

The role of non-timber forest products in sustainable tropical forest management

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Abstract The importance of non-timber forest products (NTFPs) for forest-dwelling people in the tropics and the relatively small ecological impact of their exploitation has raised high expectations as to their potential to contribute to tropical forest conservation. Three major issues in relation to NTFPs are addressed: their potential to contribute to the conservation of tropical rainforests; their potential to improve the livelihood of forest-dwelling peoples and their potential for participatory forest management. It is concluded that for the proper management of NTFP resources, it is necessary to be specific about the aim of NTFP development and to take account of ecological as well as social and economic factors. Policy-making and land-use planning must furthermore take into account that NTFP extraction is part of an overall livelihood strategy of the people involved, in which other economic activities also play a role.

Die Rolle von Nicht-Holz-Produkten im nachhaltigen tropischen Forstbetrieb

Die Bedeutung von Nicht-Holz-Produkten (NTFP) für die im Wald lebende Bevölkerung in den Tropen und die vergleichsweise geringen ökologischen Auswirkungen ihrer Ausbeutung haben hohe Erwartungen geweckt, dadurch zum Erhalt der tropischen Wälder beizutragen. Drei Hauptpunkte in bezug auf NTFP werden hier behandelt: ihr Potential, zum Erhalt der tropischen Regenwälder beizutragen; ihr Potential zum Verbessern des Lebensunterhaltes der im Wald lebenden Bevölkerung und deren Möglichkeiten zur Teilnahme an der Bestandspflege. Für ein geeignetes Management der NTFP ist es erforderlich, sehr spezifisch auf die Ziele der NTFP-Entwicklung einzugehen und dabei sowohl ökologische als auch soziale und ökonomische Faktoren zu berücksichtigen. Künftige Strategien und Landnutzungspläne müssen ferner berücksichtigen, daß die NTFP-Nutzung ein Teil der allgemeinen Planung für die Lebensbedingungen der betroffenen Völker ist, wobei auch andere ökonomische Aktivitäten eine Rolle spielen.

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1

Introduction

When we speak about the production function of forests, we are usually referring to timber. The exploitation of non-timber forest products (NTFPs), which are also known by the disparaging appellation of 'minor' or 'secondary' forest products was, until recently, often neglected both in policy and research. Presently however, we know that there is nothing 'minor' about non-timber forest products, at least in tropical rainforest areas (de Beer & McDermott 1989; Peters et al. 1989). NTFPs in the tropics are the main source of livelihood of forest-dwelling communities, who rely on these products for their food, medicines and as raw materials for their houses, tools and equipment. NTFPs are the main source of cash income for people living in remote rainforest areas. In some cases, NTFPs even contribute to a country's export earnings, as is the case with rattan in Indonesia or Brazil nuts in Brazil and Bolivia. This economic importance of NTFPs has important implications for natural tropical forest management and the planning of land use in tropical rainforest areas.

As the extraction of NTFPs generally leaves the forest structure intact, it has been promoted during the past ten years as a strategy for forest conservation. It was believed that sustainable commercial exploitation of NTFPs, through adding value to the forest, could serve as a stimulus to sound forest management. We may say that NTFPs have grown in the past ten years from minor forest products to a major item on the international agenda. Three main issues are thereby at stake: forest conservation, improved livelihoods and participatory forest management. This article discusses what NTFP exploitation can contribute here.

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Defining non-timber forest products

Non-timber forest products can be defined as "all tangible animal and plant products other than industrial timber, which can be collected from forests for subsistence and for trade" (Ros-Tonen et al. 1995). It comprises such diverse products as game, starchy foods, nuts, spices, leaves for wrapping food, medicinal herbs, smallwood for handicraft and tools, fibres, ornamental plants, essential oils, latex for rubber and rattans (de Beer & McDermott 1996; see also Table 1). Although some authors (e.g. Sizer 1996) tend to include ecotourism among NTFPs, it is generally considered to be a forest service, which is a separate category of forest output.

Table 1. Overview of non-timber forest products
Tabelle 1. Zusammenstellung verschiedener nicht-Holz Forstprodukte

Product category	Examples
<i>A. Plant products</i>	
Food	Edible plants and plant parts (seeds, roots, tubers, stems, leaves, shoots, flowers, fruits, nuts) providing vegetables, snacks, beverages, edible fats and oils, spices, flavourings, etc.
Forage	Plants used as food for livestock and wildlife
Medicinal products	Medicinal herbs and plants and plants parts (leaves, barks, etc.)
Construction materials	Bamboo, rattan, smallwood, fibres, cork, leaves for roofing
Utensils	Smallwood for handicraft and tools, leaves for wrapping food, fibres for basketry and cloth
Biochemicals	Non-edible fats and oils, waxes, gums, latex, dyes, tannins, biochemicals for plastics and coatings, paint and varnish, toxins for hunting, hallucinogens
Aromatics	Essential oils for cosmetics and perfumes, incense
Ornamentals	Aesthetically pleasing plants, cut and dried flowers
<i>B. Animal products</i>	
Food	Meat and protein from mammals, birds, fishes, reptiles and insects; eggs, edible nests, honey
Forage	Fish oil, bones
Medicinal products	Pharmaceuticals extracted from mammals, fishes and reptiles
Utensils	Horn, feathers, bones
Biochemicals	Wax, silk, propolis, guano, toxins
Ornamentals	Live animals and animal products like feathers, hides, skins, shells and horn

Adapted from FAO (1991)

Since economically successful NTFPs tend to be domesticated (e.g. Homma 1992), some NTFPs can also be found in man-made vegetation types such as forest gardens or plantations. Former non-timber forest products such as black pepper, bananas and coffee are no longer considered as such, but products in transition from 'wild' to cultivated products are. The best known example is that of rubber from *Hevea brasiliensis*, which is collected from natural forests in Brazil, while in Indonesia it comes from plantations. The same occurs within one and the same country with gum Arabic from *Acacia senegal* in Sudan and resin and turpentine made of the oleoresin of *Pinus merkusii* in Indonesia (Coppen 1999). When such products appear on the market, they bear no label that clarifies their origin. Several authors therefore apply the term 'non-timber forest product' to 'wild' as well as to domesticated products of forest origin. FAO, for example, applies the term non-wood forest products to "all goods of biological origin other than wood, derived from forests, other wooded land and trees outside forests" (italics by the author) (Walter 1999). Jahnige (1999) suggests considering forest-related products from man-made vegetation types as NTFPs only if the vegetation system from which it originates was not purposely managed to obtain that product. Others (e.g. de Beer and McDermott 1989) specifically exclude plantations as a source of NTFPs.

In practice, the distinction between natural and man-modified forest ecosystems cannot always be drawn that easily. There is often a gradual transition from the collection of 'wild' products in natural forests to enrichment planting in secondary forest and intensively managed home gardens (Ros-Tonen et al. 1995). Reviewing the history of forest manipulation by indigenous people and various types of indigenous forest management, Wiersum (1997; 1998) concludes that there is an evolutionary continuum in forest-people interactions, during which a

process of co-domestication of forests and trees takes place. Consequently, the natural ecosystem is gradually transformed into an agro-ecosystem. This evolution is characterised by increasing input of human labour per unit of forest land and intensified human intervention in the reproductive biology of desired species.

In spite of these gradual transitions and "grey" areas, a clear terminology is needed, in order to be able to formulate clear and transparent recommendations for the sustainable management of NTFP resources and to lay down criteria for the certification of NTFPs (Ros-Tonen 1999b). As the term NTFP was coined in the context of strategies for the conservation of biodiversity in natural forests, it is here suggested to use it only for products from natural forest systems, whether they are modified by human intervention or not. Alternative terms can then be used for products of forest origin coming from man-made vegetation types, such as forest garden products (Senanayake 1999), non-timber plantation products (Melvani 1999) or agroforestry products (Ottens 1999).

3 The potential contribution of NTFP extraction to forest conservation

Although most NTFPs are locally used as food and medicines, some of them find their way into international markets. Presently, at least 150 NTFPs are internationally traded (FAO 1997). Among them are nuts, honey, palm heart, plant and animal inputs to the pharmaceutical industry, rattan, bamboo, cork, essential oils, and gum Arabicum. Especially in relation to this commercial extraction, a central hypothesis underlying much NTFP research is that, through adding value to the forest, it may provide an incentive to conservation and sustainable forest management. The underlying reasoning is that local authorities and forest resource managers will have an interest in preventing indiscriminate forest use or conversion of

forest to other land uses when NTFP extraction contributes to the Gross National Product and export earnings. For local communities, increased income from the trade in NTFPs is thought to provide a stimulus for protecting their forests and manage them sustainably. Many NTFPs can be harvested without significantly altering the forest structure, thus maintaining the forests environmental services and biological diversity. All these factors have led to the notion that the commercial extraction of NTFPs is a potentially sound conservation strategy (e.g. Fearnside 1989; Nepstad & Schwartzman 1992).

This commercialisation-conservation link is now being strongly disputed. Any harvesting of NTFPs does have a number of ecological impacts, including a gradual reduction in the vigour of harvested plants, decreasing rates of seedling establishment of harvested species, potential disruption of local animal populations and nutrient loss from harvested material (Peters 1996). Compared with logging or conversion of forest to other land uses, however, these impacts are viewed as minimal. But it is the low extraction level rather than the ecological ability to maintain yields that makes the extraction of NTFPs sustainable. It is incorrect to suggest that NTFPs can be harvested indefinitely without proper management practices to sustain their yield. Only products which can be harvested without killing the individual plants or animals, which are abundant or which regenerate easily, offer good prospects for sustainable management (Peters 1994). Examples are Brazil or Amazon nut (*Bertholletia excelsa*) exploited in Bolivia and Brazil (Assies 1997), palm heart from multi-stemmed species such as *Euterpe oleracea* and the aerial roots of 'nibi' (*Heteropsis flexuosa* (Araceae)) and 'kufa' (*Clusia grandiflora* and *C. palmicida* (Guttiferae)), which are used as plaiting material for basketry and furniture in Guyana (van Andel and Reinders 1999). Still then, they can only be sustainably harvested on a commercial scale if a procedure is followed which comprises careful species selection, yield studies, monitoring of regeneration and harvesting adjustments (Peters 1994).

In practice, exploitative commercialisation systems and substitution by synthetics discourage extractors to follow such a procedure (Richards 1993). There was ample evidence of over-harvesting even at the time that NTFP exploitation was promoted as a nature conservation strategy. Brazil, where extractive reserves raised great expectations for the participatory management of forest resources, had in the past witnessed the depletion of its Brazilwood (*Caesalpinia echinata*) and rosewood (*Aniba rosaedora*) resources (Ros-Tonen et al. 1995), which were exploited to obtain natural dye and essential oil, respectively. De Beer and McDermott (1989) reported the overharvesting of rattan, edible bird's nests and other NTFP resources in Southeast Asia. Various other examples of overexploited NTFPs can now be added, such as wildlife in Guyana and at the Côte d'Ivoire, the bark of *Garcinia lucida* in Cameroon (Tropenbos 1999) and palm heart (*Euterpe precatoria*) in Bolivia (Peña & Zuidema 1998). In general, it may be said that, the larger the market for an NTFP, the higher becomes its value and the greater the danger of overexploitation (Sepp et al. 1996).

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NTFPs as a means for improved livelihoods

One of the attractive promises of NTFP development is its potential for improving the livelihoods of people who depend on the forest for their basic needs and cash income. An important motive for promoting the commercial extraction of NTFPs has been the expectation that increased marketing of NTFPs may lead to higher incomes.

Although NTFPs contribute substantially to forest peoples' incomes, its potential to improve their livelihoods should not be exaggerated. In the first place, NTFP use is associated with poverty. It is the socially most marginalised people who are the main actors in NTFP extraction. This holds true for the Bagyeli ('pygmy') people in Cameroon, the Amerindians in Guyana's North West District, as well as for the Dayaks in Indonesia. For these peoples, extraction is a part-time, seasonal and subsistence-oriented activity, complementary to farming, mining or logging. Only in a few situations is extraction capable of providing a livelihood (Ros-Tonen 1999a). In general, extractors of NTFPs prefer other jobs, once alternative employment opportunities become available. In this respect, many non-timber forest products are still 'minor'. Except for bush meat and some NTFPs traded in national and international markets, society's appreciation of NTFPs is generally low. Although traders do have some status, extraction itself is generally looked upon as an inferior economic activity (cf. Dove 1993). In addition, forest-dependent people generally live in poor conditions, where even the most basic health care and educational services are lacking.

Moreover, the extraction of NTFPs is often based on exploitative labour and trading relations. In NTFP studies carried out in South America, a similar picture emerges of debt-peonage, in which the extractor is seldom or never paid in cash for his work. Instead, the buyer of his product advances him merchandise, which can be paid off with the harvested products. Because the buyers demand higher prices for the merchandise advanced as compared with what they pay for the NTFPs, they place the extractors in a situation of permanent indebtedness, from which it is hardly possible for them to escape. This system is called *endeude* in Colombia (Rodríguez and van der Hammen 1999), 'bonded labour' in Guyana (Forte 1999), *aviamento* in Brazil and *habilito* in Bolivia (Assies 1997). It will be clear that these in-debt relationships hold little promise for improved livelihoods, where these are based on the extraction of forest products. Promoting commercial NTFP extraction without tackling such unequal production and marketing relationships will not result in a socially desirable land use (Ros-Tonen et al. 1995).

Other factors that limit the potential of NTFPs to contribute to forest dwellers' incomes are related to marketing problems. Among these are lack of information on potential markets and marketing channels, the fragmented nature of NTFP markets, the lack of sufficient volume and the unpredictability of the production cycles, resulting in irregular supplies (Panayotou 1991). The perishable nature of many products combined with the poor infrastructure and high transport costs in tropical rainforest areas also hinder the successful marketing of NTFPs, together with

the lack of organisation among harvesters and lack of access to credit and storage facilities (Verhey & Reinders 1997; van Dijk 1998). Moreover, forest-dwelling people like the Amerindians in Guyana's North West District are handicapped by a failing education system, poor health and poverty, which prevent them from fully developing their economic potential (Forte 1995).

In general, the potential contribution of commercial NTFP exploitation to improved livelihoods for forest-dwelling people is limited for NTFPs from natural forests, because of the low densities at which they occur and their irregular distribution (van Dijk 1998; van Valkenburg 1997). If the primary aim is to generate incomes, focussing on man-modified vegetation types might offer better prospects, as these have a higher species density and are generally located at closer distance to the villages and cultivated lands (van Dijk and Wiersum 1999).

In sum, the marketing of NTFPs from natural forests cannot simply be expected to function as a vehicle for improved livelihoods. It is inherent in NTFP-based livelihoods that they tend to disappear. Once people are offered other opportunities, they invest in other economic activities, such as cash crops or trade (e.g. Dijkman et al. 1999; de Jong 1999). Thus, if the aim is to raise forest peoples' incomes, opportunities to do so will probably best be found outside the forest. Support for NTFP development can be recommended only in situations where such alternative options are absent or difficult to integrate in peoples' way of life. In such cases, it must be realised that support should also be given to the satisfaction of basic human needs and the improvement of the social conditions under which extractors live and work (*cf.* Forte 1995; Browder 1992; Ros-Tonen et al. 1995).

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The role of NTFPs in participatory forest management

A third important reason why NTFPs have become a major issue on the international agenda is the political struggle of rubber tappers in Brazil. Anthropologist Mary Allegratti and the leader of the rubber tappers' movement, Chico Mendes, launched and made a political success of the concept of extractive reserves (Allegratti 1990; Schwartzman 1989). These extractive reserves were proposed as a combined strategy both to secure forest peoples' rights to forest resources and to promote environmental protection at the same time. The combination of scientific interest and political struggle at grassroots level set the stage for an initially almost euphoric belief among scientists and environmentalists in the potential of NTFP exploitation to simultaneously combat deforestation and poverty. Extractive reserves were seen as a model for participatory forest management.

From the very beginning, several authors questioned the effectiveness of extractive reserves as a conservation strategy (e.g. Anderson 1990; Browder 1992; Fearnside 1989). In general, however, the concept was regarded as a useful way of organising collectors of forest products and mobilising them in order to secure and defend their rights to natural resources, to escape exploitation by landowners and merchants, to build their marketing capacity and to improve their living conditions.

Central to the concept of extractive reserves is the issue of recognised and legally protected rights to land and resources. Although secure tenure is not a guarantee for successful extraction, the prospects of NTFPs to contribute to sound forest management are better in cases where extraction areas have a legal status. In the case of open access resources, unclearly defined access rights often result in a lack of feeling responsible for the management of the resource. Lack of formal ownership also implies a risk of losing investments or not being able to benefit from them. The development of participatory local resource management models furthermore require confidence and long-term collaboration among the parties involved (de Jong and Utama 1998; Rodríguez and van der Hammen 1999), which are difficult to achieve without a long-term perspective of forest use. Such long-term cooperation with indigenous communities in the Colombian Caquetá region, for example, resulted in the recovery of indigenous knowledge of traditional management systems (e.g. Matapí and Matapí 1997) and a participatory natural resource management plan for the legally recognised territory of these indigenous people (Rodríguez and van der Hammen 1999).

Although such outside-sponsored and supported initiatives may encourage local people to engage in participatory management, in general, the expectations of the sustainable management of NTFP resources should not run too high. For forest people, NTFP extraction is just one way, among others, of making a living. In general, it is the need to survive and the wish to earn money for desired 'luxury' items that primarily motivates their participation.

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Conclusion

The role that NTFPs can play in forest conservation, sustainable and participatory forest management or improving the livelihoods of forest-dependent peoples has been the subject of high expectations. Studies carried out under the Netherlands-based Tropenbos programme at various locations in the tropics confirmed that NTFPs play an important role in forest-dwelling peoples' livelihoods. At the same time, the scope for commercial exploitation is confined to a few products and may easily lead to over-exploitation.

Because of the important role that NTFPs play in local forest use, it is important to continue research on the possibilities for NTFPs to contribute to sustainable forest management. The design of multipurpose and participatory management systems containing a place for NTFP use by local populations thereby deserves priority. In developing such management systems, it is important to bear in mind that NTFP use forms part of a total livelihood strategy of which other and often less sustainable forms of forest land use also form a part. In order to develop sustainable commercial NTFP exploitation systems, it is important not only to know the ecological parameters, but also to consider local indigenous knowledge and social and economic conditions. The socio-economic situation of forest-dwelling communities cannot be improved on the basis of an extractive economy without policy makers and development efforts giving due attention to the provision

of basic needs. In addition, it is necessary to be specific about the aim of NTFP development (conservation, participatory forest management or improved livelihoods) and to consider whether these can better be fulfilled in natural forests or in man-modified vegetation types.

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