



The non-wood products of African forests

Gunnar Poulsen

GUNNAR POULSEN is a Danish forestry and land-use consultant with extensive experience in Africa.

African dependence on forests for the needs of everyday life tends to be ignored by many development officials. The forest provides an abundance of essential foods and pharmaceutical products' wood and fibres of all kinds and the environment for wild and domestic animals that people need.

Historically, forest administrations concerned themselves mainly with ensuring a steady supply of essential wood products, by which was understood timber for construction and, where appropriate, sawlogs for export. Later, industrial wood was added to the list. It is only in the very recent past that a general awareness of the fundamental rôle forests can play as suppliers of energy has developed. In several countries this may now, in fact, be considered the most important function of forest land.

In contrast to the considerable attention usually given to wood production in its different forms, little is in general heard about the non-wood forest products. Quite often, these are in fact only mentioned on a few pages close to the back cover of development and management plans, given none of the VIP treatment accorded to wood products. In so far as "minor forest products" are only of minor importance in the regions or countries under consideration, this makes perfect sense. However, quite frequently an in-depth investigation shows that this is far from always being the case. It is not unusual to find that some of the locally available non-wood forest products are equal to or exceed in importance that of one or even both of the two principal categories of wood products.

Such failure to appreciate the relative value of one or several non-wood products is generally caused by an inappropriate yardstick being utilized. The unsuitable measuring rod being referred to and which seems to dominate the thinking of many planners is "commercial significance". In its place it is suggested that it would be far better to apply: "Importance in respect of the well-being of the people concerned". In fact, an evaluation based on "commercial significance" often results in attention being directed almost exclusively to products subject to long-distance transportation and, in particular, to international trade. Precisely for this reason, fuelwood has often been overlooked as unimportant. As long as it was mainly collected and consumed locally - even in large amounts - nobody paid much attention to this commodity. In respect of fuel, attitudes may now have changed. However, when it comes to resource-evaluation for non-wood products, the old approach still seems to dominate.

As an example, gum arabic is, as a matter of obvious fact, considered a much more important

non-wood forest product than baobab foliage. To any observer using the commercial significance yardstick, there can be no doubt this is so. The produce harvested from the *Acacia senegal* tree is a very valuable cash crop indeed. It provides additional income to some people who struggle to survive under particularly harsh environmental conditions and it brings in no less welcome foreign exchange to central banks. According to available statistics, baobab leaves do not seem to offer any of these spectacular advantages. In those West African countries where they are harvested on a large scale - quite possibly of a magnitude measured in tens of thousands of tonnes - production and consumption remain almost entirely a local affair with only a small proportion entering commercial circuits. Even where marketing is organized to some degree, as, for example, at Dakar, most of the produce is harvested within a short distance from the city and, in any case, within the boundaries of Senegal.

PREPARING DINNER IN MALI surrounded by forest products, including the fish

If thousands of tonnes are harvested annually, processed even slightly - dried in fact - and transported for some distance, it means that a far from insignificant amount of labour is invested in this activity by people who find it reasonable to make the effort. Since cash is not involved on any large scale, the explanation must be that the leaves are considered to be of importance, somehow, for people's well-being. This is not all that is surprising. They constitute a vegetable which, either fresh or dried and ground to a powder, is added to a diet mainly composed of grain crops. The nutritive value of food of this type may quite possibly be raised substantially by the inclusion of the various proteins, vitamins, minerals and fibres contained in baobab foliage. Supposing now that this evaluation is correct and consequently that the health and vigour of a large number of people are enhanced through the consumption of baobab leaves, then it must certainly be justified to rate this commodity as an important non-wood forest product, possibly even more important to many people's well-being than gum arable. However, the purpose of this discussion is not to arrive at any such conclusion but to draw attention, by an example, to the fact that the commercial significance of a product and the publicity which surrounds it need not be commensurate with its more fundamental importance - the extent to which it promotes people's well-being.

Another aspect of resource evaluation deserves mention in this context. The "fact" that a product is not exported does not necessarily mean that it does not help to "earn" foreign exchange. It may do so indirectly by making it unnecessary to import a possible substitute. To illustrate this, rather than baobab foliage those African countries that produce large amounts of shea butter from the *Butyrospermum parkii* tree may not need to import cooking oil.

Neither large quantity of output nor high cash value is necessarily required for a product to qualify as important for the well-being of people. Another non-wood forest product serving human nutrition may make this clear. In some parts of southern Africa, some species of caterpillars are used as food. In fact, they are so highly valued that the trees on whose foliage they feed are specially protected by the local people. It needs a lot of caterpillars to make a tonne and the quantities traded are in fact quite small. However, if the caterpillars are to be considered as a non-wood forest resource of some importance, which may be justified, it is neither because of the quantity involved nor due to their undoubtedly excellent taste. A better argument is found in their supposedly high content of vitamin B₁₂. If the assumption is correct, eating caterpillars may correspond to taking vitamin tablets in other parts of the world, compensating for some deficiency in the basic diet. The importance to health and vigour of such an intake may naturally be completely out of proportion to the quantity or the value of the produce involved, whether it be caterpillars or vitamin tablets.

The main concern, so far, has been how to assess the importance of forest products and among these of non-wood products in particular. Attention has been focused on the fact that there may be other and more satisfactory ways of rating resource value than on the basis of trade statistics alone. The examples used were chosen among non-wood forest food products

yielded directly or indirectly by tree vegetation. Actually the point might just as well have been made with a wide range of other products, e.g., pharmaceuticals or fibre materials.

Planning and management of forestry activities aimed at satisfying human needs as best as possible must take into consideration all the important benefits that the forest area under discussion may be able to yield. The non-wood products of the African forest are very unevenly documented. A fairly complete set of statistical data exists only for a tiny fraction of them. Furthermore, in respect of some of the products, the available information does not at all show their true potential because they remain vastly underutilized. In the case of others, the matter is complicated by there being very little connection between quantity and importance. Finally, it should not be overlooked that the potential of many vegetation types for yielding valuable non-wood products still remains to be completely explored. There may well remain hidden among the trees important resources waiting to be utilized.

It is hardly possible, within the space of one article, to cover all or even most non-wood forest products as regards yield potential, and research, development and planning needs, etc. Attention is therefore restricted here to selected groups and particularly interesting single products. The various items are not introduced according to any assumed order of priority but presented in some sort of alphabetic and, in reality, random arrangement.

Forest feed

Feed from forest vegetation may benefit two groups of animals, wildlife and livestock, which in turn both may yield products satisfying human needs such as meat, milk, hides, eggs, etc. One basic condition for obtaining a steady output at a high level is that feed in sufficient quantity and of a suitable composition be available more or less continuously. Forest feed is of two kinds, the herbaceous fodder obtained from the ground vegetation, and tree fodder. Particularly in areas with a prolonged dry season, tree fodder is of immense importance to livestock - and to many species of wildlife, too. It provides the animals with nutrition rich in proteins, vitamins, minerals - and also energy - at a time of the year when the desiccated ground-cover containing little other than pure carbohydrate cannot sustain health and vigour. Management of the natural fauna and livestock may be a subject mainly for the specialists in these fields. However, forestry competence will often be required to ensure that forest ecosystems exposed to the stresses of human interference will continue to yield feed. In this context, foresters may have - in fact, will have - to collaborate with representatives of the other professions concerned.

The old method of dividing land into forest reserves, where livestock was kept out and grazing areas where the tree vegetation was either destroyed deliberately or left to deteriorate unmanaged, no longer offers a suitable or even possible solution to the land-use problems involved. Active, sustained yield management of both tree and ground-cover has become an unavoidable necessity. In actual fact, this means that foresters will have to get involved in ensuring that the combined output from forest land of tree fodder, wood products and palatable herbs is maintained at optimum level. Such multi-purpose management will have to take into consideration density of tree cover leading to the most favourable balance between tree products and herbaceous fodder, tree fodder harvest methods such as pruning and pollarding, browse rotations, regeneration of trees and of ground-cover vegetation, and, possibly, enrichment planting. The last mentioned may involve the introduction of valuable fodder trees or of more productive plants within the ground-cover. An interesting example of this last type of intervention is the successful planting of *Desmodium* sp. under "miombo" in Malawi.

Forest fibres

Fibres obtained from forest vegetation are of great importance to African communities. They are used for making baskets, mats, rope, furniture and in house construction. Some quality fibres find a market overseas for the manufacture of brushes and wickerwork. High-quality fibres are mainly obtained from palms. Exquisite mats are woven from the leaf fibres of the doum palm, in particular. On the other hand, for wickerwork the best material is peeled from the outer bark of various climbing palms, e.g., *Calamus* sp. However, for this purpose, the fronds of the *Raphia* palm are also widely used. Palm fronds are also important for the manufacture of cord and rope. For this purpose, the inner bark of a large number of hardwoods probably plays an even greater role. One famous source of rope is the baobab tree whose bark, surprisingly, can be removed again and again the whole way round without any apparent adverse effect on the vigour of the tree. Some varieties of grass are also used for cord making. Rope is not only utilized for holding beasts of burden and tying goods during transport; very large amounts are used in house construction and, regionally, for tying bed tops.

The smooth operation of many African communities can be said without exaggeration to be dependent, to a large extent, on easy access to various types of fibres. For this reason, it is amazing that so little is done, in most cases, to ensure continuity of supply. A notable exception to this rule can be seen in Senegal where the Serere people take good care of the regeneration of the *Borassus* palm from which they obtain material for making baskets and mats, as well as fruits and timber.

However, by and large, it is correct to state that the regeneration of the fibre resource does not at all keep pace with its exploitation. In fact, even in cases where a flourishing mat industry based on doum fronds constitutes the sole source of prosperity of some arid-zone villages, the resource base is usually exploited as if it were an inexhaustible mine with no apparent understanding of the need for renewal. Consequently, there can be no doubt about the urgency for action to ensure the long-term supply of fibres. Beside introducing silvicultural and technical improvements and carrying out research for this purpose, it is absolutely fundamental that those concerned be made aware that it is no less essential to manage fibre resources according to sustained yield principles than those forest resources providing fuel and timber.

Forest food

In a wide sense, this heading covers the following: beverages, "bush meat", fish food from mangrove vegetation, foliage, fruits, gum (where consumed as food), honey, insects, livestock, oleaginous products, vegetables from the forest floor, including rhizomes. The list is so long that it is out of the question to deal in any detail with every sub-heading. Furthermore, it should be kept in mind that many of these sub-headings cover dozens of single items.

Nevertheless, it is well worth highlighting that a great variety of food may be obtained from forest land. Feeding people is not only a matter of having sufficient quantities of food at hand; variety is almost as essential. Plenty of maize or cassava will not ensure a healthy nutrition. In fact, people may suffer from grave symptoms of malnutrition if such staples are not supplemented by food items containing a variety of amino acids, vitamins and minerals. Living on a highly varied diet is usually the safest way of making sure that nothing essential for health and vigour is missing. Forest food, where available and exploited, may offer the possibility of achieving a nearly perfect balance. Unfortunately, with time, it seems in many places to become less available owing to environmental destruction, or just less used because of changes in eating habits. Whatever the reason, a clear trend toward more mass-produced staples and less forest food can be observed almost everywhere. One good argument for such a change is convenience, ready supply and preparation. In some instances, it may also be a matter of the connotation of 'backward and primitive' being linked with some types of

forest food. Such a development must give rise to concern. Too little is known as yet about the production potential and nutritive characteristics of many forest products to warrant writing them off lightheartedly as unimportant and possibly letting them disappear as a result of careless manipulation of the natural environment. Several forest food crops that were important in the past are undoubtedly now threatened by extinction.

A comprehensive survey of forest food resources is urgently required, complemented by an investigation of the nutritive features of those products which remain little known. This initial survey should be followed up, in the case of promising products, by studies of such subjects as: reproduction, genetic improvement, silvicultural management, transport and marketing, and economics. Several commendable steps in this direction have been taken in the Congo in respect of a forest creeper, *Gnetum africanum*, whose foliage used to be consumed in large amounts as a vegetable.

In regions which are unsuitable for conventional animal husbandry, "bush meat" is often of immense importance. Over large areas of the continent, particularly in the humid regions, people get most of their requirements for animal protein from this source. Unfortunately, supplies are rapidly dwindling in most places, partly as a result of destruction of the natural environment, and partly because of excessive exploitation. Strong and immediate action is needed in many places to avert a real protein-shortage crisis. Prohibition of shooting and trapping, the establishment of sanctuaries, and similar measures will not in themselves solve the problem. What is most urgently needed is the creation of alternative supplies of animal protein. Unless this is done, most control measures are doomed to fail. Such supplies may possibly be achieved through the introduction of tsetse-resistant livestock in some areas or of rabbit breeding. A different approach consists in trying to develop new varieties of domestic animals from suitable species among the wild fauna. Some degree of success has been achieved in Kenya with the domestication of eland and oryx. In Nigeria, attention is being focused on some animals more modest in appearance but no less promising as sources of meat, such as the grass-cutter and the giant rat. Snails are an important source of protein in some countries. Their systematic breeding may be possible (see *Unasylyva*, Vol. 29, No. 116, Game as food).

[SELECTING LEAVES FOR A SALAD IN BENIN forest foods are taken for granted - until the forest is gone](#)

A special case is the mangrove forests of the coastal regions. Normally they harbour a prolific fauna of fish, crustaceans and molluscs. Through the introduction of improved management practices, many mangrove areas could undoubtedly become major sources of animal protein.

Fungi belong to the vegetable kingdom. Nevertheless, they are mentioned here because they are rich in amino acids and may, at least to some extent, substitute animal protein. Forest fungi are extensively used as food on the African continent and are of some nutritional importance locally. However, the productivity in per-hectare terms is almost everywhere very low; in fact, it does not amount to more than a small fraction of the yields obtained in Japan and the Republic of Korea where forest fungi are grown as a crop. A project aimed at developing techniques for the cultivation of fungi within an African forest environment was started in Zambia a few years back. It is to be hoped that this excellent initiative will be widely emulated.

The fruits of the forest are about as varied as they are numerous. Broadly speaking, a distinction may be made between those consumed as fruits and a smaller but very important group used for the extraction of oil products.

As examples of the first category may be mentioned the very nutritious *Dacryodes* fruit of the rain forest and the "multipurpose fruit" of the *Borassus* palm of the semi-arid regions. The

latter is used in three different ways. The "milk" of unripe fruit is marketed as a nourishing and very popular beverage. The ripe, yellow fruit is occasionally consumed as a kind of mango substitute and, finally, some fruits are left to sprout cotyledons which are eaten fried. The importance of many forest fruits lies probably in their vitamin content. In areas of low and erratic rainfall conditions, the fruits of trees and shrubs also play an important role as emergency food. A particularly valuable species in this context is *Parkia biglobosa* of the Sudan-Guinea zone. Under conditions of extreme aridity, people have access to the fruits of such hardy species as *Boscia senegalensis* and *Zizyphus* sp.

Commercially, the fruits from which oil is extracted play a far more important rôle than the rest. However the largest single source of oleaginous products, the oil palm, *Elaeis guineensis*, partly falls outside the domain of forestry. Practically all large, commercial plantations are managed by non-forest structures. However, oil palms are also found in very large numbers on forest land in high rainfall areas, particularly as scattered trees in secondary, degraded forest. While the oleaginous fruits of "wild" palms are used for local oil extraction, such trees play equally important rôles as providers of palm wine and fibres.

Falling far behind the palm in respect of the amount of oil produced and traded, the shea-butter tree, *Butyrospermum paradoxum*, of the Sudan-Guinea zone probably occupies the position of the second most important oil tree on the continent. Although highly appreciated locally both as a valuable cash crop and as a source of cooking fat for domestic use, this appears nevertheless to be a neglected species whose potential is not being utilized to anywhere near its full potential. In fact, the large area still occupied by shea-butter appears to be rapidly shrinking under the combined onslaught of cultivators and charcoal burners.

A forest species which seems to offer an equal or even greater potential for oil production is the *Raphia* palm. So far *Raphia* oil is only commercialized on a very small scale. The *Raphia* palm occupies large areas of swampy land in high rainfall areas. In addition to being a potential source of oil of good quality, it produces a valuable fibre.

Many other trees are, or may be, utilized for the production of oleaginous products, e.g., the baobab, used for oil extraction in Madagascar; the tallow tree, *Pentadesma butyracea*, of rain forest regions; and the ubiquitous (although exotic) neem tree, *Azadirachta indica*, of the arid zones.

Honey is still another important food item obtained from trees indirectly. Certain forest types dominated by trees of the legume order have a very great potential for honey production, in economic terms often exceeding their wood-producing capacity. Nevertheless, efficient modern bee-keeping methods have not been introduced on any large scale in most countries of tropical Africa and the honey and wax production which actually takes place probably only amounts to a tiny fraction of the potential. We are here considering a vastly underutilized resource which furthermore could be developed without more than a minimum of external inputs.

The gum of some trees, in particular that of *Sterculia* sp. is used as food locally. Nevertheless, the importance of this group stems from products that are exported for a great variety of uses. Two absolutely distinct groups in respect of use can be discerned: the gums proper, traded under that denomination, and the incense products. Among the first, the gum arab tapped from the *Acacia senegal* tree is the most important by far. Frankincense and myrrh are obtained from a few desert shrubs of the Commiphoraceae family. In the case of the gums proper, harvesting, processing and marketing can be said to have reached a certain modest level of sophistication which, if not always to the full benefit of the producer, is at least profitable to the exporting country. The incense products, on the other hand, often seem to reach consumers by circuitous routes with middlemen making a high profit. Efforts are undoubtedly being made in the countries concerned to improve this situation.

While tapping the produce and channelling it toward consumers is being handled more or less successfully, surprisingly little has been done so far to tackle an even more fundamental problem, i.e., finding ways and means to raise the yields both of the individual trees and of the gum orchards, the so-called gum gardens. As a matter of fact, the species concerned offer remarkable prospects for genetic improvement. In the case of *Acacia senegal*, the best genotypes occurring in nature are known to yield ten times more than the average tree. Less may be known about genetic variation among incense trees but here improvement will, on the other hand, be highly facilitated by the ease with which the species involved are propagated vegetatively. It might be added that in any development effort dealing with *Acacia senegal* it should be kept in mind that this species is a multipurpose tree which, besides producing gum arable, has a remarkable capacity for soil enrichment, making it an ideal component of agroforestry systems. Furthermore, it is an excellent fodder tree and also produces good-quality fuel.

While food industries include gum in a substantial number of products ranging from soft drinks to chocolate bars, it is utilized on an even larger scale for the preparation of pharmaceutical products. This brings us to the next important group of non-wood products.

Drugs and chemicals

Since time immemorial, drugs obtained from the forest have been used in local medicine. Undoubtedly, the effectiveness has varied greatly. Nevertheless, trial and error and long experience have gradually resulted in the identification of suitable drugs for the treatment of a number of ailments. In recent times, systematic studies have been taken up in several countries, endeavouring to describe and analyse African pharmacology. In this way, attention has been drawn through the publication of substantial reports to the existence of literally hundreds of drugs derived from forest plants and fauna. Most of these are still very imperfectly understood, both in respect of their effectiveness and their chemical structure. Lack of sufficient insight should not, however, be used as an excuse for disregard. Until more studies in depth have been carried out, the potential of the forest for yielding valuable chemical compounds of great diversity, although still partly of a theoretical nature, should always be kept fully in mind. Considerations of this nature also provide strong arguments in favour of establishing sanctuaries and taking other steps for the protection of threatened species and ecosystems. In fact, almost every day it becomes more apparent that the forest has more to offer in this field than most people would have imagined only a few years back. Some examples may make this more clear.

An extract obtained from *Rauwolfia* sp., a forest shrub, is generally considered to provide the best-known treatment against high blood pressure. The leaves of *Maytenus* sp., a shrub of the Kenyan savannas, are attracting the attention of cancer researchers in the United States. Two plants occurring in Ethiopian forests, *Solanum marginatum* and *Dioscoria bulbifera*, have been found to contain compounds with interesting contraceptive properties.

Chemical compounds from the forest of indisputable present-day importance are the tanning extractives. Commercially and, particularly in respect of international exchange, the most important are those obtained from the bark of *Acacia mearnsii*, a tree of Australian origin widely planted in eastern Africa. Huge amounts of tanning extractive are undoubtedly also derived from the pods of *Acacia nilotica*, a tree of arid and semi-arid climates. However, tanning products from this source are much less well covered by statistics. Most acacia extractive is consumed locally but some exports, mainly to India, also take place. In countries with a cool climate, tanning extracts are sometimes obtained from shrubs of the genus *Rhus*. Potentially and of much more importance, the mangrove forests along the coast deserve great attention in this context. Trees of the genus *Rhizophora* produce bark with a high tannin content. In this respect, the mangrove forest is still an underutilized resource, as it also is with

regard to its capacity for producing charcoal and animal protein.

Summing up

It has not been possible during this relatively brief appraisal to cover all special cases or even categories of non-wood forest products. Some may argue: why is there nothing about *Acacia albidia*, such an immensely important tree? Others may wonder why there is so little mention, or none at all, of kola nuts, silkworms, resins, feed concentrates made from tree fruits and leaves, ninde oil, cork, promising multipurpose exotics like *Prosopis*, *Leucaena* and *Sesbania*, the use of branch mulch, latex, tea from *Combretum* leaves, and products and uses of the African forests. However, apart from limitations imposed by space, the aim has not so much been to give complete coverage of the non-wood products as to draw attention to fundamental problems related to their production and use.

What needs to be understood by people dealing with African forestry but not living in Africa, or not close to African traditions and values, is that for the well-being and daily lives of millions of people these products are comparable in importance to the use of wood for structural purposes and even to fuelwood. Africans, of course, know this, but it is so self-evident that they may not make a point of it. Or they may be intimidated by the non-economic and un-modern nature of these products compared to the concept of commercial forest products that predominates in industrialized, highly commercial societies.

As a result, the tendency among development officials - who are almost always economical oriented - is to give little if any attention to these non-wood products when they are planning land-use activities and making economic evaluations. The absence of information and quantified data about this important category of forest products further contributes to their being ignored or unseen at the economic and policy decision-making levels.

For many of the products in question, little information is available about their physical or chemical properties. The living structure from which they are obtained and its position within ecosystems may be no better known. The ignorance often extends to the size and the productive capacity of the resource base, marketing and consumption patterns, etc. Here are large gaps which obviously need to be filled through surveys and systematic research.

To ensure that the greatest benefit from the non-wood forest resource is drawn for the well-being of people, even more basic action may be needed, i.e., a revision of the ideas guiding forest management and evaluation. The leading principle of forest management, expressed in simple terms, has usually been: sustained yield management of the wood-producing resource at such a level that a favourable balance between input and return is achieved. In the case of forest land being managed principally for the supply of wood for industrial use or for marketing, such an approach seems, in fact, perfectly appropriate.

However, this is no longer the case where the benefits wanted and needed from the forest to ensure human wellbeing are of a multiple nature involving numerous production components, as for example: timber and fuel production, supply of foliage for human nutrition, bee-keeping, water yield from forest catchment, etc. In such cases, it is indispensable to apply an integrated and more complex approach to resource development.

As a suitable goal for forest management where multiple resources are involved, a tentative suggestion might be: attainment of the highest possible level of compound benefits to the wellbeing of man from the multiple resource which can be ensured while maintaining an optimum relationship between input and return. This optimum will be defined differently according to the availability of capital, manpower, etc.

It sounds fairly simple and not all that different from the classical goal of forest management.

As a matter of fact, the application of such principles will require considerable modifications of management tools, in particular in respect of forest mensuration and economic evaluation. The important point is that the forests of the tropics - in Africa and elsewhere throughout the Third World - have much more to offer than is generally assumed.

