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The importance of non-timber forest products for forest-based rural livelihoods: an evolving research agenda

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The importance of non-timber forest products for forest-based rural livelihoods: an evolving research agenda

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SUMMARY

In the past, the capacity of non-timber forest products (NTFPs) to contribute to tropical forest conservation and poverty alleviation was regarded as very promising. Recent studies have made it clear, however, that the alleged commercialisation-conservation/development link in the NTFP debate needs reconsideration. Although some NTFPs do play a role in rural livelihood strategies and can contribute to sustained forested landscapes in various tropical forest areas, there is no uniform picture as regards the actual importance of NTFPs to rural livelihoods. In this paper, we review several recently completed case studies on forest and NTFP use, notably by scholars based in the Netherlands. The case studies were selected as they provide location-specific information on NTFP use and form a good database for a comparative analysis of the various settings under which NTFP use and management take place. In addition, some studies are reviewed which provide insights into the broader context of forest (management) dynamics. The emerging picture is one of a more diversified approach towards forest and NTFP use, with more attention being paid to other NTFP sources than natural forests alone and to the broader socio-economic and spatial context in which forest use occurs. The new 'resource-in-context' approach combines insights into community-level creativity and livelihood dynamics with those into macro-economic and spatial processes, thus providing a more realistic assessment of the scope of NTFPs to contribute to improved livelihoods.

Keywords: Forest use; Rural livelihoods; Non-timber forest products; Poverty alleviation.

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INTRODUCTION

Since the early 1990s the role of non-timber forest products (NTFPs)³ for sustainable forest use and poverty alleviation has received increased attention. Starting with the (in)famous article by Peters *et al.* (1989) – which has since been widely criticised (see Sheil and Wunder, 2002) – the original idea on the potential of NTFP exploitation as a way to sustainable forest management was primarily based on the assumption that the commercial extraction of NTFPs from natural forests could simultaneously serve the goals of biodiversity conservation and poverty alleviation (Anderson, 1990; De Beer and McDermott, 1989; Nepstad and Schwartzman, 1992; Panayotou and Ashton, 1992; Plotkin and Famolare, 1992; Ros-Tonen *et al.*, 1995; Ruíz Pérez, 1996). Proponents of the ‘NTFP-strategy’ pointed to important benefits of NTFP exploitation for local communities, such as goods (food, fodder, fuel, medicine, construction material and smallwood for tools and handicrafts), income and employment. Compared to timber, the harvesting of NTFPs seemed to be possible without major damage to the forest and its environmental services and biological diversity. In sum, NTFPs were expected to offer a model of forest use which could serve as an economically competitive and sustainable alternative to logging.

Since the publication of the Peters *et al.* proposition, the forestry and academic world has witnessed a wave of studies and projects based on the assumption that, by adding value to the forest and generating incomes and foreign exchange, the commercial exploitation of NTFPs could provide an incentive to keeping the forest intact and managing it sustainably. Once results gradually became available from research projects initiated to test the original assumptions, it was found that major modifications to the original proposition had to be made (Arnold and Pérez, 1998 and 2001; Ros-Tonen, 1999b, 2000; Sheil and Wunder, 2002). The picture at the start of the new century is one in which optimism regarding the potential of NTFP extraction as a combined strategy for conservation of natural forests and poverty alleviation has waned, to be replaced with a more cautious approach or even forthright pessimism. It is now acknowledged that NTFPs are very diverse and that the scope for NTFP exploitation is both product and location-specific. Hence, there was growing recognition that the original research scope with regard to NTFPs needed further elaboration. On the one hand, the need was felt for more empirically oriented product and situation-specific approaches (Arnold and Pérez, 1998). On the other hand, there was a call to make more explicit choices about the aim to be pursued in NTFP development – forest conservation, participatory forest management or improving livelihoods (Ros-Tonen, 1999c; 2000) – and to pay more attention to the overall livelihood strategies of people and the contextual factors affecting them (Byron and Arnold, 1999). As regards the latter, two other propositions came to the fore in addition to the original one about NTFP extraction from natural forests contributing to both forest conservation and improved livelihoods:

The contribution of NTFPs to improved livelihoods can best be assured through a process of gradual domestication of NTFPs in human-modified (agro)forest types; and
The way NTFPs contribute to peoples’ livelihoods can best be understood by taking livelihoods rather than NTFPs as the central focus of study.

³ Non-timber forest products are defined in this paper as all plant and animal products that come from forested landscapes, including human-modified ones.

The three propositions concerning the role of NTFPs were reflected in three approaches that gradually evolved to study the scope for NTFP-based development, *i.e.* one focusing on NTFP extraction from natural forests, one focusing on NTFP exploitation in anthropogenic forest land-use systems and one studying NTFP use under changing livelihood conditions. These three approaches show that the studies on the development potential of NTFPs have progressively become more inclusive. Initially, attention was focused mainly on the resource potentials of natural forests, but increasingly these resource potentials were assessed in relation to the overall context of land uses and livelihood conditions. The aim of this paper is to describe and evaluate each of these study approaches and assess empirical information related to each of them. On the basis of this evaluation conclusions will be drawn regarding the scope of NTFPs to contribute to improved livelihoods.

This paper draws on two types of information. Firstly, we make a comparative analysis of several specific case studies. These case studies were selected on the basis of pragmatic considerations, such as the authors' insight into the nature of each study (on the basis of their direct or indirect involvement) and the possibility to interact with the original researchers. We therefore selected a number of recent studies carried out by Dutch researchers. Within the Netherlands, an active research network of NTFP researchers has been formed during the last decade, within which an intensive communication took place (Ros-Tonen, 1999a). Several recently published articles and theses by researchers in this network provided a good database for comparison. Secondly, this article is based on a review of recent international literature on NTFP research. Through the juxtaposition of data from case studies and more theoretical literature we will be able to present empirical information and relate it to general research trends.

DIVERSIFIED CONTEXTS

As a result of the evolving NTFP research agenda, it is now broadly acknowledged that people's dependence on the forest may vary in different settings and that there is no uniform category of "forest-dependent" people (Wollenberg and Ingles, 1998). Byron and Arnold (1999) proposed a typology of people-forest relationships that does justice to the varied dependencies on forest resources. They distinguish between:

Populations living within forests for whom forests provide the main source or starting point of livelihood.

Farming communities that rely on the forest as a supplementary source of livelihood.

People not necessarily living in or near the forest who derive their livelihoods from commercial forest activities (artisans, traders, small enterprise entrepreneurs and employees in forest industries).

This differentiation in livelihood conditions offers the opportunity to come to a more realistic picture of forest-people relationships. However, it is not only relevant to distinguish between varying degrees of dependence on forests, but it is also important to take the dependencies on other landscape units and even non-rural environments into account. We will therefore base our review on a differentiation between three categories of forest conditions and people's dependence on forest resources:

Relatively undisturbed forest areas, where hunting, gathering and fishing are still substantial sources of livelihood for forest-dwelling people.

Areas where natural forests have been partly replaced with anthropogenic vegetation types and where people make a living from a mix of forest-based and agricultural economic activities.

Forest areas of either type where the rural-urban interface and links with outside markets predominate people's livelihood strategies.

The selected case studies in the first category are three studies carried out in Guyana, Honduras and NW Amazonia by Van Andel (2000), Demmer and Overman (2001) and Duivenvoorden *et al.* (2001), respectively. These studies focused on Amerindian population groups which combine subsistence farming on a slash-and-burn basis with hunting, gathering and fishing. The selected case studies in the second category were carried out in Cameroon by Van Dijk (1999a, submitted), in West Kalimantan, Indonesia, by De Jong (2002) and in the Philippines by Kusters (1999). These studies deal with population groups which, though still extracting some NTFPs from natural forests, rely mainly on human-modified (anthropogenic) vegetation types for the collection of NTFPs. These vegetation types may or may not be intentionally created for the exploitation of NTFPs. De Jong's study provides several examples of purposively created NTFP sources, such as rubber gardens and forest gardens (*tembawang*), while in Van Dijk's study a significant proportion of NTFPs come from vegetation types not specifically created to this end, such as secondary forests, young fallow vegetation and cacao plantations. In the Philippine case, human-induced modification of the forest has unintentionally created an environment favourable for the growth of bamboo (*buho*) in secondary forest. The third category is represented by a study carried out in Bolivia (Henkemans, 2001; see also Assies, 1997 and Bojanic Helbingen, 2001) in a relatively isolated region that thrives on a forest-based economy founded on the exploitation of Brazil nuts and other forest products. Here, the rural-urban interface plays a twofold role. In the first place, the exploitation of the main commercial NTFPs – principally Brazil nuts, but also palm heart and timber – is not typically carried out by forest-dwelling people, but by urban-based labour gangs since the "traditional" estate system has come under increasing pressure (Assies, 1997).⁴ In the second place, the livelihood strategies of independent forest communities tend to be increasingly linked with the urban centres which provide markets for forest goods, employment, education and medical services (Henkemans, 2001). Many households, especially those in forest communities with good access to regional towns, combine farming and Brazil nut harvesting with a part-time urban life in which males work as taxi drivers, females find employment in the Brazil-nut processing industry and children attend school (*ibid.*).

⁴ The feature of urban-based labour gangs does not mean that people from forest and other rural communities do not play a crucial role in this form of exploitation. Each and every 'farmer' or rural family in Northern Bolivia collects Brazil nuts (Boot, personal comment).

These varying contexts set the stage for the three different, though partly overlapping, approaches to study the options for NTFP development. These will be elaborated below.

THREE APPROACHES TO NTFP DEVELOPMENT

NTFP extraction from natural forests

Use of NTFPs

Some of the studies reviewed here were carried out in settings where natural forests predominate (Van Andel, 2000; Demmer and Overman, 2001; Duivenvoorden *et al.*, 2001). In these regions, the predominantly indigenous populations live by practising slash-and-burn subsistence agriculture, extracting forest products, hunting and fishing. People in these areas have an extensive knowledge of the forest and the potential uses of forest species. Together with the studies discussed later in this paper, in which only part of the NTFPs are extracted from natural forests (Van Dijk, 1999a; De Jong, 2002) these studies showed that the forest offers a wide range of goods contributing to people's basic needs for food, shelter and medicines. The most striking points that come to fore are:

- The high number of plant species used as NTFP (575 in Indonesia, over 500 in South Cameroon, 357 in Guyana) or potentially to be used as such (around 1,000 in NW Amazonia).
- The large proportion of these used for medicinal purposes (around 300 species in both Guyana and Cameroon; 50% of the 160 NTFPs used for subsistence in Bolivia).
- The importance of animal species – fishes and game – as a source of protein, especially among the poorest segments of the population, and the cultural importance attached to hunting (Demmer and Overman, 2001; Van Dijk, submitted; Henkemans, 2001).⁵

A general tendency, even in situations where most people should be classified as 'poor', for the poorest among them to be the ones who consume relatively more forest products than others (Demmer and Overman, 2001; Van Dijk, submitted; Table 1).

Even in conditions where hunting/gathering from natural forests form an integral part of people's livelihoods, in most cases they depend on slash-and-burn agriculture for the provision of their staple food (bananas in the case of the Tawahka Indians, rice and cassava in the case of Amerindians in Guyana and yucca and bananas in the case of the Indians in NW Amazonia).

⁵ Van Dijk (1999a and c) mentions no less than 280 animal species that are used as a source of protein, including bush meat, fish, crustaceans, insects and molluscs. Demmer and Overman (2001) indicate the importance of animal species in the Latin-American context.

Table 1. Relation between level of income and the share provided by plant NTFP sales for Bagyeli and Bantu people in south Cameroon (Van Dijk, submitted)

Share of NTFPs as % of total income	Total income < 5,000 CFA	Total income 5,000-50,000 CFA	Total income 50,000-100,00 CFA	Total income > 100,000 CFA	Total % of surveyed population
< 5%	45 - 13	14 - 13	8 - 10	5 - 3	72 - 38
5 - 25%	0 - 0	7 - 11	5 - 3	0 - 7	12 - 21
25 - 50%	2 - 2	3 - 10	1 - 3	0 - 2	7 - 16
> 50%	6 - 13	3 - 11	0 - 2	0 - 1	9 - 26
Total % of surveyed population	53 - 27	28 - 44	14 - 17	5 - 13	100 - 100

X- Y = % surveyed population of Bagyeli and Bantu respectively

In addition, forest products contribute to peoples' cash needs, especially where other income-generating opportunities are absent. Such commercial products not only include NTFPs, but also timber products, while money can also be earned with forest-based services like guide work.

- The most important forest-based sources of income for Tawahka men in Honduras include the sale of canoes and wood boards and guide work, while women may earn a modest amount of money from the sale of handicrafts (bark cloths, hammocks and baskets from inner bark) and forest medicines. On average, 23% of the Tawahka people's cash income is forest-based (Demmer and Overman, 2001).
- In Guyana the options for commercialisation seem to be more diverse, including palm heart, wildlife, the aerial roots of several hemi-epiphytes that provide raw materials for the furniture industry, fibres for hammocks, baskets and tourist souvenirs, medicinal plants, palm leaves for roof thatching, and mangrove bark commonly used for tanning leather. Palm heart and furniture fibres form the major source of income for forest-dwelling people (Van Anandel, 2000).
- In NW Amazonia the main commercial forest products are fish (large catfish and, to a lesser extent, ornamental fish) in Colombia, wood and animal products such as mascots, bush meat and skins in Ecuador, and construction timber and (on a small scale) some handicrafts in Peru. The scope for trading plant forest products is limited mainly to some forest fruits (*Mauritio flexuosa*, *Euterpe precatoria*, *Theobroma grandiflorum*), medicinal plants, fuelwood and forest product-based handicrafts, involving only 0.6% of the total primary production and 0.3% of all income generated by trade (Duivenvoorden *et al.*, 2001).
- As far as the Bagyeli people in south Cameroon are concerned, who still depend to a large extent on hunting and gathering, hunting provides an average of 90% of their cash income. The sedentary Bantu farmers living in the same area sell both game and vegetal NTFPs, which on average generates around 20% of their cash income (Van Dijk, submitted).

Except for bush meat (Cameroon), live animals (Guyana), fish and, to some extent, wood, the trade is primarily oriented towards local markets and the traded quantities are often very small. In south Cameroon, for instance, 60% of all trade was directed at satisfying local demand (Van Dijk, submitted). Due to limited demand and poor infrastructure, this trade offers little scope for boosting people's incomes, unless there is an established (export) market, as in the case of Brazil nuts in Bolivia (Henkemans, 2001). This does not disregard the fact that forest-based income is often an essential ingredient for sustaining present livelihoods and that forest products are in many cases the major source of income for forest-dwelling people.

Contribution to sustainable forest use and poverty alleviation

Although the various studies highlighted the often important role of NTFPs for local communities, they also have led to doubts about the potential of NTFP extraction from natural forests to contribute simultaneously to forest conservation and poverty alleviation (Arnold and Ruiz Pérez, 1998; Ros-Tonen, 1999a; 2000). It was found that it is not at all easy to serve ecological, economic and social objectives simultaneously through the sustainable extraction of NTFPs. As regards the ecological impact of NTFP exploitation commercial harvesting of NTFPs does have a number of negative 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). For instance, Demmer and Overman (2001) observed during an experiment a complete cessation of flowering and fruiting in plants of the palm *Asterogyne martiana*, from which leaves were harvested for roof construction, while Guedje (2002) observed that a decrease in vitality of *Gnetum africana* often occurred as a result of the harvesting of parts of the bark for use in beer production. The stripping of the bark of *Garcinia lucida*, which is used as an additive in palm wine, even results in a 74% mortality rate (*ibid.*). Such impacts can sometimes be remedied by careful extraction and plant management practices. In practice, however, exploitative commercialisation systems and substitution by synthetics often discourage extractors to follow such a procedure (Richards, 1993). As a result, over-exploitation frequently occurs when NTFPs are harvested on a commercial scale. Thus, the assumption of ecologically sustainable commercial NTFP extraction was found to be doubtful or in several cases even untrue.

With regard to poverty alleviation, the potential of NTFP extraction proved to be limited as well. In the first place, it is usually the socially most marginalised people who are the main actors in NTFP extraction. They generally live in poor conditions where even the most basic health care and educational services are lacking. Only in a few situations is extraction capable of providing a significant contribution to rural livelihoods, notably in cases where the extraction of different commercial NTFPs can supplement each other and can be combined with farming. In the Amazon region such agro-extractive cycles include a rotational collection of wild rubber, Brazil nuts and, more recently, palm heart (Assies, 1997). In general, however, the income-generating capacity of NTFP extraction in natural forests is restricted due to the often low densities at which the NTFP-producing species occur and their irregular distribution (Boot, 1997; Van Valkenburg, 1997; Van Dijk, 1999b). Only in some oligarchic forests may high densities of specific NTFP species occur (Peters, 1992). As a result, extraction is mostly a part-time, seasonal and subsistence-oriented activity, complementary to farming, mining or logging. Moreover, the trade in NTFPs is often

hindered by marketing problems, such as a 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 remote tropical rain forest areas also hinder the successful marketing of NTFPs. Arnold and Ruiz Pérez (1998) further point towards the volatility of many NTFP markets, where prices fluctuate and many NTFPs follow a burst-and-boom cycle which ends up in their substitution by domesticated species or synthetic alternatives (Homma, 1992). Finally, the lack of organisation among harvesters and lack of access to credit and storage facilities (Verheij and Reinders 1998; Van Dijk 1999a) impede the extractors' access to markets. Exploitative production and trading relations are often the result.

Indeed, it can be argued that, even though millions of forest-dwelling people are still relying substantially on NTFPs for subsistence, it is an inherent characteristic of NTFP-extraction based livelihoods that they tend to disappear (*e.g.* Ros-Tonen, 2000). In general, extractors of NTFPs prefer other jobs, once alternative employment opportunities become available (*e.g.* Godoy and Bawa, 1993; Dove, 1993; Browder, 1992), unless they are able to specialise on some relatively profitable products such as Brazil nuts or rattan. The study of Demmer and Overman (2001) confirms this trend: they found that the more wealthy Tawahka Indians in their study area concentrated on the extraction of woody species used for canoes, while the time spent on fishing, hunting and other forest activities declined. A similar trend occurs with the consumption of NTFPs, which tends to dwindle as other food sources become available through improved supplies from agricultural and industrial sources or (in Africa) more efficient food relief programmes (Godoy *et al.*, 1995; Arnold and Ruiz Pérez, 1998; Byron and Arnold, 1999). Other reasons for a decreasing importance of NTFPs in local consumption include the penetration of new products in rural markets, change of taste, decreased availability of NTFP resources and reduced NTFP knowledge as a result of a change to sedentary crop production and exposure to modern information through communication and schooling (Arnold and Ruiz Pérez, 1998).

However, the fact that the scope for boosting incomes through commercial extraction of NTFP from natural forests has been found to be relatively low, does not mean that NTFPs do not have any role to play in poverty alleviation. As mentioned earlier, millions of forest-dwelling people still depend substantially on NTFPs for subsistence, while the sale of forest products may be one of the few opportunities they have of earning an income. Moreover, the option of selling forest products may serve as a means of obtaining money in times of necessity. Thus, the scope for poverty alleviation of NTFP extraction from natural forests does not relate to boosting incomes, but rather to its role as a safety net for the poor (Wunder, 2001; Arnold, 2002).

The scope for NTFP exploitation in anthropogenic forest land-use systems

As a result of the recognition that the extraction of NTFPs from natural forests has limited potential for improving household economies, several scholars began to question whether the objective of enhancing forest-based livelihoods could not be better fulfilled by optimising NTFP production in anthropogenic vegetation types

(Wiersum, 1997a; Van Dijk and Wiersum, 1999; De Jong, 2002; Kusters *et al.*, 2001). Van Dijk and Wiersum (1999) found that the most limiting factor to the further development of NTFP extraction from natural forests in South Cameroon was the relatively low density of NTFP species in natural stands and they suggest that intensification of management and semi-domestication (*e.g.* through mixed cacao and NTFP plantations) would be a more feasible option to increase the development potential of NTFPs. This suggestion was based on the observation that forest products are not exclusively collected from wilderness areas, but from forested landscapes in which a mosaic of more or less natural and anthropogenically developed land use and vegetation types (including secondary forests, mixed cocoa plantations and agricultural fields with scattered trees) coexist. Such landscapes evolved during an evolutionary continuum in interactions between people and forests from nature to culture (Wiersum, 1997b). During this evolution, the management activities have gradually become intensified, involving a process of co-domestication of forests and tree species (Table 2). This process of co-domestication is closely linked to a gradual change in exploitation rights from open access to communal and finally to private land and/or tree tenure rights (Den Hertog and Wiersum, 2000; Paudel and Wiersum, 2002). Often, several NTFP production systems characterised by a specific set of exploitation rights coexist in one area (Van den Berg *et al.*, 2000).

The study by De Jong (2002) of forest products and local forest management in three Bidayuh villages in West Kalimantan confirms the co-existence of several NTFP exploitation systems involving various types of managed natural forests and anthropogenic vegetation types. Table 3 is presented here as an example. Van Valkenburg (1997) also noted such coexistence of NTFP exploitation systems in East Kalimantan.

The *tembawang*, studied extensively by De Jong (2002) is a good example of how local communities may have developed NTFP exploitation systems which are intermediate between natural forests and monocultural plantations systems. These forest gardens consist of a mixture of planted, tended and spontaneously regenerating trees that develop into full-grown forest gardens and have a structure and species composition that compare favourably with those of mature natural forest. The five *tembawang* inventoried by De Jong had an average number of 426 trees/ha, with a range of 281-569 trees/ha, while there were 562 and 569 trees/ha (dbh \geq 10 cm) in two neighbouring forest plots. The natural forest plots had an average of 256 plant species/ha, while the five *tembawang* had 170 species/ha (*ibid.*). Of a total of 581 species, 174 occurred in both the *tembawang* and natural forest plots, while 202 were specific for *tembawang*. The numbers of species with a reported use amounted to 160, on average, on the *tembawang* plots, and 218 in managed natural forests.⁶ The total number of species with a reported use from all vegetation types together amounted to 575. These figures suggest that the forest gardens not only hold an enormous potential for NTFP use, but that they also play a role in maintaining a high biodiversity even where the natural forest has disappeared.

⁶ Yet, only 11-18 species (7-12%) of these were actually harvested in 1993, while these numbers were even slightly lower for the managed natural forests (2-11%).

Table 2. Different agroforestry systems incorporating NTFP production (Wiersum, 1999)

A.	(Modified) forests with prevalently tolerant forest management practices
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1.	<i>Gathering of non-timber products in natural forests in which NTFPs are protected:</i> specific areas or specific tree species in natural forests that are favoured and protected because of their value for providing useful materials. Example: individually claimed trees
2.	<i>Resource-enriched natural forests:</i> natural forests, either old-growth or fallow vegetation, whose composition has been altered by selective protection and incidental or purposeful propagule dispersion of food and/or commercial species. Examples: enriched natural forests; enriched fallows

B.	Transformed forests with prevalently intrusive forest management practices
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1.	<i>Reconstructed natural forests:</i> (semi-)cultivated forest stands with several planted useful species, tolerated or encouraged wild species of lesser value and non-tree plants (herbs, lianas) composed of mainly wild species. Example: forest gardens
2.	<i>Mixed arboriculture:</i> cultivated mixed stands, almost exclusively of planted, and often domesticated, tree species. Examples: home gardens; smallholder plantations
3.	<i>Interstitial trees on croplands:</i> either naturally regenerated or protected trees, or planted and sometimes domesticated trees scattered over agricultural fields. Example: scattered fruit trees cultivation on/along crop fields
4.	<i>Commercial plantations with associated agroforestry practices:</i> plantations of domesticated tree crops which are (temporarily) inter-cropped with food plants or grazed by livestock. Example: (mixed) tree-crop plantations

There is no unidirectional trend from forest towards more specialised NTFP exploitation systems (such as enriched swiddens and rubber gardens), but a complex pattern in which land-use intensification may occur in some areas, while others may experience de-intensification (Wiersum, 1997b). For instance, De Jong (2002) observed that de-intensification might take place in swidden fallows which run the risk of becoming permanently invaded by *Imperata cylindrical* grass vegetation (*alang-alang*). Under these circumstances, farmers may opt not to reserve such fields any longer for future rice production, but to plant them with rubber and fruit trees.

In Cameroon, similar trends in NTFP exploitation systems as in Kalimantan were noted (Van Dijk, 1999a; see Table 4). Although species richness and the number of NTFP specimens per ha were highest in the least disturbed forest and swamps, only 50% of the 28 NTFP species with a known market value were collected from these habitats, with the other half coming from man-made habitats such as fallow lands, secondary forests and, in particular, cocoa plantations. The fact that some commercial NTFPs, such as some fruit species and *Strophantus gratus* (the seeds of which are

traded at international markets as an input for the pharmaceutical industry) had their highest abundance in cacao plantations indicates that these species were purposively planted or managed. The different forests and forest-derived habitats not only differed with respect to the type and intensity of cultivation and harvesting techniques, but also with respect to the rights of access and ownership of different NTFP resources. As a result, the local exploitation and management of different NTFP resources were shaped by a complex system of customary and official legal rules and regulations (Van den Berg *et al.*, 2000).

Table 3. Managed forests in Dayak villages in West Kalimantan (adapted from De Jong, 2002)

Forest type	Description	Main uses	Average no. of useful species inventoried	No. of useful species harvested in 1993	Corresponding category in Table 1
<i>Hutan tutupan</i>	Communally protected natural forest	Ironwood, rattans, edible leaves, medicinal plants, fruits	202	23	A.1-2
<i>Pulau rimba</i>	Privately owned mature natural forest islands surrounded by agricultural fields	Rattan, poles, wild fruits, palm heart	234	5-17	
<i>Sompuat</i>	Honey tree forest islands	Apiculture	6 ^a	-	A.1
<i>Tembawang</i>	Mixed-fruit forest gardens	Fruits, rubber, bamboo shoots, rattan, leaves (various species), ironwood, firewood	160	11-18	B.1-2
<i>Kebun karet</i>	Rubber gardens	Rubber	n.a.	n.a.	B.4
<i>Bawas</i>	Swidden fallow secondary forests	Various forest products	n.a.	n.a.	A.2

^a Number refers to honey trees only.

Table 4. Species diversity and richness in the main habitat types distinguished by Van Dijk (1999a) in South Cameroon

Habitat type	# ha	Number species/ha	Number NTFP specimens/ ha	Total number of different NTFP species ^a
Forest > 540 m	7	103	637	166
Forest 350-540 m	3	101	551	153
Forest < 350 m	2	112	570	158
Swamp forest	1	109	734	125
Secondary forest (logged)	3	100	543	157
Secondary forest (agriculture)	4	82	470	139
Cocoa plantations (abandoned)	1	85	371	105
Cocoa plantations	1	81	271	96
Young fallow lands	2	51	151	87

^a Numbers for the total area inventoried of each habitat type

To sum up, the studies in Kalimantan and Cameroon made it clear that an important potential of NTFPs contributing to people's livelihoods lies outside natural forest areas in anthropogenic vegetation types, which are purposively manipulated to this end. Although this had not yet been observed on a large scale in the Philippine case, it has been suggested that this might also be the perspective for bamboo exploitation in the near future (Kusters *et al.*, 2001). Such (semi-) domestication of NTFP in a complex of anthropogenic land-use types not only involves a gradual selection of species and modification of the natural forest habitat but also a gradual strengthening of social institutions regarding the production of NTFPs (Wiersum, 1997a). The presence of biodiverse NTFP production systems such as the *tembawang*, which are intermediate between natural forests and mono-cultural plantations, indicates the creativity of local communities in enhancing their environment with species valued by them. From an NTFP resource point of view, these anthropogenic forest types are enriched rather than degraded. Michon and De Foresta (1997) argue that such agroforests should be considered as truly domesticated forest ecosystems rather than pre-domesticated forest plantations.

NTFP use from a livelihood perspective

We have already indicated above that various socio-economic conditions affect the role that NTFPs play in people's livelihoods, such as the availability of alternative employment opportunities, access to markets, the availability of products with established markets, agricultural development, the degree of linkages with urban areas and the importance of labour migration. The importance of such conditions indicates that when considering the options for NTFP development from a socio-economic perspective, attention needs to be given to the fact that the previously remote forest areas are increasingly becoming incorporated into external social, economic and policy networks (Wiersum, 2000). Under the impact of such external conditions the livelihoods of forest dwellers are subject to change. An example is the situation of bamboo cutters in the Sierra Madre, the Philippines, whose sources of livelihood changed dramatically during the last decades. Firstly, improved accessibility of the region and more widespread possession of draught animals made farmers move from subsistence-oriented shifting cultivation to more sedentary and cash-oriented corn farming based on the use of ploughs, fertilisers and agrochemicals. Secondly, the economic importance of small-scale logging – the most important off-farm source of income for forest migrants during the 1990s – diminished considerably as a result of the depletion of the most accessible timber resources. Presently only 4% of the study village's income comes from logging, as compared to 58% from the sale of corn and 13% from cutting bamboo (Kusters *et al.*, 2001). Examples such as this one illustrate that the scope for NTFPs to contribute to rural livelihoods can best be understood by focusing on the characteristics and dynamics of rural livelihoods rather than on the characteristics of NTFP resources.

Several recent studies on the livelihood strategies of rural people in developing countries have highlighted the significance of livelihood diversification (*e.g.* Ellis, 1998; Zoomers, 2001). Today, many rural households diversify their livelihoods and combine various strategies to obtain food, consumer goods and income, without focusing on a single activity, crop or even space. With increasing exposure to national and international markets, new opportunities are emerging for the acquisition of goods and income. People at the forest fringe combine the exploitation of natural resources

with farming, off-farm employment and labour migration to cities or even abroad. Thus, most forest people are no longer merely hunters and gatherers and many farmers are no longer exclusively farmers. Within such diversified livelihoods, natural resource exploitation such as the collection of NTFPs still may play an important role (Wiersum and Shackleton, 2003). On the one hand, rural communities, even if they are incorporated in external networks, may still partly rely on NTFPs for their own consumption. Although the number of used products may have decreased in comparison to traditional forest-based communities, the amount of used products may still be considerable. In Bolivia, for instance, in an area subject to seasonal migration, it was found that the local communities still used 160 forest species (Henkemans, 2001). On the other hand, as witnessed by the existing trade in NTFPs, urban-based people may also still use selected forest products. Recently it has become increasingly evident that urban-focused commercialisation of NTFPs not only involves the sale of 'wild' products, which are cheaper than their industrially produced substitutes, but also the sale of 'wild' products which, from the cultural point of view, are held in high esteem (Cocks and Wiersum, 2003).

The case study by Henkemans (2001) explicitly used a livelihood approach (Carney, 1998) for the analysis of the importance and prospects for sustainable NTFP use. This analytical approach distinguishes between five forms of capital:

1. *Natural capital*: natural resources such as land, forests, water, wildlife, waters and minerals.
2. *Physical or produced capital*: such as privately-owned assets that can be used to increase labour and land productivity (farm animals, tools and machinery); publicly-owned economic infrastructure (roads, electricity); and social infrastructure (schools, educational facilities).
3. *Human capital*: including health, nutritional levels, educational standards, knowledge, information, skills, experience, creativity and inventiveness.
4. *Financial capital*: including cash income and savings, loans, credit, subsidies, remittances and pensions.
5. *Social capital*: the set of relationships between people which help to shape livelihood options, including kinship, friendship, patron-client relations and reciprocal arrangements and the social and cultural norms, values and institutions that shape mutual support and assistance.

The degree to which people have access to these capitals and succeed in effectively combining them to realise their self-defined development objectives determines to a large extent whether they are capable of maintaining and improving their standard of living and reducing their vulnerability (Carney, 1998; Henkemans, 2001). Both economic rationality and socio-cultural norms and values such as peoples' identification with a forest-based livelihood determine people's livelihood choices. The result is a livelihood strategy based on 'multi-tasking'. In independent forest-fringe communities, people combine the extraction of timber and non-timber forest products with agriculture and wage labour in a year-round agro-extractive cycle which provides them with food, fuel, shelter and other necessities. The rural-urban interface plays an important role in this 'multi-tasking strategy' in the more accessible areas.

The availability of the five capital forms determines to a large extent the future prospects for sustainable forest-based livelihoods. Under the isolated conditions of a

barraca system – a large forest concession where a single patron controls the exploitation of forest resources – these prospects are poor: access to natural capital (in terms of right to control) is restricted, hence can hardly be used to improve people's livelihoods; physical capital (especially publicly-owned economic and social infrastructure) is poorly developed; human capital imposes constraints due to poor diet and health conditions and lack of self-confidence and inventiveness; financial capital is virtually non-existent and the mobilisation of social capital is hindered by a lack of social cohesion and social organisation (Henkemans, 2001). Henkemans is more positive about the prospects for independent communities of former rubber tappers, in particular those that have a well-developed infrastructure, good social organisation and can benefit from a strong urban-rural link. People in these communities seem to be able to combine the positive elements of two worlds. A relatively secure food supply from forest and farming land and a social network which they can fall back on in times of economic hardships provides them with *tranquilidad* (tranquillity, peace of mind), while the markets, income-generating opportunities, educational and health facilities and development agencies in nearby regional towns compensate for the constraints on development and economic suffering (*sufrimiento*) associated with forest life in more isolated areas (*ibid*).

In contrast with Henkeman's optimism about the prospects of sustainable forest-based livelihoods in the north Bolivian context, Bojanic Helbingen (2001) considers the long-term options for alleviating poverty on the basis of a forest-based economy as limited, because the natural potential for either NTFP exploitation, sustainable timber extraction or agroforestry development is too restricted. He therefore argues that in addition to sustainable forest-based production systems, non-forest economic activities need also to be developed to enhance the economic development of the region and combat the widespread poverty among its inhabitants.

TRENDS IN THE ROLE OF NTFPS IN PEOPLE'S LIVELIHOODS: THE FOREST AS A SAFETY NET AND SOURCE OF MARKET-ORIENTED PRODUCTION

The question now is, what are the implications of diversification strategies for the importance of NTFP harvesting and exploitation in peoples' livelihoods? In this respect, several authors (Wunder, 2001; Arnold, 2002; Wiersum and Shackleton, 2003) point at two, partly opposing, trends. The first trend is that of NTFP extraction becoming a function of increasing poverty and forests forming a safety net for the poor. As such, forests provide a cheap alternative for food, medicines and building materials in times of economic hardship. This hypothesis of the forest as a safety cushion was specifically addressed by Demmer and Overman (2001) in their analysis of seasonality in economic behaviour. For edible products, they present some evidence to suggest that the poorest people recur to the forest during the months in which agricultural products become scarce and less diverse (at the end of the dry season and the first months of the rainy season). In these months, poor Tawahka households increase the use of game and fish to complement their diet; a peak that could not be observed among the more wealthy households. The strongest indication that the forest functions as a safety net for Tawahka Indians can be seen in the seasonal consumption of wild banana; a forest product considered inferior compared with the domesticated species and which is hardly consumed by the wealthier

households.⁷ Henkemans (2001), too, mentions fishing and the sale of bush meat (in addition to wage labour and the sale of fruits, manioc and plantains, if available) as options to bridge a slack period in the economic life of the local Camba people between the sale of the agricultural harvest and the start of the Brazil nut harvesting season. It seems that the role of the forest as a safety cushion is important, in particular, in the more remote areas, where few other options exist to compensate for scarce food resources.

The second trend that can be observed is that new income-generating opportunities emerge as a result of increasing exposure to markets. This occurs at local scale, where improved infrastructure gives more people access to urban markets, but also at global scale, where new markets are being opened up as a result of globalisation and liberalisation. Consequently, the trend in commercialisation is increasing, creating new alternatives to earn cash income. Demmer and Overman (2001) specifically address the consequences for forest resource use of increased integration into markets and investigated how economic behaviour of Tawahka Indians in Honduras changes with increased market integration and wealth levels. They found no statistically relevant linear relationship between integration (estimated from the amount of household cash earnings and labour transactions with outsiders) and the time spent on forest-related activities and agriculture. With increased market integration the relative share of forest products in people's total cash income decreased, however, indicating a growing importance of non-forest based income. Generally speaking, more integration into the market leads to people tending to earn more money from the sale of fewer products. The pressure on hardwood species for canoes and wood boards increases and less money is earned from game meat and fish. When people become wealthier, the time spent on forest-based activities diminishes, while the reverse is true as regards time spent on agricultural and other economic activities (*e.g.* tending a shop, wage labour or gold panning). The decrease in time spent on forest-related activities is, however, not associated with a decrease in the consumption of forest products. With increasing wealth, the consumption of wood, game, fish and medicines initially increases by 36% and only after a twenty-fold increase in wealth do consumption levels tend to fall below those of poorer households. The same trend was observed in Cameroon (Table 1) and Guyana. In the latter country better-off people continue using traditional NTFPs such as basketry, fish and game. However, instead of gathering, hunting and fishing themselves they buy these products from their poorer neighbours (Van Andel, personal comment). To sum up, increased integration into markets creates new economic opportunities, which changes the importance of forest products for people's livelihoods. The main tendency is towards specialisation and increased importance of non-forest based occupations, but this does not necessarily imply that the consumption of NTFPs will be ended.

THE IMPORTANCE OF LOCATION

One of the consequences of increased exposure to markets is the changing spatial organisation of people's livelihoods. This is reflected in the increasing importance of external labour markets, as well as in the reorganisation of people's economic space

⁷ The authors warn, however, against jumping to conclusions that the cushion function of the forest applies only to the poor, pointing to extreme events like Hurricane Mitch when *every* Tawahka was dependent on forest food in the weeks preceding the arrival of outside food aid.

in which migration and multi-location households seem to be on the increase. Henkemans (2001) observed this trend in the most accessible areas of northern Bolivia, but other authors (*e.g.* Wiggins and Proctor, 2001; McDowell and De Haan, 1997) have pointed to this phenomenon as well.

This suggests that location matters when it comes to the potential role of NTFPs in people's livelihoods. Interesting in this respect is the 'rediscovery' of the location model of the 18th century geographer Von Thünen. Cleuren (2001) took this model as a starting point for his comparative analysis of deforestation in Brazil, Ecuador and Cameroon and distinguished three land-use zones at the forest frontier with varying distance to markets and transport costs:

- *The extraction zone*: a remote primary forest zone where timber and minerals are still abundant, the forest has an open access character and land is abundant and cheap. This zone largely corresponds to the relatively undisturbed forest areas distinguished earlier, where subsistence farming, gathering, fishing and hunting predominate. Timber and oil companies might also be active in this area.
- *A zone of extensive but consolidating land use*: an intermediate area where most of the forest conversion takes place. It is in this zone that farmers have a range of livelihood options, combining farming with trading, off-farm work and the extraction of timber and commercial forest products. This zone largely coincides with the zone of mixed forest and farming activities identified before.
- *A zone of intensive agriculture alongside market centres* where the last patches of forests have been transformed into farming land and where the development of roads, infrastructure, market opportunities and government services have enabled these areas to become integrated into the national economy. Due to its very nature this zone is usually not included in NTFP studies.

This classification corresponds more or less with that of Wiggins and Proctor (2001), who distinguish different options for rural development in 'remote', 'middle countryside' and 'peri-urban' areas – the remote and middle country areas being subdivided into areas that are rich and poor in natural resources. Each of these zones poses its own forest dynamics, development options and specific place for forest-based production. Linking this zonification with Byron and Arnold's typology of forest-people relationships we expect that:

- The most remote areas continue to be home to populations who still depend mainly on the forest as a source of livelihood and where the forest functions mainly as a safety net for the poor. There is, however, relatively modest scope for improved livelihoods, due to lack of infrastructure, limited access to markets and poor organisation of producers.
- The intermediate zone of consolidating land use is the place where farmers rely on the forest as a supplementary source of livelihood. Here, the options to boost NTFP-based incomes lie mainly in the domestication of commercial NTFPs and the integration of these products in people's farming systems. As demonstrated by the example from Cameroon where forest-dependent Bagyeli people and settled Bantu farmers co-exist, the distinction between (livelihoods in) remote and intermediate areas is not strictly determined by geographic factors, but also by cultural factors.

- With increasing incorporation of the intermediate zone into the national economy, the option evolves for a part of the population to become engaged in forest activities oriented towards established markets and urban demand. Such development options seem to be promising, in particular in areas where forests perform important environmental functions such as slope stabilisation, watershed protection or the provision of recreational facilities for urban people.
- In the zone near urban centres, little or no NTFP exploitation occurs, but there may be NTFP-related activities like handicraft, small-scale processing, trade and forest industries (Byron and Arnold, 1999).

DISCUSSION: OPTIONS AND CONDITIONS FOR IMPROVED FOREST-BASED LIVELIHOODS

Before summarising our conclusions about the potential for improved forest-based livelihoods and the conditions under which this potential can be realised, we should note that even where no substantial improvements can be expected, such as in the most remote areas, NTFPs may play an important role in meeting subsistence needs as one of the scarce sources of cash income and as a safety net in periods during which food becomes scarce. The scope for *improving* people's livelihoods on the basis of NTFPs seems to be limited, however, to areas closer to urban markets and seems to be feasible only if the following conditions are fulfilled:

- Producers have secure tenure rights (*e.g.* extractivist reserves in Brazil);
- Producers can combine NTFP production with other rewarding economic activities (farming, logging and/or off-farm employment) to overcome seasonality and price fluctuations;
- Products can be harvested efficiently from areas where the abundance of NTFP-producing species increased as a result of tending, enrichment planting and domestication;
- Products have established markets (*e.g.* Brazil nuts, palm heart and bamboo) or the potential to reach promising niche markets (*e.g.* carbon crediting, eco-tourism, fair trade markets, 'eco-friendly' and certified products);
- Producers have the capacity to add value to the product (*e.g.* handicrafts, furniture making, or processing of food products);
- Producers are organised and maintain effective alliances with outsiders (development agencies, environmental organisations and research organisations), who may help identify new markets and potential donors.

Finally, research has a role to play too, especially in relation to the following aspects (*c.f.* Ros-Tonen, 1999c):

- Identifying areas where people depend to a large extent on forest resources, so that access to these areas can be secured in land-use planning;
- Clarifying forest laws and regulations that hinder or facilitate the commercialisation of NTFPs;

- Designing participatory forest management plans for the exploitation of forest products (including small-scale timber products) from natural forests which are preserved for biodiversity and/or watershed protection;
- Develop optimised production systems in human-modified and man-made vegetation types;
- Develop processing techniques which add value to NTFPs;
- Search for optimal marketing channels and opportunities;
- Investigate options for more equitable commercialisation patterns.

CONCLUSIONS

This paper has shown that the original conservation/development proposition launched in the NTFP debate by the end of the 1980s has been subject to revision. The studies reviewed in this paper demonstrate how, in studying this proposition, attention gradually evolved from a resource focus to a landscape and livelihood (or ‘resource-in-context’) focus. The first studies focused mainly on the potential of natural forests for NTFP extraction. In later studies the focus extended to include the total landscape used by local communities to maintain their livelihoods and the socio-economic and spatial contexts in which these are embedded. In doing so, it became clear that local communities have often been very creative in devising forest-derived vegetation systems in which the production of essential NTFPs is actively stimulated. Such domestication of NTFPs not only involves a gradual intensification in human energy in creating and maintaining NTFP resources, but also the gradual incorporation of NTFP production systems in social networks which regulate access and ownership. As a result of this understanding of community-level creativity and the dynamics in maintaining NTFP resources, it is now clear that there are many more sources of NTFPs than natural forests alone and that each vegetation type has its own potential for contributing to sustainable rural livelihoods.

The second major shift in focus of NTFP studies concerns an increased livelihood-oriented approach to forest use and NTFP production. This shift led to the recognition that the notion of “forest-dependent” people needs further refinement. Various categories of forest users exist which differ in their relation to, and interference in, the forest. Forest resources play different roles in the livelihood strategies of each type of user, ranging from being a substantial source of food, materials, medicines and equipment in relatively undisturbed forest conditions, to sources of supplementary products in mixed landscapes or situations where alternative livelihood options are available.

Forest-based as well as other rural livelihoods are undergoing rapid changes. There is a growing tendency among forest-adjacent communities to seek a livelihood strategy which combines forest-based production with farming and off-farm activities. The opportunities available seem to be directly related to the access to urban markets and available infrastructure and these locational factors should be taken into account when assessing the scope for improved forest-based livelihoods. Moreover, attention should be given to the role of NTFP production in areas where forests perform an important

environmental function and where NTFP production can be part of a participatory, multifunctional forest management strategy.

Our final conclusion is that the role of NTFPs in people's livelihoods is basically twofold. In the first place, in remote areas where forest extraction still prevails, NTFPs provide subsistence goods like food, medicines and building materials and form a safety cushion in times of economic hardship. The increasing incorporation of rural areas into external commercial networks means there is some scope for improving livelihoods on the basis of NTFP production through the gradual domestication of NTFP species in anthropogenic forest types as well as through the creation of NTFP-related jobs (*e.g.* specialised manufacturing and trade). Such options seem to be promising, in particular in areas where forests perform essential environmental functions and farmers can develop multifunctional production systems and in areas near urban markets where more specialised forest-related activities are feasible. Although these general development options have now been well-established, there still is a need for location-specific research into the potential of NTFP production and the conditions under which this potential can be realised. Such research should consider the role of NTFP production in both rural livelihoods and rural landscapes and take account of the impact of contextual factors which influence access to NTFP production factors and markets.

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