge of indigenous people and their communities should be protected and indigenous peoples should share in the economic and commercial benefits arising from biotechnology.

Agenda 21, Chapter 16

official or clinical standards, alternative medicines and treatments vary greatly in their effectiveness. Their most important feature, however, is their availability to billions of people who have no access to other systems of medicine.

Forests also provide important remedies for livestock diseases and thus help maintain livestock production and general nutrition. There are many other links between forestry, traditional medicine and nutrition. Foods from the forests often serve a dual purpose as vitamin sources or diarrhoea cures. Few studies of traditional medical systems focus on the impact of medicinal plants on community health care or nutritional well-being. Loss or over-exploitation of NWFP resources can seriously affect both.

PROTEIN AND PROSPERITY – WILDLIFE UTILIZATION

Historically, most societies achieved stable coexistence with wildlife and attached implicit cultural value to other species, even to those animals which traditionally formed the hunter's quarry. In the past the commonest prey animals were 'small game' like deer, birds, monkeys or rodents. The same is still true today in most areas where traditional hunting for 'bush meat' and use of animal by-products, such as hides or skins, persist as major means of subsistence and rural income.

In Africa, the centralizing of authority during the colonial era undermined customary laws governing use of wild resources, as well as the authority of the traditional leaders who enforced them. As colonial administrators failed to provide alternative means of wildlife conservation, there was a rush to exploit riches like elephant ivory and other 'big game' trophies for short-term gain, particularly as new

Tropical rainforests are by no means the only habitats that abound in forest-based medicines. For instance, in the forests of the Pacific North-west of the USA, the bark of the Western Yew tree (***Taxus brevifolia***) is harvested in quantities exceeding 350 tonnes a year. It yields the drug taxol which is currently undergoing clinical trials as an anti-cancer agent. Formerly a throwaway by-product in the eyes of local foresters, trade in the yew bark now provides an alternative livelihood for an army of local 'pickers', including many loggers thrown out of work by recent declining markets in timber and wood products. Non-wood forest products (often known to US foresters as Special Forest Products) in general are worth more than $130 million a year in industry revenues and employ at least 10 000 people full-time in the USA.

international markets opened up at the same time.

After independence, most African countries retained the colonial structure of centralized game departments and systems of national parks and protected areas. Wildlife management in these areas has typically been based on punitive measures designed to maintain barriers between wildlife resources and local residents, drawing little or no distinction between traditional hunters specialized in small game subsistence hunting and organized criminal gangs poaching on a commercial scale for big game.

At the same time, the official practice of culling (or selectively slaughtering) over-large herds of protected game animals has become more and more widespread. Local people are often not sufficiently involved in the distribution of the meat and other benefits arising from culling. Other market benefits from protected areas, such as safari tourism revenues and visitors' fees, are not always fairly shared with the local community whose ancestral lands were, in many cases, set aside to form the reserves in the first place.

A number of community-based projects in different parts of Africa, notably Botswana, Zambia and Zimbabwe, are inviting local participation in wildlife management and in the management of tourism facilities. Under these arrangements, local people assist in culling wildlife or in conducting safari hunting for foreign tour parties and thus gain income and employment. They also have official permission to consume or trade in a quota of the meat, hides and other by-products of culling or safari hunting.

Culling is a management technique that often attracts controversy and safari hunting is by no means everybody's idea of sport, but there is little doubt that, without schemes

Ritual hunting scene, Turkana Lake (Kenya).

Roberto Faiduti

like these, illegal hunting and farming incursions into protected areas would be uncontrollable. Populations of rare or endangered animals are maintained at sustainable levels and (in the case of Zambia's ADMADE scheme), Community Development Accounts have been set up to hold wildlife revenue shares at the disposal of local development councils headed by recognized local leaders. In 1988 these shares totalled $230 000 for ten ADMADE sites, and revenues have been invested in improved local infrastructure such as schools, health facilities and new roads.

Most of the world's forest wildlife occurs (and most hunting, trapping and gathering of wildlife takes place) outside protected area boundaries. There is, however, little reliable information about these resources and practices except in protected situations. Studies conducted by the World Wide Fund for Nature and a consortium of bilateral development agencies in the region surrounding Korup National Park, Cameroon, showed that in 341 households studied, hunting, trapping and fishing accounted for an average 27 percent of annual income, while income from other forest products totalled some 29.4 percent of yearly earnings.

Rewards from bush meat can be extremely high: in Peru, a hare hunter can earn the equivalent of US$1350 a month, compared with a labourer's typical wage of US$100 a month. Household consumption of 'bush meat' is harder to chronicle, as it fluctuates with the availability of game, and bush meat hunting in many cases is an 'undercover' activity. People living near forest reserves in Nigeria consume as much as 84 percent of their animal protein in the form of game, whereas people in areas far from special hunting grounds consume less than seven percent. Many households turn instead to fish, birds' eggs or insects to supplement protein-poor diets. Studies in Zimbabwe's Communal Areas suggest that well over 90 percent of households routinely consume insect protein, mostly in the form of termites.

Fish that spend part or all of their life cycles in estuaries and river basins protected by forests are also, in a sense, forest products. Forests help maintain the conditions under which many kinds of food fish, crustaceans and shellfish feed and breed.

Fish and molluscs dependent on forested ecosystems (especially mangrove swamps) contribute significantly to the diet of many people, while forest plants often yield chemicals traditionally used as poisons to capture fish. In Sarawak, Malaysia and the Peruvian sector of the Amazon Basin, 50 to 60 percent of annual protein intake comes from fish, while in parts of Nigeria more than three times as much fish as meat is eaten.

Another option now being explored in many parts of the world is game ranching of wildlife to provide meat and other products on a more organized and sustainable basis. In New Zealand, introduced roe deer were formerly regarded as an agricultural pest. Now 4500 deer farmers stock some 600 000 deer in forested rangelands under carefully controlled conditions. Today, exports of deer meat and antlers earn New Zealand more than US$26 million a year.

Residents of Papua New Guinea's swamplands have virtually no saleable resources apart from the crocodiles that abound in these densely vegetated areas. One skin of a mature crocodile can fetch around US$150 in the capital, Port Moresby. The Government of Papua New Guinea has been working with FAO and UNDP since 1983 on a project aimed at developing the crocodile skin industry while protecting the wild crocodile population from over-exploitation. The scheme involves fattening and breeding crocodiles from young specimens captured in the wild. A network of village crocodile farms has been established for this purpose. Larger, more advanced breeding stations have also been set up and national staff have been trained in techniques to improve the grading and marketing of skins. The scheme has special exemption under the wildlife trade convention, CITES.

Other notable wildlife products obtained in various parts of the world and traded for high prices include snake venom and frogs' legs. The Netherlands-based Tropenbos programme is helping farmers in Côte d'Ivoire achieve sustained-yield harvesting of African giant snails (***Achatina achatina***) in the buffer zone around Tai National Park. An estimated 8000 tonnes of these protein-rich molluscs were sold in 1986: each snail provides some 100-300 grams of meat and the shells can also be used to provide calcium for animal feed or crop fertilizer.

LUBRICATING DEVELOPMENT – FATS AND OILSEEDS

The seeds of the sal tree (***Shorea robusta***) have an oil content that can be as high as 12.5 percent. The oil is widely used in soap or as a component of cattle or poultry feed in India and several other Asian countries. Sal seeds are also boiled with the flowers of another tree to produce a substitute for rice and other grain staple foods.

Other oilseeds from Asian forest lands yield cooking oils, lamp oils or paint and varnish ingredients. In rural areas of north-east Brazil, more than 450 000 households depend on income from sales of kernels from the babassu

palm (***Orbygnya phalerata***), rich in a nutritious oil resembling coconut oil. Many poorer farmers rely on this income during the lean off-season or use it to buy seed or other farming inputs for the following year. Around two million people also depend on by-products of babassu palm for medicines, subsistence foods, thatch, beverages and a range of other household uses.

Oilseed trees like the sal and the babassu palm are prime candidates for domestication in home gardens and farming systems. Since edible oils are highly prized on world markets, scope probably exists for further steps towards plantation farming of useful oilseed trees on a still larger scale in the future, in the same way that coconut and oil palms were taken into cultivation in the past.

COMMON PROPERTY RESOURCE MANAGEMENT

As in the case of fuelwood and charcoal, forest foods and other forest products gathered by rural people either for immediate consumption or for processing and sale, come predominantly from existing forests, woodlands and marginal or 'waste' lands.

Such 'common property resources' are losing ground rapidly in many parts of the world, chiefly as a result of privatization, encroachment or official appropriation of land for other uses. Whatever the new land use may be, the chances are that it will lead to a weakening or breakdown of local control or management of resources and yield diminishing returns of non-timber or non-wood forest products.

Among communities, the poorest typically depend most on non-wood products and other common property resources such as fuelwood. Even in the heavily degraded dryland communal areas of India, it has been estimated that village people obtain the majority of their fuel and fodder resources and 14 to 23 percent of their income from the wild.

Where common property resources have been depleted, trees that yield useful products may be grown instead as part of farming systems or 'home gardens'. These cultivated trees, like the natural forest, can play an important part in the food security of low-income rural people but the transition from forest to farm or plantation is not always successful. The full participation of local people in any rural appraisal exercise prior to changes of land use is critical to communal well-being and the long-term sustainability of forest resources.

PRODUCT FILE – MAINLY FOR PROFIT

FIBRE CONNECTIONS – BAMBOOS AND RATTANS

In South-east Asia, climbing palms or rattans are commercially the second most important forest product after timber. They are extremely versatile with a wide range of traditional and local uses as building, handicraft and general purpose materials. They also command high value as the raw material of cane furniture. Many people depend on sale of rattan and rattan handicrafts or other products to supplement their farm income all year round. Others engage in such activities only seasonally or in times of hardship.

Rattans are notably important commodities in Indonesia, Malaysia, the Philippines, Sri Lanka and Thailand. Bamboos are more widespread. They are widely used and traded in China, Japan, Bangladesh, India, Thailand, the Philippines, Vietnam, and several African and Latin American countries. In places in South-east Asia where rattans predominate, bamboos are often regarded as a more throwaway or low-grade product for craft or trade purposes.

Many people depend on sale of rattan and rattan handicrafts or other products to supplement their farm income all year round. Others engage in such activities only seasonally or in times of hardship.

Virtually all rattans used in trade are collected from the wild. Increasing demand for canes for furniture manufacture has led to useful species being overcut, especially in forest areas near rural settlements, roads and railways, leaving almost no commercial rattans. Since rattans must grow within forests (they use trees as supports to enable them to climb into sunlit positions), the supply tends to dwindle in direct proportion to tropical forest loss. Indonesia, the Philippines and Thailand now ban the export of raw canes and the export of semi-processed and processed canes from peninsular Malaysia is prohibited, to conserve the supply for domestic industry.

Such bans have some effect on the supply situation by depressing the value of canes, making the activities of collectors less worthwhile. Pressure on forests may thus be eased in due course but prior to the entry into force of bans there is a spate of collecting for stockpiles that can do more harm to the natural supply than no ban at all.

Rattans occur in many varieties and qualities. For furniture making those that are supple and of good colour are best. Given open access to forest areas, people cut the canes till none are left to bear seeds. At first the market will accept lower grade species, using extra processing – bleaching, staining or steaming – to correct flaws. Once this processing becomes too costly, however, domestication and selective breeding at the source of supply begin to take over.

In parts of the Philippines where the natural rattan supply has been exhausted, nurseries are now being established to provide stock to plant out in the forest. In this case, the growth and 'monetization' of the market in the natural product appears to be in the process of converting it from a wild product into a crop. Much the same process may have led to the development of other non-wood forest products into staple crops in the past.

Bamboos are now routinely plantation-grown but, while they can be grown in the forest without the additional expense of owning or renting the land they grow on, like rattan they are likely to remain a predominantly wild or semi-cultivated crop for many years to come. Rattan collection, cultivation and processing also provide important options for buffer zone schemes around protected areas. Replanting indigenous species can help to rehabilitate logged forest and justify maintenance of forest cover.

Aase Wolstad

Harvesting bamboo (China).

Aase Wolstad

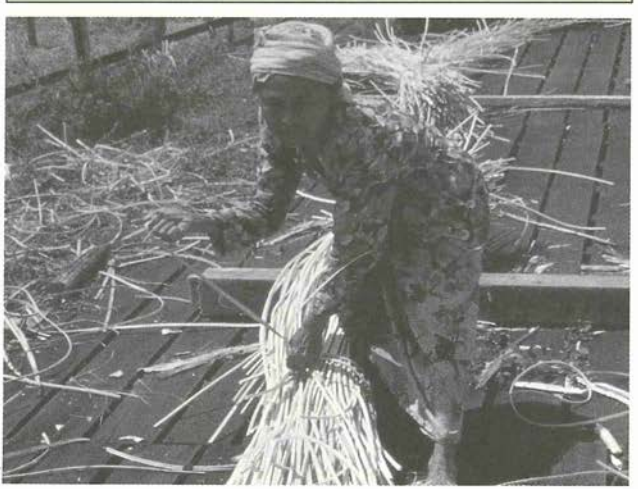
A woman increases her income by making rattan baskets for sale in the market (Philippines).

South-east Asia's rattan trade is dominated by Indonesia's harvest: Kalimantan, the Indonesian part of Borneo, supplies more than half of the world's raw rattan. Of the 600 species of rattan, those that yield canes of good colour and suppleness are most sought-after as raw materials for cane furniture: they abound in the island's interior, inhabited mainly by indigenous tribal people. In most cases, rattan collection is a part-time activity for members of families who otherwise earn a living mainly by farming.

Prior to the current ban on raw rattan exports, most of the rattan collected to make furniture was exported unprocessed to Hong Kong or Singapore. Rattan collected in the island's interior now is brought downstream by traders, processed to a rudimentary stage of manufacture then sold on to mainly Chinese exporters.

Manufacture of mats and carpets is, on the other hand, generally done within Kalimantan: in many rattan processing or carpet-making enterprises, women of the Dayak tribe comprise 30 to 40 percent of the workers. The mat and carpet industry is growing to rival the timber industry as an employer and source of rural income in the area of South Kalimantan.

Work is now under way to establish rattan plantations in the areas where wild stocks have been depleted by over-collection, to establish more processing centres nearer the source of collections and to clarify the terms of access and title to forest rattan collection. Ways of utilizing a greater variety of rattan species in trade are also being investigated.



P. Johnson

Freshly cut and cleaned rattan enters a rattan products factory in Balikpapan, east coast of Kalimantan (Indonesia).

At least five million hectares of wild bamboo occur in South and South-east Asia. Among literally thousands of uses, bamboos are used in pulp and paper manufacture and as food (in the form of bamboo shoots), as well as for handicrafts or building.

Unlike rattan, which is a climbing plant that normally needs a forest environment, most bamboos grow more outside than inside forest limits. New techniques of bamboo micropropagation are currently being developed by scientists in many Asian countries, with backing from FAO and other international organizations.

Flowering of bamboos is unpredictable and seed collection is difficult, so growers have long used vegetative propagation techniques, using cuttings or divided root masses. Modern techniques enable tens of thousands of 'propagules' to be multiplied from a single parent plant, each of which will form a new generation of bamboos. The impact of this breakthrough on bamboo breeding strategies will be considerable.

MUSHROOMING GROWTH – THE TRADE IN FUNGI

Many kinds of mushrooms that are important in trade can only grow in very particular kinds of natural habitat under a narrow range of ecological conditions and micro-climates. That often means they cannot be systematically cultivated despite abundant demand in distant and local marketplaces.

Examples are the 'black mushrooms' or morels (***Morchellus*** species) which are widely gathered in wooded areas of north-central Pakistan and traded internationally

P. Johnson

Cleaning mushrooms in one of Bhutan's mushroom centres. Unknown until recently, the mushroom is becoming an important crop for Bhutan.

in large quantities. Urban entrepreneurs buy them from local collectors and transport them in dried form mainly to overseas markets, especially in Europe, where demand for them as a gourmet or speciality food consistently exceeds local or regional supplies and prices are uniformly high.

Other kinds of mushroom can be cultivated, or semi-cultivated in compost derived from their natural habitat. In Bhutan, for example, four kinds of oyster mushroom (***Ostreus*** species) are grown in year-round rotation on forest logs injected with fungal spores or in compost mixtures made from forest litter.

In the mid-1980s, in harness with the UN Development Programme (UNDP), FAO project workers helped Bhutan's agronomists and growers identify the most suitable species, refine growing methods and open up potential new markets for the mushroom crop. An association was formed to encourage farmers to grow mushrooms and local canning factories were equipped to process the product for export sale to India, Nepal and Bangladesh. As a result of these efforts, mushrooms have since become a major source of export revenues for Bhutan.

Growing and collecting wild or semi-wild mushrooms is now a significant use of forest lands in Thailand, Chile, Turkey and many other countries around the world. According to a recent FAO study of eight countries in the Mediterranean coastal zone, harvesting wild mushrooms yields on average an estimated cash return to the collector of some US$250 per hectare per year, while highly prized truffles (***Tuber*** species) can yield more than three times that amount.

Mushrooms demonstrate many of the most serious disadvantages of non-wood forest products. They are extremely seasonal, local and sporadic in their occurrence and they are difficult to harvest, transport, process and store. They nevertheless support a thriving export trade, bringing solid benefits to all concerned in their collection, processing and marketing.

MUSHROOMS AS A SUBSISTENCE FOOD

The *per capita* consumption of mushrooms during the rainy season in Zimbabwe can be as high as 1.8kg. They are commonly valued as meat substitutes and they supply surprisingly large amounts of protein (up to 45g per 100g dry weight in some cases) and essential minerals. More than 20 tonnes of gathered mushrooms, mainly chanterelles (***Cantharellus*** species), are gathered and consumed by the some 700 000 residents of the Upper Shaba area of Zaire every year.

INSECT PROVIDERS – SILK, HONEY AND LAC

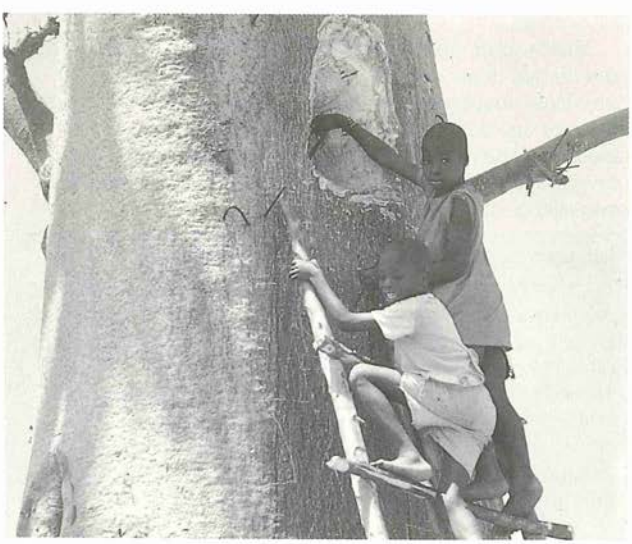
Insect life forms a major fraction of the animal biomass of forests and forest lands, especially in tropical forests, and gives rise to a great variety of significant forest products. The most obvious use of insects is as food. Caterpillars, termites, bee larvae and other soft-bodied insects are widely consumed as a protein food and dietary supplement. Just 100g of termites can provide 561 calories of food energy, while bee larvae contains ten times more vitamin D than cod liver oil and twice as much vitamin A as egg yolk. Insects also form a large part of the diet of foraging poultry and food fish, so contribute indirectly to human diets in a variety of ways.

Honey is an insect product universally valued for its high energy content – more than 280 calories per 100g. The blossoms of forest trees and plants growing below the forest canopy provide a year-round supply of food for bees in the form of nectar and pollen. The pollinating action of the bees as they forage is also a crucial factor in maintaining yields of tree crops, especially oilseeds and fruits. In some tropical countries (in Tanzania, for example) trade in honey and other beekeeping products such as beeswax and 'royal jelly' is a larger contributor to the national exchequer than all other forest products put together. Village-level beekeeping in India yields an estimated 37 000 tonnes of honey a year.

A vogue for 'health foods' in the diets of consumers in the EC, Japan, North America and other relatively affluent

Roberto Faidutti

Above: Traditional bee hive (Guinea Conakry).



Roberto Faidutti

Right: Children collecting wild honey from a Baobab tree (Senegal).

regions – a reaction to the over-processed foods characteristic of economies geared to mass production – has boosted demand for natural products like honey in recent years. Growth in honey production and improvement in beekeeping techniques have consequently assumed high priority in many countries, including Tanzania, the Philippines and Brazil. Honey is also a key item in subsistence diets, particularly where it is available in the 'hungry season' prior to the harvesting of crop plants.

Another important insect product is silk from the larvae of the silkworm moth. Although most of the world's silk is produced under farmed conditions, demand for 'wild silk' and the more robust silk fabrics such as tasar silk, widely produced on 'cottage-industry' scale in Thailand, India and elsewhere, has remained steady.

Trade in lac and lacquerwork also depends on an insect product, the gummy secretion exuded by the lac beetle (***Technadria lacca***) onto certain forest trees in many parts of Asia. The secretion dries to a hard crust capable of taking a high polish. The lac is collected, purified, coloured and sold in stick-form to handicraft workshops where it is used to give a glamorous finish to wooden toys or other small items of carpentry such as inkwells or pen holders.

Markets for lacquerware products are changing dramatically as mass-produced plastic substitutes for these items flood local and nearby urban markets. Export trade in lacquerware handicrafts has, however, shown healthy growth and larger, mechanized factories have sprung up to cater to this trade, supplanting the mainly women artisans who were formerly the mainstay of small-scale production.

In one town (Channapata) in Karnataka State, India, where lacquerwork is a predominant local industry employing more than 35 percent of the total workforce, annual production in 1991 was worth some 30 million rupees (US$300 000) and 70 percent of total production was exported.

Another commercial growth area for insect products is the trade in sustainably 'ranched' live tropical butterflies (or their eggs or pupae) to supply exotic butterfly-farming businesses outside the tropics. Many countries of the South Pacific and in Central and Latin America which have a spectacular butterfly fauna are profiting increasingly from this trade.

FOREST ESSENCES – SAPS, GUMS, RESINS, SYRUPS AND OTHER EXTRACTS

Extractive tree products include aromatic or essential oils, gums, resins, latex, tanning products and syrups. Extractive products are often of high market value but their development typically faces a number of risks both on the supply and the demand side.

Resin tapping from pine or other resinous trees is perhaps the best-known extractive use of forests and it remains one of the largest forest-based industries in the non-wood forest products sector. Its roots lie in the days of wooden ships, when pitch and tar derived from resin were essential sealants for ships' hulls. The main uses today are for production of turpentine solvent and rosin, a solid lubricant.

Despite sustained demand, the supply of pine resin has nose-dived in several countries in recent years as a result of low market prices and over-extraction. In India, production has dropped from 74 000 tonnes in 1975 to 35 000 tonnes in 1985 and a national campaign is under way to encourage collectors to adopt more sustainable methods of extraction. Genetic improvement of trees, fairer prices for the raw material and research and development to improve the product are also being urged.

Gum arabic is a resin tapped from ***Acacia senegal***, notably in the Sudan, which supplies 80 percent of the world market in this commodity. Gum arabic is widely used as a stabiliser or fixative in food, drugs and lithographic plates and varnishes. The tree takes only five years to reach maturity, after which it can be tapped for 10 to 12 years before it is cut down or coppiced. It yields about 100kg of gum arabic per hectare and earns the Sudan millions of dollars in foreign exchange as well as supplying timber, fuelwood, fodder and a host of other benefits to local people during its life-cycle.

Speciality oils such as bay rum (obtained by distillation from bay leaves in several islands in the West Indies and used in perfumery) have a less predictable future. Enlarging the scale of cultivation is the only sure way to keep the price of the novel commodity competitive, but markets can sometimes fail before such economies of scale are achieved.

Several forest trees are sources of tanning materials used to preserve and soften animal hides as leather. Strong competition from synthetic tanning chemicals has lately put many collectors of ***Acacia*** bark and other natural tanning materials, out of business. In India, plantation growing of appropriate trees is being attempted in an effort to undercut the cost of synthetic substitutes and rescue village industries based on tanning, from collapse.

In much of southern Africa, including Zimbabwe, bark from a variety of ***Acacia*** is the source of glues used in the manufacture of particle boards and plywood, both valuable sources of foreign exchange.

The kitul palm (***Caryota urens***) is a small tree found in Sri Lanka and southern India, in moist forest habitats and home gardens. Its young flowers are tapped and the nectar is fermented to produce toddy, an alcoholic drink, or crystallized to produced jaggery, a popular local sugar substitute at times when imported sugar prices are high. No concentrated effort has been made to bring the kitul palm under cultivation or develop a wider market for it, partly because the tree has a complex life-cycle and partly because the product cannot be preserved for long or processed for export.

In the case of another popular natural sweetener, maple syrup, a major limiting factor on supply is damage to trees that has been attributed to air pollution from industrial sources in Canada and the northern USA. Failing supplies have driven prices of the natural product to unprecedented heights and artificial substitutes now command the bulk of the market. Although, as these examples show, many kinds of extractive non-wood products are 'problem products', their commercial potential remains attractive and offers wide scope for diversification of forest industries throughout the world.

Roberto Faidutti

A worker taps natural latex, which becomes chicle (Rio Negro, Amazonia).

NON-WOOD PRODUCTS IN PERSPECTIVE

Forestry is the science, business and art of managing and conserving forests and associated lands for continuing economic, social and environmental benefit. It involves the balanced management of forest resources for optimum yields of wood products, wildlife..., water..., scenic and recreational environments... and a variety of other services and products.
Science Council of Canada, 1973

ECHOES FROM THE NORTH

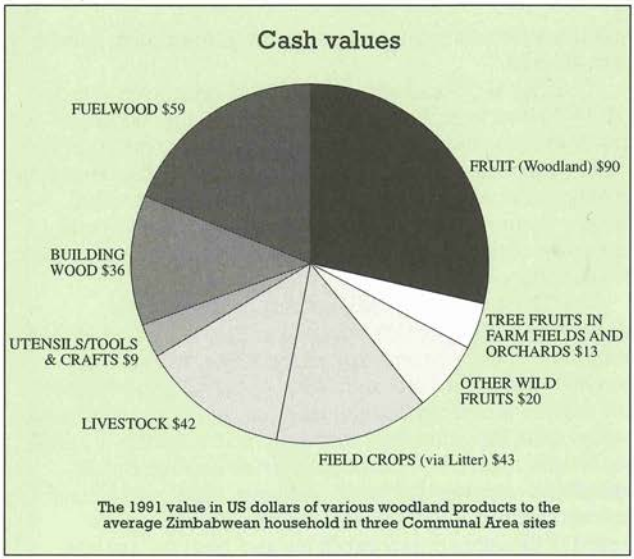
Though developing countries tend to be the focus of much analysis of non-wood product use and development, forests elsewhere abound in such products and uses. The extensive forests of the cold northern zones of Europe and North America are especially rich in examples and here too, interest in new approaches to product development and innovative multiple-use is on the increase.

Canada, for example, has recently embarked on an ambitious Model Forests programme aimed at reconciling the country's massive timber and processed wood product industries with environmental requirements, amenity uses such as recreation and tourism, and the special needs of indigenous people, particularly where non-wood products are concerned. The programme's design draws on lessons learned in the many developing regions where Canada sponsors multiple-use forestry projects in a technical cooperation role.

Though not always directly comparable, particularly in view of the very different degrees of development or under-development that form their background, experiences of multiple-use forestry in the world's richer and poorer countries offer illuminating contrasts and potential for valuable information exchange in both directions.

A LOCAL PERSPECTIVE: ZIMBABWE'S COMMUNAL AREAS

Detailed investigations during 1991 by a team of Canadian and Zimbabwean researchers, supported by IDRC, into the use of non-wood forest products in small-scale farming communities in three sites in Zimbabwe's Communal Areas, provide a revealing glimpse of the true value in cash terms of goods derived from trees growing in the *miombo* woodland ecosystem. In the 359 households studied, forest fruits either consumed at source or sold on local markets were calculated to have an average cash or cash equivalent value of around Z$280 per hectare per year. Other wild foods were worth Z$63, leaf litter used as a farm fertilizer or mulch Z$134 and fodder and browse for livestock some Z$100-Z$160 per hectare per year. Added to the value of timber, fuelwood and other wood products, the worth of these woodland products was close to Z$1000 (US$320) a year for each household.



The 1991 value in US dollars of various woodland products to the average Zimbabwean household in three Communal Area sites

A NATIONAL PERSPECTIVE: INDIA

Non-wood forest products provide the majority of all forest-based exports from India. This oft-quoted fact masks the fact that unsustainable harvesting in the past has depleted forests below commercially viable levels in most of India's formerly richly forested humid zone. Ideally, timber and non-timber production should thrive in equal measure if raised under sustainable multiple-use conditions.

Nevertheless, one positive result of India's dependence on the non-timber sector is the high level of employment generated by forest-based enterprises – jobs enough for more than 30 million people nationwide. Outstanding among products that create jobs are oilseeds (100 000 man years/year), gums and resins (87 000 man years/year), bamboo (48 000 man years/year) and kapok floss (10 000 man years/year).

The highest-turnover forest product of all is the foliage of the tendu tree (***Diospyros melanoxylon***), used to wrap the small cheroots known as *bidi* that are popular throughout India and several neighbouring countries. India produces some half a million tonnes of bidi leaves a year. Gathering, processing and selling them provides employment for at least one million people.

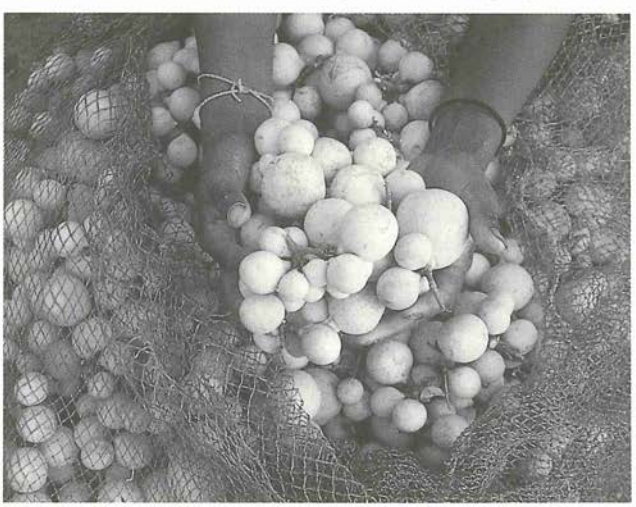
Now moves are under way in India to intensify the harvesting and marketing of non-wood forest products along sustainable lines to increase the rewards that products sold on internal and export markets bring to poorer communities. In many of the latter, 90 percent or more of community

members depend on forest products as their main source of livelihood.

The Tribal Cooperative Marketing Federation of India (TRIFED) was launched in 1987 to fulfil a nationwide programme of procurement, processing and marketing of forest and agricultural commodities produced in the country's extensive tribal areas. India's officially classified tribal groups number some 8.3 percent of the population and many are highly dependent on non-wood products for their livelihoods and cash income.

The TRIFED scheme has been responsible, it is claimed, for a 90 percent increase in prices earned at market by the collectors and extractors of non-wood forest products between 1988 and 1990. About 50 commodities are traded, including cashew nuts, lac, pepper, sal oil, sisal hemp, aloe, tamarind fruit, turmeric root, cardamon, sarsaparilla and tasar silk. A fortnightly price bulletin is published and circulated to trade, industry, tribal and official interest groups. Research and development projects aimed at identifying new products and markets are run from TRIFED laboratories in Bombay and Delhi. Some 5000 local Service Centres are being set up to procure goods at fair prices and a chain of warehouses and refrigerated stores is also under development.

Various initiatives have also been taken at state government level to encourage the growing of trees that yield useful wild goods, on 'home farms' and in between field crops in farming systems. In Orissa State, bonus incentives are payable to farmers who grow tendu, neem, sal and other productive trees, including those which play host to



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Wild fruits from Landolphia heudelotii linnea (Guinea Bissau).

the lac beetle. The Bihar State Government pays fixed prices for a number of forest tree oilseeds, which have become nationalized commodities. The prices offered are set at much higher levels than pre-nationalization prices.

REINDEER AND BERRIES

In Finland the use of non-wood forest products both for rural self-sufficiency and in trade might be expected to be dominated by service aspects of multiple-use forestry rather than characterized by strong dependence on specific products. In fact, though service functions of forest lands are more prominent than in India's case, products such as wild berries, mushrooms and wild game are of considerable economic significance.

Of a potential harvest of some 400 000 to 700 000 tonnes of wild berries, some 5 percent is harvested each year (10 000 to 20 000 tonnes) mainly for household consumption, though between 300 and 800 tonnes comes to market in larger urban centres like Helsinki. Mushroom consumption follows a closely similar pattern. Commercial trade in lichens (used, for example, in production of food additives and industrial chemicals) is substantial: the annual production of 0.5 million kilograms is mainly exported and revenues from this sector average FIM 8.6 million.

Herding of semi-domesticated reindeer as meat animals is a lucrative business in Finland and most Finnish forests, both private and public, are of importance as reindeer grazing grounds. Annual trade in reindeer meat grosses 3400 tonnes of product, worth some FIM100 million. But trade in wild game from forest lands out-performs the reindeer meat trade almost two-fold both in quantity and value.

Owing to widespread state ownership of forest lands, amenity, recreation, nature conservation, watershed protection and other service functions are of great importance in Finland. The fact that these values can be maintained alongside harvesting and use of non-wood products in a sustainable fashion means that, even where public forest passes into private ownership, the pressure to monopolize the newly privatized forest for wood production is moderate. In many cases the mix of uses after privatization remains surprisingly constant, because profitable use can be made of forest lands without recourse to intensive mechanized forestry.

A REGIONAL PERSPECTIVE: THE MEDITERRANEAN

FAO studies for Silva Mediterranea, of non-wood forest product use in Morocco, Tunisia, Spain, Greece, Italy and the coastal zones of France and Algeria, indicate that trade in the Mediterranean of commodities such as cork, resin, mastic gum, honey, mushrooms, wild fruits and wild game, added to the value of trees used in livestock production (mainly as sources of fodder) had an estimated cash value of more than US$1 billion in 1992, with a development potential of anything up to US$5 billion a year.

Historically, the Mediterranean region has been the home of tree crops like olives, sweet chestnuts, dates and many other commodities of high food value. These crops have crossed over into cultivated use at some point in the distant past, but are still only semi-cultivated in places.

The wild fauna and flora of the Mediterranean have suffered waves of depletion and man-modification in past ages. Current developments, such as the grafting of EC farm policy on to traditional Mediterranean agriculture, are tending to erase still further the region's distinctive patterns of land use. In many ways, vernacular Mediterranean agroforestry is a model of sustainable land use. The use of non-wood forest products in the region is currently being challenged by pressures not unlike those which operate in many more southerly developing regions.

A special factor in the Mediterranean's case is its importance as a tourist destination. Almost 100 million visitors seek recreation in the coastal zone each summer: they represent a mobile market for forest products like honey or wild game that is independent of the trade and tariff restrictions that operate in larger markets such as the EC. Nevertheless, positive management interventions will be necessary in the Mediterranean, as anywhere else, to secure a prosperous future for non-wood forest products.

Value (in US$ per hectare per year) and estimated regional production (in tonnes per year) of some typical non-wood forest resources and outputs in the Mediterranean coastal zones of Algeria, France and Italy, and in Spain, Tunisia, Morocco, Greece and Portugal:

	Value (US/ha.year)	*Production (t/year)*
Cork	89.0	3 750 000
Silvopastoralism	88.0	2 021 000
Silvofauna	63.5	1 211 000
Medicinal &c. herbs	39.7	4 546 965
Mushrooms	278	757 827
Honey	302	5 469 000

Historically the Mediterranean has been the home of cultivated tree crops like the olives shown here (Tuscany, Italy).

Roberto Faiduti

EMERGING TOPICS AND CONCERNS

FOREST INDUSTRIES AND NON-TIMBER PRODUCTS

There is a growing tendency for people to leave forests and forest lands. This trend is specially marked in the more isolated forest areas of the tropics where the incidence of disease and child mortality is typically high and where modern health care, education and other facilities are often lacking. A compromise may be found by applying research to develop new products from forests (and new markets for them), then using the revenues of forest industry and commerce to generate better and more secure livelihoods for residents of forest neighbourhoods.

Established forest industries like timber extraction, sawmilling or pulp and paper manufacture can be integrated with small or medium scale non-timber enterprises to enhance local benefits. New combinations of large and small forest industries can also make a slower rate of tree extraction economically feasible and more sustainable.

Management systems for boosting production of non-wood forest products while introducing longer felling cycles and lower harvesting intensities for timber, have already been proposed in several countries. An example of such a system in action is the Yapo National Forest in southern Côte d'Ivoire, where revenues from fuelwood, charcoal, poles, chewing sticks, ornamental plants and matchwood, defrayed forest management costs to the tune of US$26 000 in 1987, enough to offset a more conservative timber harvest than in previous years.

New kinds of management regimes may be needed to accommodate new forms of multiple-use. The use of fire to promote forest floor growth, one of the oldest of range management practices, can threaten some wildlife or plants that have value as non-wood products, though it can also have a beneficial effect on availability of certain others. Conflicts of interest are also likely to arise between non-wood cash crop collectors and subsistence users.

Management practices will have to take account of these and other potentially conflicting factors in the future. Research into new techniques of propagation, varietal improvement and other forms of husbandry could help bolster development of new forest industries based on non-wood products. Coppicing techniques used in forestry could, for example, be applied to large grasses or reeds that yield useful forest products.

Research could also be applied to processing, storing and marketing of products. A technique for preserving

palm sugar to compete with other commercial sweeteners, would – for instance – allow tree-derived sugar to vie with beet or cane sugar for a share of national and even of world markets. More than research, however, market development needs people with entrepreneurial vision and drive who will see and seize the opportunities for new forms of commerce in forest produce.

EXTRACTIVE RESERVES

The concept of the extractive forest reserve implies the controlled extraction of a safe quota of useful or valuable products from areas of rainforest or other forest biomes. The revenues gained should in theory enable the area to be left ecologically intact without paying economic penalties. Such reserves can help generate income and protect forests but they are not panaceas. The more usual fate of non-wood forest products that gain long-term popularity, is depletion.

Palm heart and brazil nut exports earned Brazil some US$20 million in 1989. Exports of chicle (the resin of ***Manilkara zapota***) or the Sapodilla tree used for chewing gum), allspice and Xate (ornamental fronds of two palms in the ***Chamaedorea*** subfamily) bring US$7 million a year into Guatemala. But the aguaje palms (***Mauritia*** species) that grow in the lowland jungles of Brazil and Peru have been decimated by collectors harvesting hearts of palm. Sapodilla trees tapped for chicle and felled for timber have been depleted over large areas of Guatemala and Mexico. The fate of many gatherers is continuing poverty while middlemen and urban elites enjoy the fruits of the collectors' labours. brazil nut gatherers working in extractive reserves in Amazonia, for example, receive a mere 2 to 3 percent of the product's wholesale price on distant markets.

These social drawbacks are not new. The great rubber boom of 1870-1910 brought thousands of rubber-tappers to Amazonia. It also led to the subjugation and mass extermination of great numbers of Amerindian tribespeople at the hands of the rubber-tappers: eventually the latter, too, were reduced to the condition of forced labourers. For many of the tappers, today's conditions offer little hope despite their having diversified their labours to include brazil nut collection: plantation growing of brazil nut is now threatening to remove their alternative livelihood.

Despite these poor omens, the principle behind extractive reserves is sound. What may be missing is a more localized marketplace (perhaps at existing sawmills or other processing centres) where supplies of non-wood products can be auctioned or tendered for in an open, fair and accountable manner.

J. Van Acker

Women at market making brooms from dried palms (Samoa).

WOMEN AND NON-WOOD FOREST PRODUCTS

Income and home employment opportunities created by trade in non-wood forest products can provide openings for a high level of participation by women in small-scale forest industries.

In rural areas of India, women often dominate income-earning handicraft activities such as mat or basket weaving, as these tasks can be combined with household and child-care activities. For many women, the handicraft connection is the only opportunity that they will have in their lives to earn an independent cash income. Products made from natural fibres like rattan or raffia are, however, losing their market share to synthetic, mass-produced substitute products in many areas.

Rattan and bamboo products are also prey to this trend, except where furniture-making and other heavy-duty handicrafts are concerned. These are expanding markets, but the shift of emphasis from small craftwork to larger products that are more likely to be made in a workshop using machine tools than at home by out-workers, has also changed the gender emphasis of fibre craftwork production. Now men, not women, are most likely to dominate the rattan or bamboo craftwork labour force.

Another illustration of the far-reaching effects of shifts in market demand on the collection, processing and use of non-wood products, is provided by the trade in uppage (pronounced 'oo-pah-jey') fruit in Karnataka State, India. The seeds of the evergreen uppage tree (***Garcinia cambogia***) have a high (30 percent) fat content and have been traditionally gathered by women of the Havyak Brahmin caste to produce a vegetable substitute for ghee (clarified butter). The rinds of the uppage fruit were discarded in this process as an unwanted by-product. However, a new market for uppage rind developed in neighbouring Kerala State, where it became fashionable as a condiment to be used in place of tamarind in fish curries.

The hugely increased demand for uppage rind that this market shift has created in Karnataka State during the past ten years has drawn increasing numbers of villagers into the collection of the fruits as a source of seasonal self-employment. Though no longer an exclusive preserve of women, the collection of uppage has put many more women in a position to earn a personal income. It has also led to new restrictions on access to the resource, as what was formerly a commodity held in low esteem acquires ever-higher market value.

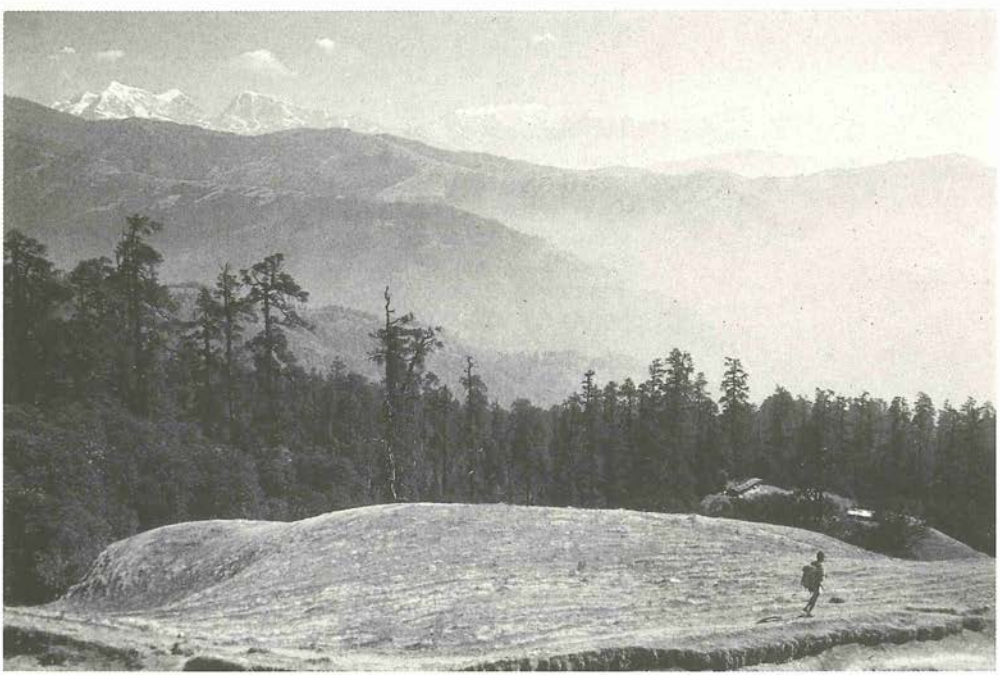
SERVICE BENEFITS OF FORESTS

Forests and trees play an important supporting role in improving agricultural and livestock production, providing social amenities such as shade and shelter, and protecting soil and water resources from erosion and depletion. They also help regulate climate, atmosphere and weather conditions. They perform these functions whether they are of natural or cultivated origin.

In addition, forests (especially natural forests) can harbour a range of species and habitats that represent genetic and ecological resources of great potential significance. Forested landscapes, particularly those that are rich in wildlife, also attract tourism and other wealth-creating leisure industries to low-income rural areas.

They are benefits that 'spin off' from forests and forestry in general. Few would deny that they are more likely to be delivered abundantly by forests and forest lands that are utilized in sustainable ways. Though the connection is not always beneficial, the multiple or conjunctive use approaches made possible by the existence of non-wood resources, usually make sustainable use of forests easier to achieve because communities in rural areas are more likely to rally behind them.

Trekking in Nepal.



Roberto Faidutti

FAO AND NON-WOOD FOREST PRODUCTS

Interest in the future development of non-wood products from forests, forest lands and woodlands is not limited to poor rural situations but concerns the global community. The need for such development cuts across related disciplines such as forestry, agriculture and horticulture and poses the challenge of coordinating action at local, national and international levels.

FAO has long recognized the complex interaction of these factors. It is reflected in systemic linkages between the many divisions whose work relates to non-wood forest products. For example, the Agricultural Department of FAO has been concerned with the development of wild species of oil-producing palms, while the Forestry Department has been concerned with the resource management of vicuna in Peru and captive crocodile projects. Cooperation within and between these and other FAO departments is acknowledged as vital to ensure that technical expertise is applied across the broadest possible front and without needless duplication of effort.

The diversity of the non-wood products field means that its development and promotion often requires a multidisciplinary approach involving not only specialists within FAO but also their counterparts in other national and international organizations.

Multidisciplinary links are fundamental to the work of the FAO's Forestry Department. Non-Wood Products and Energy Branch of the Forest Products Division (FOPN*) of the Forestry Department has been designated as the main focal point for the coordination of actions aimed at promoting and developing non-wood forest products and is establishing close links with the Community Forestry Unit of FON (Forestry Policy and Planning Division) as well as with FOR (Forest Resources Division) and FODO (Forestry Department Operations Service). On plant genetic resource conservation and biodiversity in general, FOPN liaises with the International Board for Plant Genetic Resources (IBPGR), for which FAO supplies secretariat services.

Other non-wood product-oriented forestry interest groups within FAO are the Forest and Wildlands Conservation Branch, and the Forest Resources Division (FOR). The latter division has special interest in the context of anti-desertification activities in dry ecosystems. Various technical groups such as the joint ECE/FAO Agriculture and Timber Division and Silva Mediterranea, a group with special responsibility for monitoring forest production and utilization in the Mediterranean Region, also count non-wood products among their key interests.

**** Full titles appear in the list of acronyms at the end of this booklet.***

THE TROPICAL FORESTS ACTION PROGRAMME

The Tropical Forests Action Programme (TFAP), launched in 1985, is co-sponsored by the United Nations Development Programme (UNDP), the World Bank and FAO. Its purpose is:

- to raise awareness and mobilize commitment at all levels of society to tackle the problems of deforestation;
- to foster multidisciplinary sectoral planning approaches at national level in order to formulate effective policies and programmes;
- to mobilize national and international resources, both financial and technical, for the implementation of programmes for the conservation and sustainable use of forests.

More than 90 countries are currently in the process of developing national TFAP plans. Activities at national level involve the active participation of communities, voluntary non-governmental organizations and commercial interest groups as well as official bodies. There is a strong emphasis in every TFAP initiative on multidisciplinary interaction to streamline and consolidate institutional approaches to forest issues and on the inter-sectoral linkage.

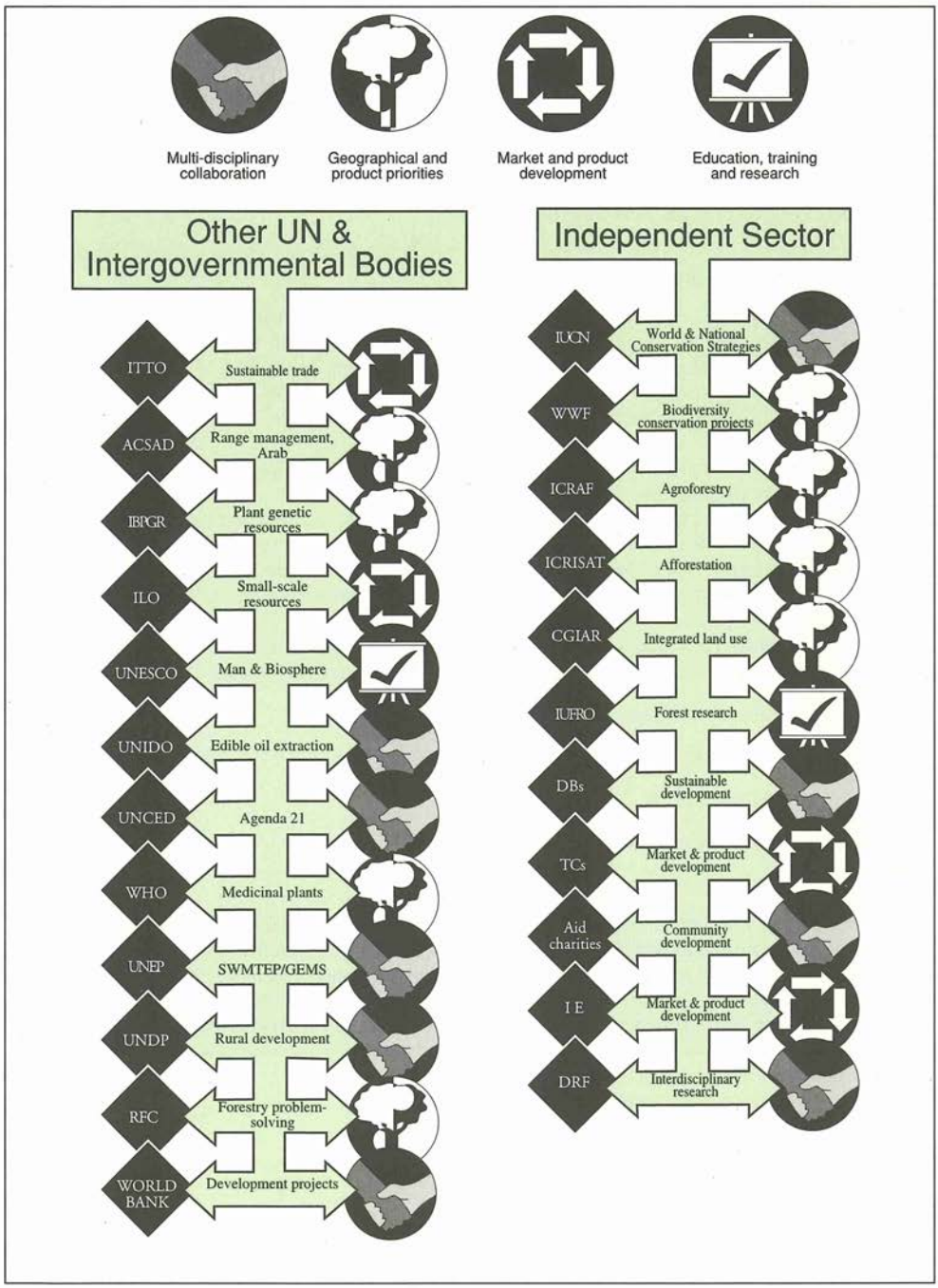
The TFAP is one of the major existing mechanisms which can be used for implementing forest-related objectives and programmes as proposed in the UNCED Agenda 21. It stresses the need to support countries: '... in taking action to ensure that forest resources contribute to social and economic development, in particular through multi-purpose forest management.' It hence holds special significance for NWFP development. FAO provides technical guidance and assistance in developing a comprehensive public database on all TFAP-related projects.

Other departments within FAO that have an interdisciplinary stake in non-wood forest products include the Agricultural Department Branches responsible for:

- forage and livestock management in plantations (AGAP);
- water resources and watershed management (AGLW);
- soil conservation (AGLS);
- forage, horticultural and industrial crops (AGPC);
- agricultural industries and marketing (AGSI).

On food policy and nutrition matters, FOPN liaises with ESNP, ESNA and other sections in the Nutrition Division, and with the World Food Programme. The main links with the Fisheries Department is FIRM, which deals with marine environment and mangrove management issues and with FIRI, the Inland Water Resources and Aquaculture Service. Both units are within the Fishery Resources and Environment Division of the Fisheries Department.

In addition to interdisciplinary links within FAO, opportunities exist for collaboration with an extended global network of intergovernmental and international bodies, including other UN bodies and major international NGO networks. The nature of the likely collaboration with FAO is broadly classed in the chart above under four broad headings.


Multi-disciplinary collaboration
Geographical and product priorities
Market and product development
Education, training and research
Other UN & Intergovernmental Bodies
ITTO
Sustainable trade
ACSAD
Range management, Arab
IBPGR
Plant genetic resources
ILO
Small-scale resources
UNESCO
Man & Biosphere
UNIDO
Edible oil extraction
UNCED
Agenda 21
WHO
Medicinal plants
UNEP
SWMTEP/GEMS
UNDP
Rural development
RFC
Forestry problem-solving
WORLD BANK
Development projects
Independent Sector
IUCN
World & National Conservation Strategies
WWF
Biodiversity conservation projects
ICRAF
Agroforestry
ICRISAT
Afforestation
CGIAR
Integrated land use
IUFRO
Forest research
DBs
Sustainable development
TCs
Market & product development
Aid charities
Community development
I E
Market & product development
DRF
Interdisciplinary research

THE FUTURE: A FRAMEWORK FOR ACTION

FAO's outlook on the future use and development of non-wood forest products has evolved from substantial experience in many settings over the past four decades. Some aspects of that experience have been outlined in the foregoing pages. This experience can serve as a basis for seeking consensus and setting realistic courses of action for the international community as it surveys an uncertain future for the world's forests, its forest lands and the people who depend on them.

Though still an evolving process, adoption of a programmatic approach will fulfil many critical needs, while the consequences of inaction or lack of coordinated action are likely to be costly indeed in human, economic and biological terms.

The framework for action that follows, identifies three main types of proposed targets. Under a set of broad development objectives for the medium and long-term, it itemizes a number of crucial immediate objectives that, once achieved, will clear the way for more orchestrated efforts. Finally, it pinpoints a number of special considerations that nobody whose labours are dedicated to more and better use of non-wood forest products can afford to ignore in the short or longer term.

Roberto Faidutti

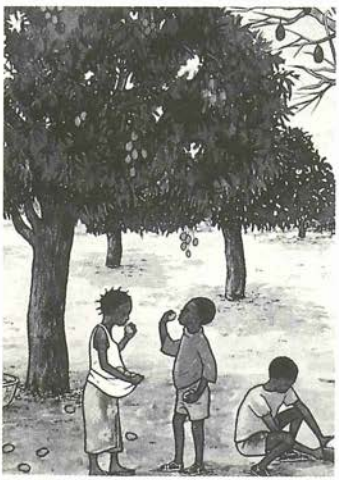
Women selling Landolfia asulis and cashew apples at market (Guinea Bissau).

DEVELOPMENT OBJECTIVES

Natural ecosystems conservation: Natural ecosystems should be conserved and their biodiversity maintained. More versatile and better-organized use of a wider range of products yielded by forest ecosystems, can bring these goals measurably nearer.

Rural income and employment opportunities: Profitable activities in forest lands that will generate more income and new employment opportunities, should be fostered within managed programmes and projects for sustainable rural development

Sustainable community livelihoods: Living standards, welfare and food security of people living in rural communities in forest areas should be improved in a format that persists from generation to generation. Efficient and rational utilization to recover the full value of goods and services yielded by forests, forest lands and woodlands, will help build such sustainable livelihoods.



Ali Diop

Utilization of forests as a supplier of wealth. (This image has been taken from the Awareness Campaign.)

Forests as a life support system: The natural, social and economic contribution of forest ecosystems to sustainable development in rural areas, should be husbanded and given scope to increase in quantity and quality.

Diversification and productivity: A wider range of non-wood forest products and services should be utilized and the productivity of such uses raised, in order to boost the benefits to rural communities of sustainable development efforts.

IMMEDIATE OBJECTIVES

Awareness: Political and general awareness of the importance of non-wood forest products should be raised in order to attract investment and orient activities in this field.

Knowledge bases: Investigative research, surveys and other means of collecting and accessing information and quantitative data on non-wood forest products should be given increasing priority.

Transfer of knowledge and skills: Personal skills, technical expertise and managerial capability to formulate policies, plans, programmes and activities affecting non-wood forest products, should be constantly improved and widely shared through training and other means of information exchange.

Institutional development: Relevant national institutions should be given optimum scope to raise yields and enhance the productivity of non-wood goods and services from forest sources, giving due attention to effective conservation and care of forest resources.

Networking and international linkages: International, regional and national cooperation should be mutually developed through cooperative networks. Coordination and liaison between intergovernmental organizations such as FAO, UNDP, WB, ITTO, UNEP, UNESCO, UNIDO, ILO, and non-governmental and private voluntary organizations involved in promoting or improving the use of non-wood forest resources, should be strengthened.

SPECIAL CONSIDERATIONS

A participatory approach: Initiatives to improve rational utilization of forest resources should aim at optimizing benefits to local communities and should be custom-made,

allowing full participation of local people in all programme or project phases from conception to completion. This participatory approach should blend local knowledge and skills with science-based principles of environmentally sound forest management and sustainable forest utilization.

Common factors: As a rule, all such initiatives should promote diversification of forest activities, increase revenues from forests and improve food security, nutritional standards and health care in the local population through more abundant and better-managed use of the resources in their vicinity.

Breaking down barriers: To succeed, popular approaches to improved management of non-wood forest products should encourage new and closer relationships between governments, NGOs and local community associations.

Gender fairness: The role of women in managing and using non-wood forest products should be acknowledged and their views and knowledge duly heeded in the participatory process.

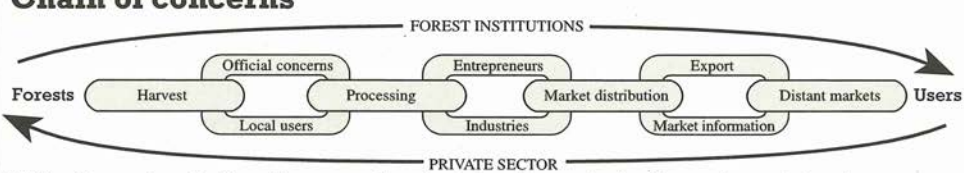
While developing countries have great resources of biodiversity and great wealth in tropical forests, the technology to harness this wealth – other than timber – lies very much in developed countries and often in the private sector. The development of sophisticated technologies and improved biotechnologies offer opportunities for harnessing the yet undiscovered wealth within the multitude of biodiversity that exists in tropical forests.
M.N. Salleh (Director General, Forest Research Institute of Malaysia)

MAIN LINES FOR ACTION

Objectives and parameters having been established, their translation into action is expected to take the form of a combination of programme activities involving many sectors and geared to varying levels of responsibility. These activities will be grouped according to their point of impact, as follows:

- Conserving multiple roles and functions of forest ecosystems by developing suitable management techniques to upgrade production of forest products other than timber and enhance the service functions of forest lands.

Chain of concerns



Utilization and marketing of non-wood products involves a chain of procedures, interest groups and market factors, all of which must be heeded when further development is contemplated.

- Through research and development, improving and establishing environmentally sound resource utilization techniques and harvesting operations that involve NWFP.

- Identifying NWFP with the greatest development potential in a given situation and for these:

  – Promoting efficient, rational and sustainable utilization of all types of non-timber forest products and services by developing socially acceptable, economically feasible and environmentally sound forest-based processing industries and enterprises.

  – Building up more efficient trade and market infrastructures that will increase demand for non-wood forest products and their profitability, while creating opportunities to market new products, in order to optimize revenues from a full range of goods and services based on trees and forests.

LIST OF FAO FORESTRY PROJECTS

COUNTRY	FUNDING SOURCE	DURATION (YEARS)	TYPE OF PROJECT
Bhutan	UNDP	9.5	Technical assistance to mushroom development
Bhutan	FAO	2	Production of essential oils by smallholders in remote areas
Burkina Faso	UNDP	4	Wildlife management
Cape Verde, Mali & Burkina Faso	Italy (Trust funds)	2	Forest and food security
Central Africa Republic	UNDP	6	Wildlife management
Cuba	FAO	2	Production of medicinal plants
India	UNDP	2	Establishment of the Wildlife Institute of India
Indonesia	Japan	3	Development of crocodile industry
Madagascar	UNDP	2	Crocodile breeding programme
Mediterranean Near East	Italy (Trust funds)	2	Forestry and food security in Mediterranean and Near East Region
Nepal	UNDP	3	Cultivation of medicinal and aromatic plants
Pakistan	UNDP	5	Animal feed development resource project
Philippines	UNDP	5	Bamboo research and development
Somalia	FAO	2	Strengthening of wildlife management
Uganda	UNDP	5.5	Support to wildlife and national parks

INFORMATION SOURCES AND SELECTED READING

Ajayi, S.S. (1990), Ed. ***Rural community participation in integrated wildlife management and utilization in Botswana, Zambia and Zimbabwe***. Field document No.2, FO. TCP/RAF/8962. FAO, Rome, Italy.

Arnold, J.E.M. (1991) ***Community forestry – ten years in review.*** FAO Community Forestry Notes No. 7.

Arnold, J.E.M. & Stewart, W.C. (1991) ***Common property resource management in India***. Tropical Forestry Papers, No. 24. Oxford Forestry Institute.

Asibey, E.O.A. (1986) ***Wildlife and Food Security***. FAO Forestry Department Paper.

Bostid, F.R. (1983) ***Managing tropical animal resources: butterfly farming in Papua New Guinea***. National Academy Press, Washington.

Bruce, J. (1990) ***Rapid appraisal of land and tree tenure***. FAO Community Forestry Notes No. 5.

Chambers, R. & Leach, M. (1987) ***Trees to meet contingencies: savings and security for the rural poor***. Institute of Development Studies Discussion Paper, No. 228.

Clarke, R. (1987) ***Restoring the balance: women and forest resources***. FAO/SIDA miscellaneous publication.

Davis-Case, D. (1989) ***Participatory assessment, monitoring and evaluation***. FAO Community Forestry Notes No. 2.

De la Cruz, V. (1989) ***Small scale harvesting operations of wood and non-wood forest products involving rural people***. FAO Forestry Paper, No. 87.

ECE/FAO (1988) ***Seminar on products from the Mediterranean forests***. Florence, Italy.

Falconer, J. (1989) ***Forestry and nutrition***. A reference manual. FAO, Rome.

Falconer, J. (1990) ***The major significance of 'minor' forest products – the local use and value of forests in the West African humid forest zone***. FAO Community Forestry Notes No. 6.

Falconer, J. & Arnold, J.E.M. (1989) ***Household food security and forestry: an analysis of socioeconomic issues***. FAO Community Forestry Notes No. 1.

FAO (1978) ***Forestry for Local Community Development***. Forestry Paper, No. 8.

FAO (1986) ***Forests, trees and people***. Forestry Topics Report, No. 2.

FAO (1987) ***Indo-Pacific Fisheries Commission – Report of the Workshop on Strategies for the Management of Fisheries and Aquaculture in Mangrove Ecosystems***. Fisheries Report, No. 370.

FAO (1987) ***Small scale forest-based processing industries***. Forestry Paper, No. 79.

FAO (1989) ***Forestry and food security***. Forestry Paper No. 90.

FAO (1989) ***The management of crocodiles in captivity***. Conservation Guide, No. 22 (see page 50).

FAO (1990) ***Non-wood forest products: the way ahead.*** Forestry Paper No. 97

FAO (1991) ***Women's role in dynamic forest-based small scale enterprises***. Community Forestry Case Study No. 3.

FAO (1991) ***Case studies in small scale enterprises in Asia – rattan, matchmaking and handicrafts***. Community Forestry Case Study No. 4.

FAO (1992) ***Forests, trees and food***. Miscellaneous paper.

FAO (1992) ***Focus on Bamboo***. Special Forest News supplement in Tigerpaper Vol. XIX, No. 1, January-March 1992.

Hytönen, M. (1991) ***Multiple-use forestry research in Finland 1970-1990: an annotated bibliography***. Bulletin of the Finnish Forest Research Institute (in print).

ICRAF (1987) ***Agroforestry – a decade of development***. ICRAF, Nairobi, Kenya.

ITTO (1992) ***Criteria for the measurement of sustainable tropical forest management***. ITTO Policy Development Series, No. 3.

Leach, G. & Mearns, R. (1988) ***Beyond the fuelwood crisis: people, land and trees in Africa***. Earthscan Books, London .

May, P.H. (1990) ***Institutions and markets for Amazon forest dwellers***. FAO Complementary Paper.

Molnar, A. (1990) ***Rapid appraisal***. FAO Community Forestry Notes No. 3.

Myers, N. (1988) ***The primary source***. W.W. Norton, New York.

Ogden, C. (1991) ***Guidelines for integrating nutrition concerns into forestry projects***. Community Forestry Field Manuals No. 3.

Quimo, T.H. (1986) ***Guide to low cost mushroom cultivation in the tropics***. Bulletin of the College of Agriculture, University of the Philippines at Los Banos.

Ryan, J.C. (1991) ***Goods from the woods***. Forests, Trees and People Newsletter, No. 14: 23-30.

Sayer, J. (1991) ***Rainforest buffer zones***. Guidelines for protected area managers. IUCN, Gland.

Svensson, B. (1991) ***Bees and trees***. SUAS/IRDC Working Paper No. 183.

Varshney, R.K. (1988) ***Lac literature: a bibliography of lac insects and shellac***. Shellac Export Promotion Council, India.

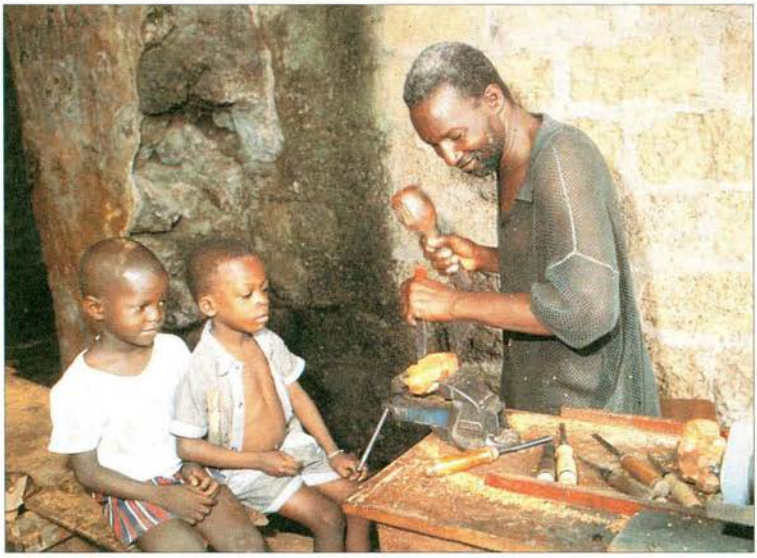
World Bank (1978) ***Forestry: sector policy paper***. World Bank, Washington.

WWF (1990) ***Economic analysis of conservation initiatives. Examples from West Africa***. WWF-UK, Godalming.

ACRONYMS AND ABBREVIATIONS

LIST OF ACRONYMS

ADMADE	Administrative Management Design
AGAP	Animal Production Service
AGLW	Water Resources Development and Management Service
AGLS	Soil Resources, Management and Conservation Service
AGPC	Crop and Grassland Service
AGSI	Food and Agricultural Industries Service
ACSAD	Arab Centre for the Study of Arid Zones and Drylands
CFDT	Committee on Forest Development in the Tropics
CGIAR	Consultative Group on International Agricultural Research
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DB	Development Banks
DRF	Development Research Foundations
ECE	Economic Commission for Europe
EC	European Community
ESNA	Nutrition Planning, Assessment and Evaluation Service
ESNP	Nutrition Programmes Service
FIM	Finnish marks
FIRM	Marine Resources Service
FODO	Forestry Department Operations Service
FONS	Planning and Statistics Branch
FOPN	Non-Wood Products and Energy Branch
FOR	Forest Resources Division
GEMS	Global Environment Monitoring System
IBPGR	International Board for Plant Genetic Resources
ICRAF	Intrnational Center for Research in Agroforestry
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IDRC	International Development Research Centre
IE	Individual Entrepreneurs
IFAD	International Fund for Agricultural Development
ILO	International Labour Organization
ITTO	International Tropical Timber Organization
IUCN	International Union for Conservation of Nature and Natural Resources (World Conservation Union)
IUFRO	International Union of Forestry Research Organizations
MAB	Man and Biosphere Programme (Unesco)
NGOs	Non-Governmental Organizations
NWFP	Non-Wood Forest Product
RFO	Regional Foresty Commissions
SIDA	Swedish International Development Authority
SWMTEP	System-Wide Medium-Term Environmental Plan
TC	Transnational Corporations
TFAP	Tropical Forestry Action Programme
TRIFED	Tribal Cooperative Marketing Federation
UNCED	UN Conference on Environment and Development
UNDP	UN Development Programme
UNESCO	UN Educational, Scientific and Cultural Organization
UNEP	UN Environment Programme
UNIDO	UN Industrial Development Organization
USA	United States of America
US$	United States dollars
WB	The World Bank
WHO	World Health Organization
WWF	World Wide Fund for Nature
Z$	Zimbabwean dollars



Wood and its associated products form but one chapter in the catalogue of forest-derived goods that upgrade and safeguard rural livelihoods and the quality of human life the world over. Knowledge about the benefits and uses of other, 'non-wood' forest products (NWFP) is, however, less widely available. In many cases such knowledge is rooted in local or vernacular traditions of land and resource use, an evolving cultural heritage passed down from generation to generation.

As pressure to husband the world's vital forest resources intensifies, so the need grows to share, disseminate and mobilise NWFP wisdom more generally. This booklet is a step in that direction.

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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