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European Tropical Forest Research Network

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NEWS

NON-TIMBER FOREST PRODUCTS

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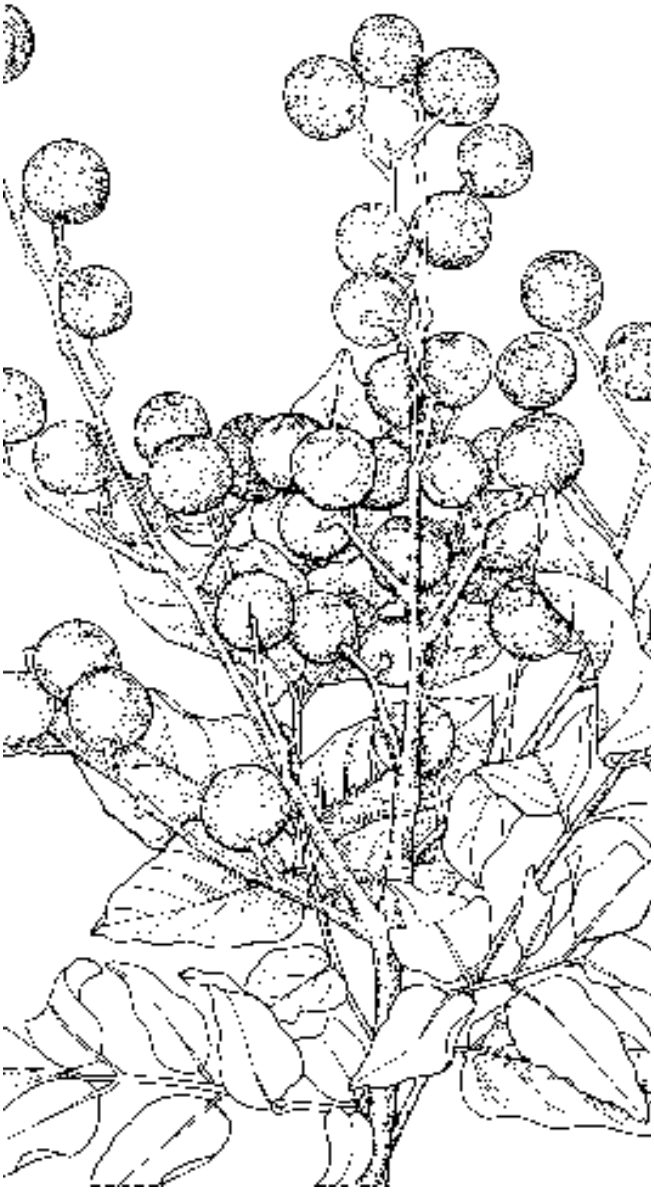

Editorial

Dear Readers,

The year 2001 starts with a bumper issue of ETFRN-News. Being the guest editors of this special edition, Christiane and I are indebted to all authors for their contributions and excellent collaboration.

When the idea of an issue on NTFPs came up at the ETFRN Steering Committee meeting last year we were all enthusiastic. But soon after starting the preparations a number of crucial questions arose: what specific themes should be addressed, is a pre-structuring required, what about a regional approach, who could or should be the authors and how to cope with the given time frame?

The reaction to our first call for papers was rather scanty. Unexpectedly our second attempt produced an overwhelming response. This left us facing the dilemma of how to fit all the papers into a single issue with limited space and funds for printing. As we did not want to leave out any, we urged all authors to really condense their contributions, to omit reference lists, figures and tables as far as possible. Various authors kindly left it to the editors to shorten their papers which is to be acknowledged.

In some cases the editors further shortened texts containing large amounts of detail and, exceptionally, when tables were omitted the main contents were inserted into the text. Of course, this may mean that some important information has not been included. We do regret this and hope for your understanding as the long versions would have led to an unsolvable situation.

The papers presented here provide a broad coverage of NTFP issues, both in thematic and regional terms. We have grouped the different contributions under a number of headings although these are not totally appropriate for all papers. In any case, it is the contents that are important, and these provide a considerable amount of very interesting information, specific experiences as well as contradicting viewpoints which we hope will encourage further discussions and exchange of ideas.

We wish all a pleasant reading.

Jochen Heuveldop and Christiane Then
Institute for World Forestry, Hamburg, Germany

We are grateful to Jochen Heuveldop and Christiane Then for editing this bumper issue of the ETFRN News; and to Kate Schreckenberg for the final editing. Please note the themes and deadlines for the next issues on the back cover.

Jane Thornback
ETFRN Acting Coordinator

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Cover illustration: *Clausena lansium (Lour.) Skeels* (Wampee) Drawing by P Verheij-Hayes

Uses: The ripe fruit is often consumed raw. In South-East Asia a kind of champagne is made by fermenting the fruit with sugar and straining off the juice. In traditional medicine, the dried unripe fruits and dried sliced roots are used as a remedy for bronchitis. Ripe fruits are said to have stomachic and cooling effects and to act as a vermifuge. A decoction of the leaves is used as a hair wash to remove dandruff and to preserve the hair colour.

From: Prosea 2. Edible fruits and nuts. CD-ROM E.W.M. Verheij and R.E. Coronel (Eds). (see Publications section)

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ECOLOGICAL ASPECTS: INVENTORY FOR SUSTAINABILITY

PERSPECTIVES

NTFP ISSUES: THE VIEW FROM AN INTERNATIONAL CENTRE

By Wil de Jong, Brian Belcher

Thinking of Bali, the artistic and colourful carvings and masks sold at all the major tourist spots come quickly to mind. These Balinese souvenirs and art objects are the most important segment of the US$45 million Indonesia earns each year from exporting woodcarvings. As a major generator of income and employment, with a steady source of wood from cultivated species, this is in many ways a forest product success story.

Just next to Bali, on the island of Timor, we find an equally dramatic story of failure. Here, sandalwood, the fragrant wood of the *cendana* tree, was once a major export, attracting traders from distant lands, bringing wealth to the island. Today sandalwood has been seriously depleted, collectors have lost an important source of livelihood, and the local carving and essential oils industries have been virtually wiped out.

There are innumerable examples of NTFPs used for a wide variety of purposes: for daily needs, cash income, as a "safety net" in times of shortage, and as raw materials for industries. Awareness of the importance of NTFPs as one crucial benefit from forests, coupled with a desire to conserve forests while making life better for millions of poor people, has made forest products the object of many research and development interventions.

Considering these facts, what should be the role of the Center for International Forestry Research (CIFOR), which is funded by the Consultative Group on International Agricultural Research? This consortium of 58 public and private-sector donors supports 16 research centres in bringing to bear scientific knowledge on agricultural and natural resource issues on the problem of how to end hunger and poverty and increase food security in developing countries while protecting the environment. The 16 centres share a mandate to produce 'international public goods', meaning that research results should be useful beyond the individual research sites and a national context.

Toward systematic methods

NTFP researchers have been plagued by a lack of coherence in the understanding of the potential role of NTFPs in development efforts. Most of the research so far has been case-based, making it difficult to draw generalisable conclusions. Differences in data classification methods and researchers' perspectives can lead to conflicting results. To help bring order to this chaos, CIFOR has developed a methodology for analysing diverse cases of commercial forest product use. Information from about 50 cases from around the world is recorded using a standardised set of 220 descriptors. This will provide the basis for a classification of these, and any other cases, and detect patterns that correlate with their development and conservation outcomes.

Commercialisation trends

NTFP commercialisation is the primary objective of many development programmes, but this raises many important questions. How will local use and management of a forest product change as development progresses? What will happen if people succeed in increasing the sales of forest products and their incomes? Experience suggests that some products will become quite important — the cases of bamboo in China and India are good examples. Other products will remain important only in economic or ecological niches — wild-gathered rattan, for example, is economically viable only when land

pressure is low. Other forest products will be abandoned as better opportunities arise. In most cases pressure on the resource will increase. When produced on common land, social controls may be needed to prevent over-exploitation and encourage sound management. Research should show us how institutions (local rules and norms) evolve when changes in the relative value of forest products occur.

Increasing production

Commercialisation of NTFPs often demands intensified production. Feasible 'production' models range from 'pure' extraction to intensified cultivation, such as plantations. Intermediate management within a forest environment merits greater attention because it has advantages in relation to biodiversity conservation and, sometimes, socio-economic development. Recently CIFOR co-organised a workshop with FORRESASIA and EFTRN to define the social, economic and ecological conditions under which intermediate systems of NTFP management are viable. Another important issue is how to integrate timber production with supplies of other products, often for multiple users. Research may lead to new silvicultural and institutional tools to aid this kind of management. One way to increase forest product production is to domesticate high-value trees for on-farm cultivation. The International Centre for Agroforestry (ICRAF) is providing knowledge to improve the reproduction, growth and yield of promising forest species.

Downstream issues

Successful development of forest products depends as much on the markets for the products as on ecology and production. Research has ignored this, although recent work by FAO, RECOFTC, and others is helping to close the gap. A methodological approach identified as a "production-to-consumption system" addresses forest product issues like the need for sustained supply, the distribution of income, ensuring markets and marketing channels, and institutional and policy problems. Although the approach is generally well defined, more work is needed to incorporate practical experience into the theory.

Benefiting the poorest

NTFP commercialisation practitioners tend to ignore that many forest products are important because they are available to poor people. Development and conservation projects that make forests inaccessible — economically or legally — to poor people can have severe economic and social consequences, especially in hard times. New tools and methods for forest management need to take into account the tradeoffs of forest development, identifying the winners and losers. The poor, and not any well-connected elites, need to benefit from development assistance or policy changes. This requires strengthening user groups that have limited power and influence, and their land and resource property rights.

A role in priorities and policy changes

CIFOR and the other CGIAR international research centres must make sure that research has impact. One way to do this is to influence government policy. Governments increasingly recognise the real and potential benefits of forest products to poor people and are becoming more amenable to policies favouring sustained, equitable use of forest products. There are many examples of how bad policies have had negative effects. In the case of sandalwood in Timor, for example, the government imposed regulations intended to control the supply, leading to a virtual depletion of the resource. On the other hand, China's investment and trade liberations encouraged private production of bamboo, boosting exports and contributions to rural income.

Conservation groups, development agencies and NGOs are driving much of the current interest in NTFP development. CIFOR and ProFound, a Dutch NGO, thought it useful to understand the project portfolios of such agencies. Both organisations have started a study to that extent. This will, among other things, help to design a research portfolio, which should produce results more useful to targeted beneficiaries.

Expectations are that our research will produce knowledge that helps to solve real-life problems, such as how to better target and achieve success in NTFP development efforts. In our vision, examples such as sandalwood from Timor will be the exception rather than the rule and, 10 or 20 years from now, we will be able to point to many more examples like the woodcarvings from Bali.

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SOME RECENT ACTIVITIES OF THE NWFP PROGRAMME OF THE FAO FORESTRY DEPARTMENT

By Laura Russo

Since 1991 the Forestry Department of the Food and Agriculture Organization of the United Nations (FAO) has implemented a programme on "The promotion and development of Non-Wood Forest Products". Under this specific programme and other ones linked to it, FAO carries out many activities aimed at addressing gaps in knowledge and field application of best practices for NWFPs. Some of them are presented as examples below.

Improving data on NWFPs

Since 1997, FAO and the European Commission have started collaborative programmes aimed at improving the availability and quality of statistical data in the forestry sector. Work under these efforts encompasses both development of methodologies and actual gathering of data. The data thus collected are used as inputs to a Special Study on NWFPs for the Global Forest Resources Assessment 2000 (FRA 2000).

Three projects on "Data collection and analysis for sustainable forest management: linking national and international efforts" are ongoing in Africa, Asia and Latin America.

Under the one almost completed in Africa (1997-2000), quantitative and qualitative information was gathered during 1998/99 on the exploitation practices and production levels of major NWFPs in collaboration with relevant specialists in 42 African countries. Information was collected on a country basis on major NWFPs, the plant or animal sources from which they are extracted (and part used), the habitat in which they are found/produced, their destination (subsistence/trade), main uses and economic value. The process also identified the most important NWFPs in Africa, on which further development efforts should be concentrated, including: gums, mushrooms, forest fruits, bushmeat and medicinal plants.

Developing methodologies

Methodological work in support of the gathering of available information concentrates on the information requirements for data collection of NWFPs at the national level, and on harmonizing definitions and classification for NWFPs. The latter area is one in which FAO is actively seeking the collaboration of international organizations, such as IUFRO, for the organization of an international

meeting on this subject in the near future.

An FAO/EC project entitled "Sustainable forest management in African ACP countries" (2000-2002) is looking at methodologies for assessment of NWFPs. Methodologies are being developed and will be tested in collaboration with national institutions (government and NGO) in sub-Saharan African countries. The project has maintained close links with other initiatives in this field, such as the ZF0077 Forestry Research Programme (UK DFID funded) pre-project to examine the biometrics of current NTFP assessment methods (see Jenny Wong's article in this issue). A publication based on the outcomes of the FRP project will be published under the FAO NWFP Series.

The FAO NWFP programme is presently looking for national and international partners who have field activities on NWFP inventory and assessment in Africa and who would be willing to join in this effort.

Disseminating technical knowledge

The above activities all have a very strong orientation toward strengthening national capacity to collect, analyse and disseminate forest information data. FAO also compiles and disseminates knowledge on good practices for NWFP production, management and market trends and potential. This is done chiefly through the FAO NWFP series of publications.

At present, there are 12 publications in the NWFP series (see at http://www.fao.org/forestry/FOP/FOPW/NWFP/public-e.stm).

One of the future additions will be a publication on wild edible fungi, under preparation, and expected to be issued in early 2002. The publication, which will be coordinated by CABI Bioscience, will document the contribution of wild edible fungi to food security and will cover aspects from forest management issues to market issues, as well as nutritional aspects, and will include case studies from various parts of the world.

Product analysis and development

In May 2000, an African regional network for natural gums and resins (NGARA) was established. The main focus of the network so far has been gum arabic (from Acacia senegal and A. seyal), although gums and resins from other natural and planted species will be considered. Membership of NGARA is open to all countries in Africa that want to develop the use and markets of natural gums and resins. FAO's continued technical support to the network is also focusing on securing operational funds for the network secretariat.

In December 2000, FAO called for an international expert consultation in Rome to address the issue of dwindling resources of rattan, one of the most important NWFPs, the demand for which is increasing. This consultation was jointly organized with SIDA (Sweden) and the International Network on Bamboo and Rattan (INBAR) (see also announcement/ short note in this issue).

Policy and technical advice

Given its global mandate, FAO assists governments in all regions of the world in their efforts to develop comprehensive and coherent forest strategies and policies in support of the sustainable utilization, conservation and development of NWFPs. A recent example is the support given (since 1999) to the Iran initiative on low forest cover countries (LFCCs). The development of NWFPs is considered one of the priority technical issues to be addressed by the Teheran process. An important research theme is R&D for new products and economic and market research, including strategic evaluation of

market conditions and opportunities for NWFPs.

Marketing and trade issues
Another particular focus of FAO's work on NWFPs is marketing. Activities are directed at increasing awareness of the importance of marketing in the NWFP sector, to provide information and understanding of the basic elements of marketing and the business environment and to increase collaboration between public and private organizations in this sector.

In October 2000, a seminar on NWFP marketing was organized in Moldova. The seminar was attended mainly by representatives of Albania, Armenia, Azerbaijan, Belarus, Bulgaria, Kazakhstan, Kyrgystan, Romania, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

An initiative on these subjects recently launched by the FAO Regional Office for Latin America and the Caribbean is a study on the experiences of certification of NWFPs in Latin America.

More information on the activities of the FAO NWFP Programme can be found on the Internet at:
http://www.fao.org/forestry/FOP/FOPW/NWFP/nwfp-e.stm
The website is in 4 languages (English, French, Spanish and Arabic) and also allows access to NWFP publications online, including the bulletin *Non-Wood News*, the electronic newsletter NWFP-Digest-L, and the database on NWFP organizations.

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NTFPs: AN INSTRUMENT IN SUSTAINABLE DEVELOPMENT?

By Wim Dijkman

Integrating C&D
Since the late 1980s the Dutch international conservation and development community has had an interest in NTFP exploitation as an alternative to timber exploitation in tropical rainforests. Following a study by the Dutch Committee for IUCN on the economic importance of NTFPs in Southeast Asia (De Beer & McDermott 1989),several Dutch development agencies have been supporting southern initiatives to improve income generation for forest dependent people through NTFP exploitation.

One of these was a survey of NTFPs with an export market, carried out by the Prince Bernhard Centre for International Nature Conservation of Utrecht University together with IUCN, in several Latin American countries from 1990-92 (Broekhoven 1996). This survey highlighted several interesting products and regions with ample international market opportunities (Brazil nuts, palm heart, tagua nuts, etc.) and enabled us to contribute to the Tropenbos research strategy (Ros-Tonen et. al. 1995). It also revealed that several key assumptions underlying the hypothesis that NTFP extraction is an effective strategy for integrating conservation and development objectives had not been tested. These included the assumption that NTFP extraction is a more sustainable land use than timber exploitation, as it is considered to have a lower impact on the structure of the forest and species composition. A second assumption is that NTFP extraction is more labour intensive and provides a better and more constant income for forest

dependent people. To test these assumptions and try to extrapolate our results to NTFP extraction in general, we developed the PROMAB programme in northern Bolivia.

PROMAB (Programa Manejo de Bosques de la Amazonía Boliviana)

PROMAB is an international research, training and extension programme fostering the sustainable exploitation and management of forest resources in northern Bolivia. It is a joint effort of the Instituto para el Hombre Agricultura y Ecología, Bolivia, the Universidad Técnica del Beni, Bolivia and Utrecht University in association with the Center for International Forestry Research. Funding is provided through the Dutch Development cooperation, Utrecht University and CIFOR.

PROMAB facilitates forest exploitation through technical assistance to a wide range of stakeholders in the rainforests of the Bolivian Amazon. The area is largely covered with relatively undisturbed rainforest, mainly due to low population pressure. Rural population density is approximately 0.002/km^2. The main economic centre is Riberalta. The area has an interesting history of NTFP extraction, starting in the mid 19th century with quinine and – at a larger scale – rubber (*Hevea brasiliensis*). The rubber boom (1887-1917) resulted in immigration of nearly one hundred thousand people from all over Bolivia and abroad. The rubber was extracted in *barracas* (forest estates) owned by a patron. The tappers were dependent on this patron through a debt-peonage system. Rubber exploitation declined gradually during the 20th century and Brazil nut (*Bertholletia excelsa*) extraction emerged within the same system. These two products were complementary as rubber was tapped during the 'dry' season and nuts are collected during the 'wet' season. In the early 1980s rubber extraction ceased and the main source of employment in the region nowadays is the Brazil nut industry, occupying 50% of the workforce. Palm heart extraction (*Euterpe precatoria*) only occurred for a short period (5 years) and has stopped. Timber exploitation for export is increasing. Several other forest resources are exploited for the local and national market, such as Jatata *(Geonoma sp.)* leaves as roofing material.

Sustainable?

PROMAB analyses the sustainability of NTFP extraction from different perspectives: ecological, economic and social. The ecological perspective includes two components: (1) the impact of extraction on biodiversity, and (2) the maintenance of the productivity of the resource. We focus on the impact of extraction on fauna and the consequences of the harvesting of the three important products for population dynamics of species providing these resources. Models for population dynamics – matrix models – are used to evaluate the sustainability of current exploitation. Furthermore, the application of these models for woody plants has been reviewed and an additional type of sensitivity analysis for matrix models presented (Zuidema 2000). These models provide data on productivity, the basis for analysing economic profitability of forest product extraction. For the two most important forest products, Brazil nut and timber, we analysed the profits made in the exploitation process: from harvesting to the processed end product. Based on the results, we can make recommendations such as the need for proper taxation of the forest resource through the government. Furthermore we have measured the impact of NTFPs on the economy of rural households and analysed how extractivists perceive farming and extraction of forest products. This has revealed how different farming styles depend on access to forest resources, life history of the extractivist, distance to urban centres, etc.

What we have learnt so far...

- Sustainable harvest levels and intensities vary enormously, depending on the type of (plant) product extracted from the population. Harvesting seeds (Brazil nuts) has a far lower impact on population growth rates than harvesting adult individuals (palmheart), for instance. Sensitivity analysis revealed that protecting the pre-adult phase in the life cycle of *Bertholletia excelsa* has a high impact on future productivity of the population.
- As Redford illustrated in his famous paper 'The empty forest', we also demonstrated that fauna density is lower in extraction forest than in undisturbed forest.
- The region's economy currently depends too much on Brazil nut exploitation.
- The very low value per unit of land of Brazil nut wild production implies a risk of deforestation and replacement of Brazil nut with alternative uses such as cattle ranching or agriculture.
- A large number of actors benefit from this industry (at least 25,000 people) but only a few attain levels of income sufficient to cover their basic needs.
- Differences in income are high, being concentrated in favour of a small group: processing plant operators, brokers, moneylenders, etc.
- Middlemen in the forest obtain only a marginal profit.
- The collection of Brazil nuts is a largely seasonal activity, encouraging seasonal migration (for three months) from the main cities to the forest and vice versa.
- Farmers' dependency on extractivism for their daily income is related to factors such as: access to forest resources as well as land, distance to urban centres (i.e. market for agricultural products), etc.
- Subsistence use of NTFPs is very important for food security;
- Where extractivists settle as independent farmers, they increasingly depend on farm output for their income, indicating the higher profitability and/or status of the farm activity.

Implementation in management

Based on the data we collected, we are advising the Bolivian government on the implementation of the Bolivian Forest Law. At local and provincial level we support communities in writing forest management plans for their concessions. Furthermore we provide assistance to all the other stakeholders in the forestry sector.

Evaluation

Under specific conditions NTFP extraction can provide a reasonable income for forest dwellers and can take place without causing much damage to the forest structure. Brazil nut is a (rare) example of such a product. NTFP extraction is, however, part of a forestry

transition process in which the opportunity costs of forest management for forest products are still too high. Unless the (inter)national market is willing to pay for the extra costs of this type of forest management, people are eventually tempted to convert the forest into agricultural land. It is expected that Bolivia will produce the first certified NTFPs in 2001.

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IMPORTANCE OF NTFPs FOR THE BETSIMISARAKA PEOPLE OF THE BEFORONA REGION, EASTERN MADAGASCAR: FINDINGS OF A CASE STUDY

By Lala Razafy Fara

Baseline

Forests in Madagascar are known to contain high levels of potentially useful biodiversity. Unfortunately, the importance of forest resources for local populations is often ignored because of outsiders' large-scale economic priorities. The Beforona region of Eastern Madagascar is historically known to be forested. The local Betsimisaraka people depend on forest resources such as humus, timber and non-timber forest products (NTFPs).

The importance of these NTFPs was studied using a holistic approach that included social and economic surveys as well as floristic inventories. The Beforona region is characterized by steep slopes and a scarcity of cultivable land. The principal activity of the Betsimisaraka is itinerant slash and burn agriculture focused on the production of mountain-rice. Given logistic constraints, Betsimisaraka households have at least three huts, including one in the village for permanent living, one near the forest for temporary living, and one for food storage located in or near the village.

The socio-economic surveys were conducted in 11 villages encompassing 128 households. A common village selection criterion was its location bordering the forest. Socio-economic information was collected through informal and formal inquiries conducted at household level. Biological inventories were conducted in the natural forest only, with an aim of understanding the forest's potential for timber and NTFP production.

Uses of NTFPs

For this study, NTFPs were classified into products having nutritional, medicinal, social and commercial values.

Nutritional use

Food-related NTFPs were subdivided into animal and plant products. Overall, NTFPs play an important role in the diet of the Betsimisaraka people, with 76% of households using NTFP foods. Some 2% eat only animal foods, while another 45% eat only plant foods, and 29% eat both. NTFP foods are used for direct subsistence. Animal NTFPs include mammals (23% of households), birds (12%), larvae (7%), honey (5%) and aquatic food (53%) from forest creeks. Plant products are of two main types: liana tubers (*Dioscorea spp*) are collected by 55% of the households and palm heart by 45%. Some fruit are gathered in an opportunistic way as people walk in the forest.

Medicinal use

Only 23% of Betsimisaraka households used medicinal plants, with most preferring to go to the regional health care centre. Of the 31 species used as medicinal plants, 12 are from the natural forest. The others can be collected in open areas. In most cases, the leaves and bark are used as a decoction for healing different diseases, most commonly: stomach-ache, intestinal diseases, measles, flu, wounds, sores, overwork, malaria, dizziness, nausea and bleeding.

Social uses
Social uses include house building and furniture (which can be grouped as handicraft products exceptionally used in the house), and clothing. Construction is the most important use of NTFPs in Betsimisaraka life, with houses consisting almost entirely of plant materials. The most commonly used NTFPs in construction are bark from the Sterculiaceae family (98 % of the households) and lianas (94%), generally used as ropes. Pandanus leaves (*Pandanus spp*) are used for walls (56 %), roofs (20 %), doors and handicraft products, while the trunk of the tree fern (*Cyathea spp*) is used by a minority (1%) of households as a weather resistant support in houses and storehouses. Palm trunks (*Ravenea spp, Louvelia spp*, *Chrysalidocarpus spp*) are used by a minority as substitute material for walls and floors. The whole plant of Ravinala (*Ravenala madagascariensis*) is used for multiple construction uses (max. 52%) as well as the whole plant of (*Raphia ruffa*) (2 %). Raphia leaf fibre is used to make clothing (1%).

Commercial use
A diverse range of NTFPs is commercialized, including potted tree ferns, orchids, pandanus, and aquatic products. Revenue obtained from sales is used for subsistence. Selling orchids and tree ferns requires special authorization but the need to make a living means that local people nevertheless sell some of these products directly to retailers on the black market.

Conclusion
In order of importance, the Betsimisaraka make greatest use of NTFPs for construction, followed by nutrition. Inventories in the natural forest show that gathering NTFPs and wood leads to disturbance. NTFP availability diminishes inside disturbed forests that are generally located near villages and temporary houses. A more sustainable use of NTFPs needs to be promoted in the future.

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THE IMPORTANCE OF NTFPs FOR LOCAL PEOPLE IN BURKINA FASO

By Rüdiger Wittig and Karen Hahn-Hadjali

The use of wild plants to obtain food, medicines and many other vital commodities is of extraordinary importance for the rural population of West Africa. Surveys conducted among the various ethnic groups in Burkina Faso (Mossi, Fulbe, Gulimancéba and Dagara) and Benin (Fulbe, Waama and Bétamaribé) have shown that more than two-thirds of all plant species are put to use (Wittig et al. 2000). These plants are employed predominantly to produce traditional herbal medicines (78.6 %), as pasture (fodder) (43.6 %), and as food for human beings (41.9 %). To a lesser extent, they are used as a source of tanning agents, dyes (7.7 %) and fibres (8.5 %) and in traditional veterinary medicine (7.7 %) (Hahn 1996, Kéré 1998, Wittig & Martin 1995). In this context, non-woody parts of trees and bushes (i.e. non-timber forest products) such as leaves, flowers, fruits, resin, sap, bark, seeds and roots also play a major role. Another factor that should not be forgotten is the importance of bushes for beekeeping (cf. e.g. Guinko et al. 1992). In the eastern part of Burkina Faso (Tapoa, Gourma, Kompienga, Boulgou and Gnagna Provinces), such uses were documented for 117 species, which is more than 80% of the total number of woody species. For most of these species, several uses were

documented.

Great importance is attached to the medicinal uses of plants in this part of the world. More than 80 % of the population of Burkino Faso (Guinko 1984) rely on traditional medical treatments for common illnesses; the low cost of herbal medicines is an important factor here. People consult university trained doctors only for severe medical problems. For many diseases, numerous species are used either alone or in combination with other species. The inhabitants of southeastern Burkina Faso make use of 92 woody plants; in the majority of plants (65.2%) the roots are used, followed by the leaves (46.7%) and bark (44.6 %). To a lesser extent fruits (9.8 %), flowers (2.2 %) and seeds (2.2 %) are used, followed by thorns (1.1 %) and sap (1.1 %).

When woody plants are used as a source of food, it is usually the leaves which are eaten as vegetables or employed as seasoning. In several cases, the flowers and/or fruit are also eaten.

We documented nine woody plants used as a source of tanning agents or dyes in the eastern part of Burkina Faso. Moreover, fibres are obtained from 10 species.

Species diversity plays a less crucial role in pasture than in the use of plants for human nutrition. What is decisive for animal fodder is not individual species, but groups of species occurring with spatial and temporal proximity. During the dry period, a number of species – in particular, *Afzelia africana*, *Khaya senegalensis* and *Pterocarpus erinaceus* – are pruned.

Whereas the harvesting of flowers, fruits and thorns does not impair the vitality of the plants from which they are taken, practices such as frequently tearing off leaves to obtain food for human beings or animals and, in particular, chopping off entire branches as animal fodder can damage trees, especially if these practices coincide with an unfavourable climatic situation such as drought. Other practices, such as removing large pieces of bark or digging out parts of roots, invariably have a detrimental effect and often culminate in tree death. For this reason, reforestation measures or efforts to plant groups of individual trees should focus on those species which are presently being depleted at an especially high rate at the locations where they grow in the wild.

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MIOMBO WOODLAND UTILISATION BY SMALL-SCALE FARMERS. EXAMPLES FROM FOUR VILLAGES IN HANDENI-DISTRICT, TANZANIA [1]

By Marion Karmann

Background of the study

Miombo woodlands cover about 48 % of Tanzania's land surface and are a settlement area for small-scale farmers and cattle-breeders. The population is sparse, but the area covered by miombo is decreasing rapidly. In many regions dominated by miombo, deforestation is mainly caused by small-scale farming together with the increasing activities of professional charcoal miners and the establishment of plantations or settlement areas. In the research area, Handeni, however, degradation mainly results from forest fires connected with shifting cultivation, hunting, and other factors.

Methods

The principal objective of the study was to reach a better understanding of the utilisation of miombo woodlands in the research area through descriptive analysis. A derived objective was to describe the potential development of the region to meet subsistence needs and improved income generation, as well as examining ergonomic factors such as labour organisation and training.

The investigation was focused on the inhabitants of four villages from two different ecological zones in the miombo woodlands. Information relating to the utilisation of forest-resources by local people, especially the potential use of NTFPs, was collected through individual interviews and group discussions as well as field observations and key interviews within and outside the research area.

People and environment

The villages Kang´ata, Kwamagome, Kwediboma and Mafisa, located in the Handeni District, Tanga Region, of Tanzania, all suffer from poor access. Most of the people belong to the Zigua and Nguu ethnic groups, both of which basically depend on small-scale agriculture for subsistence needs. At times, semi-nomadic cattle-rearing Maasai also live in this area. They depend on milk and other cattle products. Because their life style and diet differs from that of the Zigua/Nguu, their knowledge of useful NTFPs from the miombo woodland also differs. All three ethnic groups are similar, however, in that they consider woodlands to be primarily a resource for agriculture and cattle grazing.

Subsistence, and even basic survival, in the area is entirely dependent on the availability of a diverse range of products from the woodlands: firewood is the only rural source of energy; timber, poles and branches are used for construction of houses, huts and enclosures; bark fibres provide ropes; and grass is used for roofing. Wood and bark are also used in the manufacture of furniture and simple modes of transport. Wildlife and edible mushrooms offer an important source of protein, particularly where cattle husbandry is not possible (e.g. in tsetse fly infested areas). During the recurrent hunger periods experienced in rural regions, food from wild plants often provides a last chance for survival. Medicinal plants may be the only medicines available for those without access to hospitals; they are also important for the health care of livestock.

Main use of NTFPs

During the study, four woodland products (or groups of products) were identified jointly with the participants. These products are used by different sections of the population, and are seen as being suitable for sustainable use and possible marketing.

Honey is mainly used for subsistence consumption, generally in fermented form as local beer, which plays a major role in traditional culture. Honey is collected either through environmentally sound bee-keeping techniques with hives or through destructive honey hunting. Harvesting and processing of honey can create jobs and income. Intensification of skilled bee-keeping would not have any negative consequences for ecological or social functions.

Bark from selected tree species and bole forms is used in large amounts for different purposes by men and women.

Food from wild trees and bushes is used mainly during extreme dry seasons or to prepare certain local meals as a supplementary food. As their monetary value is very low, they are rarely sold and are available to fulfil the rural population's own needs. Compared to other regions of the country, only a small proportion of the potential edible plants are used and few storage techniques are known.

A wide range of **edible mushrooms** exists in the miombo, but consumption by local people is limited. Compared to several other miombo-rich countries, the potential of mushrooms is very underutilised.

Results

Participant observation and information from local experts revealed discrepancies between the extent of rural people's knowledge of the potential values of the forest and its products and the extent of their actual use of forest resources, especially for the selected products. Even though there is a large demand for income sources, NTFPs are primarily used to meet household needs. More extensive marketing is possible for some products and could be considered as an incentive for the conservation of the woodlands. The acceptance levels for greater promotion of utilisation and marketing of NTFPs varied between and within communities.

For subsistence economies, a greater use of NTFPs can be recommended, except for the case of bark splitting. Greater commercialisation, on the other hand, is only cautiously recommended because of the high risks. The establishment of collaborative processing and marketing would favour the commercial possibilities of all products investigated.

The key contribution of this study is the additional knowledge and information it provides about current utilisation of the miombo woodland and its social and ecological consequences. The discussions initiated among the villagers concerning the relative importance of current uses, the possibilities, and perspectives for sustainable miombo management can be seen as a step towards an increased appreciation of the resources of the woodlands.

[1] **Summary** of the Dissertation: Karmann, M.: Untersuchungen zur nachhaltigen Miombowald-Nutzung am Beispiel von vier Dörfern im Handeni-Distrikt, Tansania. IV, 302 S. . Ill., Kt.; (dt.) Freiburg, Univ., Diss., 1998

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NTFP USE AND SUSTAINABILITY: THE EXAMPLE OF *PRUNUS AFRICANA* IN CAMEROON

by Jobst –Michael Schröder

Introduction

Since the early 1990s, non-timber forest products (NTFPs) have been assumed to effectively contribute to the preservation of tropical forests and the improvement of forest dwellers' economic situation by raising awareness of the value of natural resources. This simple and promising approach was rapidly put into practice in many forestry-related development projects in tropical countries. The case of *Prunus africana* in Cameroon prooves, however, that the highly advocated NTFP panacea is not always positively effective.

The commodity

The bark of *P. africana* (family Rosaceae) is a well established pharmaceutical raw material on the world market. The tree is indigenous to the afromontane mountains from Madagascar to Sao Tomé and from Ethiopia to South Africa. The evergreen tree can reach heights of 30 m and a dbh of 150 cm when mature. In Cameroon the tree occurs naturally in three distinct areas of the evergreen moist forests on Mt.

Cameroon at elevations between 800 and 2000m asl. Besides timber utilisation the most important value of the tree species is its pharmaceutical significance. This is due to medically active ingredients in the bark of the tree. The European pharmaceutical market, in particular, has required substantial quantities of raw and processed bark material from Cameroon. It is estimated that up to 3000 metric tons of bark or bark products were exported from Cameroon per year in the early 1990s. The market value of the final product is estimated at US $220 million a year.

P. africana exhibits complete bark regrowth after a careful debarking of small panels leaving patches to nourish the tree and to produce new bark. A new harvest is then possible after 5-7 years. Thus, the tree species offers ideal prerequisites for a sustainable use of a non-timber forest resource as long as the harvest is carried out carefully and by skilled workers. The current harvesting arrangement is a regional licence system, granting permits to a restricted number of bark merchants for a certain quantity of bark.

Because of economic hardship and a certain dissatisfaction with the licence system, parts of the local population around Mt. Cameroon became involved in uncontrolled overexploitation of *Prunus* bark, including tree felling for complete bark stripping. An inventory carried out in the SW of Mt. Cameroon revealed in 1996 that the bark harvest exceeded sustainable utilisation by 400 to 800%. Continued harvesting at this level was calculated to be possible for only 5 to 7 years, after which local resources would be exhausted and the tree species face local extinction.

Factors of failure

To understand the unfortunate process in regard to the state of *P. africana* around Mt. Cameroon, it is necessary to understand the following factors:

- During the last two centuries the area was subject to several waves of immigration by different ethnic groups. Members of the indigenous population also emigrated to other areas. Both processes caused a substantial destabilisation of social ties and traditional regulations.

- Under the traditional land tenure system, natural forests are considered a common property resource. Dignitaries see themselves as guardians of the forests, holding the natural heritage in trust for future generations. In contrast, most of the bark stripping teams active in the area, came from other regions and were regarded as strangers exploiting a locally owned resource.

- During colonial times the local population was partly deprived of their land use rights. Recent forest legislation further restricts the use of forests by local people. Forest dwellers therefore feel marginalised from natural resources they consider to be their own.

These factors caused a widespread and increasing dissatisfaction among the population. Younger people epecially, perceived the forests as being a source of quick and easy cash income. When the Cameroonian currency suddenly devaluated by 50% in the early 1990s, traditional regulations were not able to adapt to cope with the intensified economic pressure. Villagers began to compete to strip all bark from *Prunus* trees, disregarding all traditional control arrangements and sustainable harvesting practices.

Analysis

Several factors caused the unsustainable use of a promising NTFP in the moist forests around Mt. Cameroon. The traditional control system of sustainable forest utilisation worked well as long as there were no external disturbances. Historical, social and legal conditions caused a substantial shift of attitude towards natural resources among the local population. Triggered by economic hardship, the possibility of gaining cash income from the forests led to a careless exploitation of a valuable resource previously protected by local people. Examples from other parts of the tropics and with different NTFPs have come to similar conclusions. Communities experiencing a daily struggle to meet their basic needs, cannot be expected to prioritise ecological concerns. The case of *P. africana* therefore suggests that pressure on tropical forests cannot always be eased by the commercialisation and sustainable use of NTFPs.

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WILD EDIBLE FUNGI, MIOMBO WOODLAND AND RURAL LIVELIHOODS

By Eric Boa and Gerald Meke

In 1999 we began a three year project to investigate the wild edible fungi associated with miombo woodlands. These woodlands consist of native tree species, many of which depend on fungus-root associations or mycorrhizae for their survival. An unusually large number of these associations are ectomycorrhizal and the fungus partner produces fruiting bodies above ground during the main rainy season. A significant number of the fungal species are edible. Many of them are poorly known to science.

Miombo woodlands occur from Zimbabwe to Tanzania and Mozambique to Angola. They are extensively used by local people. In Malawi and other countries in the region, wild edible fungi are an important source of food when traditional sources of nutrition are scarce. There are significant roadside markets, predominantly for local trade, as well as a limited movement of produce to more lucrative urban markets, such as Blantyre and Lilongwe.

Wild edible fungi are perhaps the least understood NTFPs from miombo woodlands. There are major gaps in data concerning the types and names of wild edible fungi, the size of harvests and whether increased pressure on the miombo woodlands is leading to a decline in productivity. Despite the extensive local knowledge about edible fungi that still exists in Malawi – as witnessed by the bewildering variety of local names – there is also suspicion and caution about poisonous varieties that has been acquired from Europeans.

Another reason for the weak history of research on wild edible fungi is the scarcity of specialists to identify them. CABI Bioscience has been able to assist in identifications through the help of Paul Kirk and Graham Piearce, who are slowly getting to grips with the diversity of edible and non-edible species. In the process, they have had to rethink the European concept of some fungus groups. There remains, however, a great deal to be done in providing taxonomic support in this area.

A renewed interest in NTFPs has led to more research and information gathering. It is vital that this research addresses the essential link between NTFPs and the needs and concerns of rural communities.

This is something that the Miombo Edible Fungi project has been striving to achieve. Originally conceived by Dr Jim Waller of CABI Bioscience, and developed jointly by Eric Boa together with the late Jimmy Lowore of the Forestry Research Institute of Malawi, this project is funded by the UK Department for International Development . Its main aim is to study the importance of wild edible fungi to local people, investigate levels of productivity and determine the potential of these fungi to improve livelihoods.

Work began in March 1999. During the first field season, plots were established in four forest reserves in Malawi and regularly monitored during the three month growing season. Surveys of local markets were carried out during the same period (January to April 2000). A preliminary analysis of results from Liwonde and Perekezi showed a total income for traded edible fungi of around US$2000 and US$800 respectively. The weight of edible fungi sold was approximately 5500 tons for Liwonde and 5000 tons for Perekezi. The actual number harvested is likely to be much higher since we assume that a significant proportion is consumed directly by the pickers.

Liwonde and Perekezi are only two of the many areas in Malawi where fungi are sold by the roadside. There are local markets in Mozambique, Zimbabwe, Tanzania and other countries with miombo woodlands but data on volume and value are rarely available. Our own research is helping to show that wild edible fungi are an important and valuable resource and we urgently need more information so that we can help to improve and sustain rural livelihoods through the application of appropriate knowledge.

A priority for the present recording season is to tackle some of the taxonomic gaps that we sense will limit our ability to apply scientific knowledge for the benefit of rural communities. We are currently gathering our second set of field data and looking generally for closer links with organisations and researchers interested in the topic of wild edible fungi. Ties have been established across the border with the FAO project led by Patrick Mushove in Nampula and we look forward to closer collaboration in the future.

We held a one day meeting in July 2000, attended by Malawi foresters, NGOs and researchers. Eric Boa has produced a detailed proceedings which brings together discussions held at the meeting, other reports on wild edible fungi and the preliminary findings from the field and market surveys. There are also extensive bibliographies and an account by Dr Anxious Masuka from Zimbabwe of his work there and in Mozambique. Copies can be obtained from Dr Boa. We would be pleased to hear from others with an interest in any of the topics and issues raised in this article.

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A REVIEW OF CURRENT RESEARCH ACTIVITIES BEING UNDERTAKEN BY THE INTERNATIONAL ECOTOURISM SOCIETY

By Lynnaire Sheridan

In recent decades, ecotourism has emerged as a popular type of nature-based tourism. The International Ecotourism Society (TIES) defines this activity as "responsible travel to natural areas that conserves the environment and sustains the well-being of local people". Essentially, it is small-scale, ecologically sustainable tourism that takes place in natural areas, it encourages the environmental education of tourists, contributes to conservation while promoting the economic and social well-being of the local host community. As such, ecotourism is dependent on natural areas, particularly national parks and managed forests.

Ecotourism has attracted the attention of protected area managers because ecotourists are fascinated by areas of high biodiversity but, with good tour interpretation, can come to appreciate the intricacies of any ecosystem. Currently there are no European data on ecotourists but North American research indicates that these tourists contribute to conservation through entrance fees to protected areas and also pay more for their tours if there is a contribution to conservation by the tour operator (tour operators have even established non-profit organizations to help protect the natural resource). Ecotourists boost local economies with longer stays and support local values when they select authentic experiences over commercialized products.

TIES has a dynamic network of 1700 members in 74 different countries that tries to promote the values of ecotourism. Our main initiatives reflect the needs of our members, a diverse group comprised of ecotour operators,
protected area managers, academics and ecotourists. This core group not only supports our work but many members practise it successfully on the ground. Current TIES initiatives include "Your Travel Choice Makes a Difference", Marine Ecotourism Guidelines, Ecolodge Guidelines, "The Business of Nature Lodges" and the Regional Ecotourism Assessment Program (REAP). We are also preparing for 2002, the United Nations International Year of Ecotourism.

In 1999 TIES launched the "Your Travel Choice Makes a Difference" campaign to increase consumer awareness of the environmental impact of poorly managed nature-based tourism. Its focus is educating tourists about sustainable nature tourism and creating awareness of the powerful choices a tourist can make for sustainability during travel planning. There has been considerable demand for the consumer brochure (it is about to be reprinted) and the TIES website (www.ecotourism.org) incorporates "Travel Choice" pages that provide helpful hints on choosing tour operators who support the values of ecotourism.

At the international level, TIES network has set about developing global guidelines and encouraging best practice in different aspects of ecotourism industry. The Nature Tour Operator Guidelines were prepared via international review and released in 1993. They have received considerable industry support and encourage sustainable business practices. In 2001, TIES will release the product of five years of research and global consultation which have culminated in the Ecolodge Guidelines and Marine Ecotourism Guidelines.

The year 2001 will also see the publication of "The Business of Nature Lodges", the results of the first-ever study to investigate the economic viability of ecolodges. TIES members deemed it essential to research all aspects of ecotourism's sustainability; ecological, socio-cultural and economic. This research also addressed requests from development funding agencies for "hard" figures that would enable assessment of ecotourism as a tool for conservation and poverty alleviation.

The REAP research endeavor currently has a pilot study being undertaken in Belize. Primarily intended for conservation and development agencies to assess the viability of ecotourism in a region, REAP will provide a standardized system for regional ecotourism assessment and, ideally, attract funding to projects that will be ecologically, socially and economically viable with the aim of maximizing the value of ecotourism as a conservation tool.

The year 2002 will provide TIES with a unique opportunity to showcase our experiences over the last ten years and promote the true principles of ecotourism. The broader tourism industry is growing at an unprecedented rate, ecotourism is only a niche within the larger industry but ecotourism will encourage the conservation of our world's precious natural resources and promote the well-being of our communities.

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DEVELOPING AND TESTING CRITERIA AND INDICATORS FOR THE ASSESSMENT AND EVALUATION OF ECOTOURISM IN TROPICAL RAIN FORESTS

By Bernd Stecker

Introduction

Ecotourism is the fasted-growing sector of the world's largest industry, tourism. According to development and conservation organisations, the potential of ecotourism to increase the economic attractiveness of conserving tropical rain forests should be promoted. It is argued that with this comparatively "wise" form of forest resource use

(1) negative environmental impacts on the forest ecosystems can be kept low,
(2) new and/or additional funds can be mobilized to support protected forest areas, and
(3) the living conditions of the local population can be improved through the provision of alternative sources of income and employment.

This would lead to a greater interest by the parties concerned, in maintaining and preserving protected tropical forests more effectively. But how can one determine if these ecotourism goals have been attained in specific cases? In order to address this problem, criteria and indicators (C&I) were developed as a tool for the assessment, analysis and evaluation of ecotourism in protected rain forests.

Methods

First, a broad literature review was conducted of the experiences made world wide with tourism in natural areas. During this process numerous parameters were identified and systematised. In a following brainstorming process all *relevant*

parameters were classified either as a criterion or an indicator, resulting in a working set of 70 C&I. With this set a comparable case study was carried out in two National Parks in Malaysia. Here it was found that some C&I were either not applicable, unsuitable or difficult to assess. Thus, in an iterative process, the C&I were constantly modified or eliminated according to practicability and efficiency, resulting in an end set of 38 C&I.

Indicators are the essential element of the assessment process and are based on the availability of data. These were generated by (a) reviewing secondary data sources, (b) expert interviews, and (c) participatory rural appraisal techniques (PRA) such as semi-structured interviews, direct and participatory observation and transect walks. The evaluation was carried out by comparing the actual "measured" value of an indicator with a reference value or a norm. As ecotourism is a relatively new concept, generally accepted norms do not yet exist for most indicators. Thus, on the basis of the available literature and the opinions of experts, three "trend categories" were applied to express either a *favourable* (↑) *no clear* (↔) or an *unfavourable* (↓) trend for each indicator towards the fulfilment of a criterion and subsequently of compliance with a goal.

The **case study areas** are located in West Malaysia. *Taman Negara* National Park (TN) in the north-east covers an area of 4,000 km² and is the country's largest protected lowland rain forest area. About 8,000 Malay villagers live within or adjacent to the park boundaries. The park is the most popular nature tourism destination and experienced a boom in tourism in the mid-1990s with 45,000 visitors per year. *Endau-Rompin* State Park (ER) is located in the south, contains lowland rain forest and is still home to 600 indigenous forest dwellers. The park covers an area of 90,000 ha. With 2,000 visitors per year, the Park is still in the pioneer phase of tourism development; the infrastructure is minimal.

Results

The TABLE presents the final set of C&I. The right column contains the results of the C&I testing in the case study areas. Particularly with regard to criteria III to VI, which are the decisive ones for achieving the goals connected with ecotourism, the results in both parks reveal some different trends.

In ***Taman Negara*** the goals have not yet been reached. The over-use of highly frequented locations results in environmental damage such as erosion of trails and river banks, water pollution, destruction of vegetation, loss of species and abnormal behaviour of wild animals. Although tourism is booming in the park and considerable revenue is generated as a result of the money spent by the tourists in the park, 90% of this leaks out of the park region. Economic multiplier effects on rural development are therefore minimal. Also, the revenue generated by the park administration from entrance, use and concession fees does not even cover half of the management costs to provide the tourism opportunity. Insufficient education and training of the local population restrict their employment opportunities to the less paid and unskilled jobs. Furthermore, the revenue from tourism is unequally distributed while, at the same time, rising prices and the increase of usage bans have a negative effect on local people's means of securing a livelihood. The reasons for this are primarily to be found in the lack of a comprehensive and effective management plan, inadequate control, monitoring and visitor management techniques, diverging interests of the parties involved and, particularly, the insufficient participation of the local population. This results in lack of acceptance of the protected area and constant use conflicts between the park administration and the local residents.

By contrast, the ecotourism goals in ***Endau-Rompin*** are mainly being achieved. In order to minimise negative environmental and socio-economic impacts, a comprehensive development and management plan was drawn up before large numbers of tourists were allowed to enter the park. Also, from the beginning a cooperative ecotourism management concept was implemented involving park authorities, nature tour operators, NGOs and local residents. Due to the limited infrastructure in the park, considerable income and employment opportunities for the local population exist as the tourists have to take up almost all services offered by the local villagers. This has lead to decreasing 'illegal' resource use by the local population while, at the same time, the acceptance of the protected forest area is increasing. However, only a revision of the C&I testing after a certain period of time will reveal if this positive development can still be confirmed once the tourism boom phase has been reached.

Conclusions

For both case study areas the proposed C&I set was found to be basically suitable - and doable in a justified amount of time - for the assessment, analysis and evaluation of the fundamental framework conditions and preconditions for ecotourism as well as the ecological and socio-economic impacts accompanying. Looking at all C&I together, recommendations for action could be made for those indicators showing an unfavourable trend towards the fulfilment of a criterion. Development organisations could, for instance, apply this instrument as a guiding 'checklist' to assess and analyse the eligibility of ecotourism for aid. Also, the C&I set can be used as a basis for further evaluation approaches, such as the development of an *eco-label* for protected areas utilised by tourism. Finally, although its role should not be overestimated, it is recommended that greater importance be attributed to the potential of ecotourism as a tool for the conservation of tropical forests.

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SOCIAL ASPECTS OF TROPICAL FOREST MANAGEMENT

By Carol J. Pierce Colfer and CIFOR's ACM Team

Between 1994 and 1997, the Center for International Forestry Research (CIFOR) was involved in a project to test criteria and indicators for sustainable forest management. A part of that work focused on social criteria and indicators, and the appropriate methods needed to assess such social conditions. The social criteria and indicators, like CIFOR's Generic Template of C&I (see the 9 tools in the CIFOR C&I Toolbox 1999), emerged from analysis of a number of interdisciplinary field tests in a number of countries. The three broad topics that proved the most important for human well being, within the context of sustainable forest management were:

- The maintenance or enhancement of fair intergenerational access to resources and economic benefits,
- Acknowledged rights and means to manage forests cooperatively and equitably, and
- The acceptability to all stakeholders

Developing and Testing Criteria and Indicators for the Assessment and Evaluation of Ecotourism in Tropical Rain Forests

Bernd Stecker

C I: Integration into national policy and planning	**Malaysia**	
Ind 1: Political stability/ threats to tourists	↑	
Ind 2: Tourism & nature conservation policy	↑	
Ind 3: Land use planning	↔	
Ind 4: Incentives	↑	
Ind 5: Overall sector co-ordination	↑	
Ind 6: Involvement of NGOs	↑	
Ind 7: Nature conservation personnel	↔	
Ind 8: Education and training	↓	
Ind 9: Marketing	↑	
C II: Suitability of the forest area for ecotourism	**TN**	**ER**
Ind 1: Protection status	↑	↑
Ind 2: Size of area	↑	↑
Ind 3: Indigenous residents	--	--
Ind 4: Natural attractions	↑	↑
Ind 5: Visibility of wild animals	↔	↓
Ind 6: Cultural attractions	↔	↔
Ind 7: Accessibility	↑	↔
Ind 8: Climatic conditions	↔	↔
Ind 9: Health risks	↔	↔
C III: Integration into a comprehensive management plan		
Ind 1: Management Plan	↔	↑
C IV: Ecologically sound management of tourism activities		
Ind 1: Environmental impacts	↓	↔
Ind 2: Monitoring and control	↓	↔
Ind 3: Visitor management	↓	↑
Ind 4: Environmental education	↑	↑
Ind 5: Number of staff	↓	↓
Ind 6: Qualification of staff	↔	↔
C V: Revenue in support of the protected forest area		
Ind 1: Amount/distribution of tourist expenditure	--	--
Ind 2: Fee takings of the Park administration	↓	↑
Ind 3: Revenue to support management costs	↓	↑
C VI: Participation of the local population		
Ind 1: Voice & rights in development decisions	↓	↔
Ind 2: Income and employment	↓	↑
Ind 3: Level of education and training	↓	↓
Ind 4: Capital availability	↓	↓

italic = most important indicator

of the health of forest actors, cultures, and the forest.

At the same time, a series of activities had been underway, looking at devolution processes and how formal regulations played out on the ground. Part of that work documented the complexity and utility of indigenous systems, focusing on adaptation in naturally occurring systems of people-forest interactions. We found growing evidence of the diversity, complexity, and unpredictability of how human and ecological systems affected forests (examples reported in Colfer and Byron 2001). Local human systems, we also noted, had important components of use to forestry more generally.

Although the identification and improved definition of what we meant by these issues proved useful in alerting forestry professionals and others to important social issues, our conclusion at CIFOR was that this was simply not enough. Real progress would not occur until a) we could see the conditions specified in the criteria and indicators evident in the real world, and b) the potential contribution of local communities in forest management was acknowledged and widely used as a valuable human resource. As we discussed our findings in our respective fields of research, we could not avoid the conclusion that particularly tropical forests were in a state of crisis. Non timber forest products were, if anything, even more adversely affected than were timber resources - with correspondingly negative impacts on the local people who depended on those products. We concluded that a more action-oriented approach was needed.

Bringing together scientists from two of CIFOR's previous programmes and identifying suitable partners in other countries, we planned a programme - "Local People, Devolution, and Adaptive Collaborative Management of Forests" - to address forest management problems in tropical forest areas. We have entered into partnerships with universities, NGOs, governments, and projects, trying always to build on ongoing fieldwork in our countries of choice. We have developed a two-pronged approach, involving both collaborative experimentation with management of those forest resources deemed important locally, using participatory action research, and a systematic effort to document and evaluate how well this approach works.

In this research we seek to identify mechanisms that build on existing local forest management systems, starting with local communities residing in and around forests, and involving other stakeholders, such as timber, plantation, or mining companies, resettlement schemes, and conservation area managers, as appropriate. In our participatory action research, we will examine strategies to institutionalize collaborative learning, seeking an iterative or adaptive approach to management in particular forests.

The strengths of this effort include:

- The commitment to building on indigenous and other local systems, recognizing the knowledge, skills, and motivation of local stakeholders to better manage local resources - particularly relevant for NTFP management;
- Experimentation with the use of adapted criteria and indicators as a starting point for institutionalizing an adaptive learning process in local management;
- Serious efforts to identify or create links between local communities and forests on the one hand, and policymakers at various levels, on the other;
- The scientific potential to be gained from comparing multiple cases across a series of dimensions already recognized as important

within forest-people interactions.

Some of these dimensions include the following:

- **S** Devolution status: In Nepal, local people have recognized, legal rights to forest use; in Indonesia, traditional rights have not been acknowledged legally.
- **S** Level of conflict: This can vary from site to site within countries, and we are characterizing our sites on this dimension.
- **S** Management type: In Cameroon, logging and conservation contexts are important, with varying implications for NTFP use; in the miombo woodlands of Zimbabwe, management is shared between the people and the government.
- **S** Forest quality: In Brazil, there are vast expanses of high quality forest; whereas in the Philippines, our sites tend to be characterized by degraded forests.
- **S** Social capital: This, like level of conflict, can vary from community to community and will have to be assessed on a site by site basis.

Our comparative participatory action research work is already underway in Asia (Philippines, Nepal and Indonesia), in Africa (Zimbabwe, Malawi, Cameroon, and Ghana), and in South America (Brazil and Bolivia). These action-oriented components are complemented by focused research looking at devolution and decentralization, institutions, and conflict management. We are also experimenting with various modeling frameworks, to reflect the interactions we identify in the field, and to help us in communicating our findings in a manner that is more widely understandable or accessible than conventional case studies.

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NTFPS AND FOREST FRUITS IN SOUTH-EAST MÉXICO

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Introduction

Recent enthusiasm concerning NTFPs as an important food and income source for forest margin households has been tempered by constraints to the development of forest economies. The extraction of forest products is not an inherently sustainable process in either socioeconomic or ecological terms, and the benefits from commercialisation have not always increased the incomes of the rural poor.

This article reports work undertaken to investigate the opportunities for enhancing forest fruit use. The focus of the research is forest margin groups in south-west India and south-east México. Some tentative but interesting results are emerging from the analysis of the first data set from a Mayan community who live in the village of Majas, in the State of Yucatán, México.

The Mayan context

It is believed that the ancient Mayas actively managed their forest ecosystems. Evidently, much of the traditional knowledge has been conserved: the peninsular flora is still used by the inhabitants of the Yucatán today for multiple purposes. There continues to be a well-informed Mayan silviculture, comprising protection of trees, cultivation, selection and domestication, transplantation, and introduction of new

species.

Findings from Majas

Our initial research results are consistent with many of the common assumptions about forest margin communities. Even under 'modern' patterns of land tenure, such as the Mexican *ejido* system, there is a system of controlled community forest management. The forest is important to all households in Majas as a source of both timber and non-timber products, which account for 18 % of all income sources (agriculture: 27 %, paid labour: 25 %, government support: 20 %).

Forest products for home consumption

Apart from honey, NTFPs are not widely marketed by the people of Majas. Forest fruits such as *sakpaj* (*Byrsonima bucidaefolia*) and *zapote* (*Manilkara sapota*) are collected every year by many households (>70%), but mostly for home consumption. All households use the forest every day for sourcing firewood and to collect fruit and plants for medicinal and other purposes. Other forest resources are exploited mainly by men, sometimes accompanied by their sons, on an occasional basis (monthly or less) or more frequently. This is true also for thatching and timber for construction and other purposes, and for hunting and trapping of wild animals for home consumption.

Commercial use of forest products

The trader family in Majas are another intriguing case. They buy forest fruits from other households in the community and sell to traders mainly from nearby towns. They have a shop and a vehicle, both of which are income sources to the household that are not available to most other households. A greater understanding of this family will help refine our understanding of the opportunities and threats to developing the NTFP economy.

While all households collect and consume forest fruits, it is the better-off families who use them for commercial purposes. On average, forest fruits account for a only a small proportion of the income from forest products and an even smaller proportion of total household income. However, in the community of Majas there is one family who stand out as significant traders, not just of forest fruits, but of NTFPs in general, as the following Table on the next page shows.

Enhanced commercialisation?

This intriguing inverse relationship between poverty and commercial use of forest products raises issues about the exploitation of forest resources in general and forest fruits in particular. There is no doubt that there are opportunities for enhanced commercialisation. For example, *sakpaj* is sold in the holiday resort of Cancún, where it is used as a bar snack. However, only six households in Majas sold *sakpaj* and one trader family were the major beneficiary. This suggests that there may be marketing barriers that prevent commercial use of NTFPs by the Mayan communities. Depending on the nature of these barriers, improved marketing may improve incomes for the poorest – or help only the better-off families.

Conclusion

The preliminary analysis presented in this article tends to support the premise that commercialisation may benefit the better-off members of the community, while making explicit the need to examine the links between marketing barriers and income status. NTFPs in general, and forest fruits in particular, play an important role in the subsistence of the household, despite their relatively modest contribution to household income. The above points

NTFPs and Forest Fruits in South-east Mexico

Remi Gauthier

Mean per cent of income from different sources, by wealth ranking

Wealth ranking	Number of households	Per cent income from NTFPs	Per cent income from forest fruits
Well-off	**1**	**27**	**3**
Slightly better-off	**2**	**17**	**0**
Poor	**14**	**6**	**<1**
Very poor	**3**	**5**	**1**

highlight the need to test the often assumed link between commercialisation of NTFPs and poverty alleviation.

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WOMEN AND FORESTS: DOES THEIR INVOLVEMENT MATTER?

by Carol J. Pierce Colfer

I would answer the question with an unequivocal "yes". I will focus on three sources of evidence on which I base this conviction, each in turn: ethnographic, comparative, and analytical.

The first source of such conviction derives from ethnographic observation over roughly ten years of residence among people in forested areas. I have conducted ethnographic research in an American logging community on the Olympic Peninsula, among swidden cultivators in East Kalimantan and West Kalimantan and in West Sumatra; as well as among peri-urban truck farmers in Riau, Sumatra. During the course of such research, women's active involvement in forest-related activities became clear. The women with whom I lived tend to have different roles from men in forest management; they tend to have different bodies of knowledge about forest and their products than men; and they tend to participate in different institutional arrangements relating to forests than men.

Uma' Jalan Dayak women, from East Kalimantan, for instance, are

- More likely to be involved in the collection of plant foods from the forests than are men;
- More likely to know about medicinal plants than are men;
- More knowledgeable about plants growing in earlier stages of secondary regrowth than are men; and
- More likely to engage in and organize cooperative work parties, *senguyun*, than are men.

These women also participate in collecting parties, in search of forest fruits, bamboos, wrapping or other useful forest leaves, rattan, along with men; and, like men, they engage in low-intensity silvicultural management of selected trees and other forest plants. Comparable patterns - of differences in forest use by men and women - can be found in all the areas where I have worked on a long term basis. Nor is my own experience by any means unique.

The second source of my conviction that women are important for sustainable forest management derives primarily from my involvement in a CIFOR project, called Assessing Sustainable Forest Management:

Testing Criteria and Indicators (Cf. Prabhu *et al.* 1996,1998). This project involved interdisciplinary and international tests of various sets of criteria and indicators for sustainable forest management, in Cameroon, Brazil, Indonesia, Côte d'Ivoire, Gabon, the United States and Austria, paying special attention to women's roles in forest management.

In these studies we learned about the complexity of measuring activities and quickly assessing the nature of women's involvement in forest management, although their involvement was obvious - e.g. through the collection and marketing of non timber forest products. Women tended to be busier than men, surrounded by children in many cases, less likely to speak the national language, and unused to interacting with strangers. Although their involvement was obvious, there was a whole host of behaviours, customs and beliefs that interfered with our access to forest women.

The third source of my conviction that women are important in sustainable forest management comes from a more theoretical analysis of a series of connections between women and forests based on a conceptual model which considers human well being and ecological integrity to be intrinsic parts of sustainable forest management and focusing on principles, criteria, indicators and verifiers (C&I testing process, see above). I place particular emphasis on the fact that any attempt to model any part of reality is a simplification.

I will focus on the effects of women on forests; in fact forest conditions also affect women's well being.

Effects of women on forests:

Health and Natural Increase

- **S** Birth rate goes up as health goes down. People among whom child mortality is high (one indicator of poor health) tend to produce numerous children voluntarily, to ensure that one or more will survive to care for them in old age - leading to natural increase. In most cultures, women play important roles in ensuring family health - through care-giving and through production of nutritious meals.
- **S** Repeated, particularly closely spaced, pregnancies have adverse effects on women's own health and, by extension, on the health of those they care for. An exhausted woman cannot provide as much care to her family as can a woman with fewer children - potentially leading in a vicious cycle to increased child mortality and more general morbidity within the family.

Women's Income/Production and Natural Increase

- **S** On a global basis there is a high correlation between women's income and decreased fertility. Women's involvement in production, tends empirically to reduce their availability for reproduction.
- **S** On an individual basis, direct contributions to family income increase a woman's value to the family, and in many cases gives her a greater voice in decision-making about reproduction, along with a greater motivation to reduce her number of pregnancies.

Education and Natural Increase

- **S** Globally, education for woman has been shown to result in lower fertility levels (with the Middle East a notable exception).
- **S** From an individual perspective, this relationship may occur because of the postponement of marriage in order to pursue education, increasing knowledge about family planning, and/or by increased interest in and

qualifications for employment outside the home. An educated woman, with fewer children to care for, may allow her daughters to gain an education, which reinforces the cycle of lower fertility.

Status and Natural Increase

- Although status is harder to define there is evidence that in areas where women's status is higher, fertility rates decline.
- Individually, women with higher status are likely, almost by definition, to have a larger voice in family decision-making, including in reproductive decision-making. Lower personal fertility levels may grant them access to opportunities that would not otherwise have been available (income generation, education) which may in turn reinforce decisions to limit the number of children they bear.

Impacts on women's well being:
In-migration can badly affect women in forest communities - in logging areas, local women may be exposed to unwanted advances by strange men (suffering themselves from a grossly unbalanced sex ratio), or to AIDS and other diseases that may follow the roads that bring in the forest workers and bring out the forest products.

Typical is women's lesser access to forest resources, *vis-à-vis* local men, and even more so *vis-à-vis* external stakeholders like logging company personnel and government officials. We could point out their lesser voice in formal forest management and often in local management as well.

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GENDER KNOWLEDGE ABOUT NTFPs

By Salma N. Talhouk, Ingrid Lorbach and Marion Karmann

Forests play a vital role in global food security, providing food, fodder, fuel and medicine, and women have historically been the ones using these resources for subsistence. Extensive knowledge of forests, developed through generations, has helped women select specific forest foods that are an important source of income and nutrition for the family. As food supplements, forest foods may even prevent hunger and famine when conventional agricultural crops fail. According to an FAO study, communities living in the wooded areas of Thailand derive 60 percent of their foods directly from forests, with tree leaves being the most widely consumed forest foods. Case studies from Usambara, Tanzania, indicated that 80% of all vegetables consumed and 50% of all meals included leaves from trees (FAO/SIDA; Fleuret). In dry lands, where resources are especially limited, women collect wild foods from trees (example from Eastern and Southern Africa: Karmann & Lorbach).

Forests are also a major source of paid employment for rural communities. Women depend more than men on NTFPs and small-scale forest industries for income. More often than men, they work as collectors and marketers of NTFPs. In contrast, men work in commercial forestry, construction, and forest-based industries, and less in subsistence activities, except for hunting. Men are also generally responsible for cutting large trees, clearing land for agriculture, and extracting commercial timber. In the few cases where women are involved in forest enterprises, they tend to work as wage labourers, and often face serious discrimination (Jill Bowling, Isabelle

Faugere, IFBWW; ILO).

This noted gender-based division of work is based on both cultural traditions and socio-economic differences. Gender roles can change over time and in response to changing circumstances (George Martine & Marcela Villarreal, FAO / UNFPA Chile). Gender roles in harvesting of NTFPs are not always strongly pronounced. Unlike East Africa and Asia where hunting is restricted to men, in Latin America women often help men hunt and trap forest animals for meat. In fact, in some parts of Latin America, men and women collect wild fruits and hunt together (Frank Bliss). Carol Grossmann describes Indonesian Dayak societies where only men gather NTFPs in primary forests because women do not venture through the forests on their own. However, when the men locate areas with high NTFP resources they seek their wives' help. Pitamber Sharma summarises gender issues in the Himalayas: although women are involved in the collection and basic processing of most NTFPs, their involvement is restricted to low-return, labour-intensive activities.

The sustainable harvesting of NTFPs by women for subsistence use is shifting to an overuse of the resources by men for income generation. In some cases only men profit from the cash flow. For example, new international markets for medicinal plants like sandalwood roots are decreasing the local stocks that have been historically used in local trade. In addition, men spend the generated money on alcohol consumption, while women have to resort to other sources to secure their family's medical care.

Case studies from Brazil and East-Africa clearly show that migration and mobile traders can exploit NTFPs for new markets in short periods. Examples from West Africa show that women prefer to collect dry wood, from dead trees and shrubs, as it is easier to collect, carry and ignite. With dwindling resources in the vicinity of their villages, however, they start to cut down trees, even those providing important NTFPs, such as the shea butter tree. Because of their partial dependence on forests and tree products women seem to suffer more from forest depletion than do men.

The sustainable use of forests requires the participation of all rural populations, including women. Although women's uses of forest resources often differ from those of men, many development programmes tend to overlook women's specific needs regarding forestry and NTFPs. This is mainly due to the lack of adequate data, information and methodologies to address this issue. This lack of gender awareness is a constraint to the development of sustainable use and management strategies of forest ecosystems and NTFPs throughout the world. In Kenya, trials initiated by women groups on farm alley cropping with *Leucaena* and *Cassia* failed to generate the desired mulch and fuelwood because men trimmed the trees for poles or allowed browsing by goats. In contrast, when left to their own devices, men and women separately planted their chosen species at chosen sites for their chosen products. Once the specific gender division of land use and product demand is understood, then fieldworkers and policymakers may build upon this to reinforce complementarity, resolve conflicts and restore the balance between men and women in traditional or experimental land use systems.

In this context recent efforts concerning certification programmes for NTFPs need further refinement to meet local realities and should take into account gender issues to ensure that the full benefits of NTFP certification are felt.

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WOMEN AND THE BABAÇU PALM FORESTS

By Noemi Porro

In the current state of environmental affairs in Brazil, there are no long-term, effectively established public policies for sustainable management of non-timber forest resources. Using the case of the 'Quebradeiras de Côco Babaçu' (women who break open the fruits of babaçu palms and extract kernels), I argue that such initiatives must necessarily combine economic, environmental, and technical concerns with political emancipation. Without citizen ownership, they are fated to collapse into the uncertainties of official programmes.

The babaçu palm forests, which cover twenty million hectares in Northern and Northeastern Brazil, have been home to peasants involved in agricultural and extractive activities since the 17th century. Women direct and work along with children on the extraction of babaçu kernels, which are domestically processed and consumed, but mostly sold to oil industries. Men direct agricultural activities, in which men, women, and children cultivate rice, beans, cassava, and maize. This agro-extractive system of production based on a specific gender division of labour establishes their cultural identity and social relations, both within the household and the village and between them and other sectors of society. As descendants of enslaved Africans, detribalized indigenous people, and immigrants expelled by the Northeastern latifundia, their access to and use of land and babaçu forest resources have long sustained them as a social group. There are, however, sectors of society that seek to dominate them through market relations established by antagonistic public policies.

In the 1970s, development policies favouring cattle ranching and land speculation resulted in agrarian conflicts and the elimination of hundreds of villages and thousands of babaçu palms. Throughout the 1980s, agrarian policies intensified land concentration. In the 1990s, due to neo-liberal policies, national and transnational consumer industries of babaçu oil began to import increasing amounts of palm oil from Malaysia. The 1997 Asian crisis slowed these imports down, but patterns of market trends for babaçu oil have not yet stabilized. From 1980 to 1995, prices were affected by irregularities in demand and babaçu production declined. Price and production instability further threatened babaçu forest conservation, since environmental laws and occasional supporting programmes were and are not sufficient to protect them. In the current political climate, conservation measures in the Brazilian Forest Code itself are in danger of being weakened.

Throughout history and despite the lack of public support for their agro-extractive economy, sectors of the peasantry living in babaçu forests have developed grassroots organizations to assure relative control over

their social and natural environments. While land concentration expelled many people, it also forced public recognition of those villages that managed to survive and overcome the conflicts through political mobilization. By the 1980s and 1990s, some of these villages achieved legal rights through an Agrarian Reform programme. Throughout the babaçu region, unions, cooperatives, associations, women's groups, etc., have joined in projects involving forest management proposed by governmental and non-governmental agencies. However, while a few of these projects reinforced political emancipation, most facilitated processes of demobilization.

Based on a combination of economic and ecological concerns and political emancipation, a movement was organized by a pool of grassroots organizations in the Mearim Valley, in the state of Maranhão including close to 3,000 families in four municipalities. It began with discussions of land tenure, credit and environmental conservation issues. Developing and strengthening local cooperatives and processing plants through administrative training has taken years. Nevertheless, since the mid 1990s, the cooperative has exported babaçu oil to Europe and run trade posts in several villages. Women's groups are handcrafting babaçu soaps wrapped in babaçu paper, processing babaçu starch and fruits.

These economic actions were closely related to investment in political emancipation, especially of women. Along with the development of cooperatives, they founded a countryside middle boarding school, held adult literacy classes and carried out workshops on human and reproductive rights. These initiatives helped to launch a movement for conservation and free access to babaçu palms. In 1997, in spite of strong opposition by the mayor and powerful landlords, a municipal law was passed protecting the babaçu and establishing free access to palms for community members. In 1999, two other municipalities approved the same law, and in 2000, some of their leaders were elected as city counselors.

Based on systematic, long-term, ethnographic accounting, examining several experiences throughout the babaçu region, I argue that in the current Brazilian state of environmental affairs, only experiences that integrate political emancipation and forest management will provide for the conservation of non-timber forest resources.

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NTFPs - INCOME FOR RURAL POPULATIONS OR NOT?

By Eva Wollenberg and Brian Belcher

After early enthusiasm about the potential of nontimber forest products (NTFPs) to provide sizeable incomes to local people and thereby reduce poverty and provide incentives for forest conservation (Peters et al. 1989), a number of limitations and concerns about this potential have emerged. In this article we summarize lessons learned about the contribution of NTFPs to rural income from research facilitated by CIFOR, especially Neumann and Hirch (2000), Ruiz-Pérez and Arnold (1996), Townson (1995) and Wollenberg and Ingles (1998). We highlight that NTFPs play important subsistence and safety-net

roles in the rural economy, but only a small subset of forest products possesses potential for significant cash income and employment generation. Moreover, the factors that limit forest product development are the very same structural and political-economic conditions that have all along marginalized rural populations.

The wide interest in NTFPs and their contributions to income stems from the fact that many rural people use a large variety of forest products for foods, medicines, building materials and rituals. The majority of these products have low cash values and are used for consumption, rather than for sale. Many are important, especially to the poorest, because they are low cost, on common property lands, and are used by people because they have no alternatives. NTFPs often play critical roles as "safety-nets" by providing food or income in times of shortage, as important dietary supplements, especially for children, and as cultural symbols. Generally speaking, it is important to recognize these values, even if they are difficult to quantify, and to protect them where possible. But, such products do not, in most cases, provide a viable basis for improving income.

In contrast to these low value products, there is a smaller number of NTFPs that *can* contribute significantly to rural cash incomes. These include several rattan and bamboo species, resins, birds' nests, various fruits and nuts, and medicinal plants. Timber is one of the most valuable products, but the availability of timber-based incomes to local communities has been limited. Products have contributed to incomes most where specialization and the application of principles of agricultural intensification have occurred. We should concentrate efforts on these products to achieve the largest improvements in income. In many rural areas there are, however, important limitations to their development as enterprises, including poor market conditions, geographic and social marginalization, and limited capacities. Where benefits have accrued, more powerful actors tend to appropriate them. The very reasons why people in forest areas are poor to begin with have been the constraints that would also block enterprise development.

If we can address these constraints to enterprise development, we will be addressing the fundamental elements of poverty. The optimism about the potential for NTFP-based development springs from the fact that forest products offer an entry point for these kinds of changes. The availability of forest resources accessible to poor people and with potential for commercial development presents an opportunity to involve poor rural people in improving their economic options. Through interventions that strengthen rights to manage and harvest valuable resources, and that improve skills to manage and market those resources, poor rural communities can be enfranchised. In this view, NTFP development can be a 'stepping-stone' to broader socio-economic development. The variability of conditions required for enterprise development suggest the need for careful and regular assessment of markets, policy conditions and harvest impacts, with a willingness to adapt in response to new information.

Even where enterprise development is successful, there is still the question of NTFP development as a tool for conservation. Here, it is important to recognize that, if NTFP-based development is successful, people may choose to diversify, and even abandon the original activity. If they can generate capital through NTFP-based enterprises, they may be better off, at some point, to re-invest in other sectors (Ruiz-Pérez et al. 1999). Moreover, the role of NTFPs as a source of

income is unlikely to provide a sufficient incentive for forest conservation because of their limited dependence on the larger forest. A single product can provide incentives for conservation of the species from which it was harvested, but rarely for the entire forest habitat.

In conclusion, the income potential of NTFPs needs to be re-thought in several ways. The main lessons are:

1. Very large numbers of NTFPs are important for their subsistence and safety-net functions. These values are critical and need to be considered and protected in development projects. But, most of these products do not have good cash income development potential.
2. A small subset of products has potential for cash income development. Many of these already have commercial value. Such products are especially valuable because they offer an entry-point for development in poor rural communities with limited alternatives. The constraints to the development of these products are the same constraints that lead to underdevelopment in the first place, including low capital (of all kinds). Populations living under the most economically marginal conditions, i.e. far from markets with poor transportation infrastructure, no electricity, no access to multiple trade networks, no social support services — as many forest-dwelling populations do – are at particular risk. Unless these broader conditions change, the cash incomes from most NTFPs are not likely to provide substantially increased benefits to rural people.
3. Conservation objectives may not be well linked to development objectives.

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NTFPs: ECONOMIC AND CONSERVATION POTENTIAL IN CENTRAL AFRICA

By *David S. Wilkie, Laurie Clark, Ricardo Godoy*

Non-timber forest products (NTFPs) are frequently touted as important to household consumption, and as a way to maintain or to increase the value of standing forest and thus discourage deforestation. In this article we assess the contribution of NTFPs to the household and to forest conservation. We do so by reviewing some of the most reliable and up-to-date quantitative studies, with a focus on Central Africa.

The value of NTFPs to households

Recent research reconfirms that NTFPs do provide sources of food, medicines, and income to many households in Central Africa (Sunderland *et al.*, 1999). Yet, these studies also confirm that the contribution of NTFPs to local and national economies is typically small relative to agriculture. In four forest villages in south-western Cameroon, NTFPs contributed 9% to the household economy compared with 43% for agriculture. Similar figures are reported for households in south-eastern Cameroon (NTFPs 1.2%; agriculture 31%) and south-western Central African Republic (NTFPs 10%; agriculture 51%). Harvesting of wild NTFPs is most important for poor families that have limited or no access to agricultural markets. Wealthy households or those with access to agricultural markets (i.e. those that can sell cash crops) often consume NTFPs, but seldom harvest them

for sale.

In the south-west and north-west provinces of Cameroon the total value of NTFP production and marketing exceeded US$19 million in 1999, and contributed 2.8% to the regional economy. In contrast, timber, in this predominantly logged-over area, contributed 5%, and agricultural crops 27% (Abwe *et al.*, 1999). In areas of Cameroon where old-growth trees have yet to be harvested the value of logging is considerably higher.

Harvesting of wild NTFPs is dirty, arduous and at times dangerous work. Wild harvesting and processing of NTFPs usually requires high labour inputs and is typically economically feasible only when the opportunity costs of labour are low or when prices for NTFPs are high. As a result, harvesting of wild NTFPs is typically a symptom of poverty rather than a cure.

The relatively small contribution of NTFPs to household economies in Central Africa is mirrored by the results of a recent review of global forest valuation studies (Costanza *et al.*, 1997). Average worldwide values (converted to 1994 dollars with an additional correction for purchasing power) of tropical forests for food production, raw materials, and intangibles (i.e. carbon sequestration, biodiversity conservation, and ecological services) were $32, $315, and $1,660 per hectare per year respectively. Estimates of the direct (i.e. tangible) value of the forest may, however, be exaggerated given the short duration of most studies. When Godoy and his colleagues (2000) directly measured and valued forest resource consumption patterns of 32 indigenous families in Honduras continuously over 2.5 years, the direct value of the forest to local communities ranged from $18-24 per hectare per year, considerably lower than the global average of $347.

These studies suggest that tropical rain forests are worth more for their global rather than their local values (Chomitz and Kumari, 1998), and that NTFPs may be less likely than previously thought to provide economic incentives to conserve tropical forests.

NTFPs do provide critical supplies of food during periods when agricultural crops fail or are otherwise scarce. Yet one must be cautious before attaching too much weight to the insurance value of the forest. Rural people can protect themselves against mishaps either by taking precautionary measures before shocks take place (e.g. inter-cropping, plot scattering) or by relying on reciprocity, tolerated theft, or out migration after shocks strike (Godoy and Wong, 2000).

The sustainability of harvesting NTFP

To increase the relative contribution of NTFPs to household economies, raise the value of intact forest, and discourage forest clearing, many have argued for increased commercialization of NTFP use. In this section we review evidence for the sustainability of commercial NTFP production in Central Africa.

Though NTFPs have been used for millennia, human population in the forested regions of Central Africa is higher now than it ever has been in history, and is likely to double to over 60 million in 20 years. As with any wild plant or animal, if harvesting exceeds annual production then resources will progressively be depleted and become locally extinct.

NTFPs prized for their leaves, roots or bark are particularly prone to unsustainable use, because harvesting either damages or kills the parent plant. Commercial demand for *Gnetum* and harvesting practices that destroy the parent plant, has driven wild populations of this leafy vine to local extinction in Nigeria and much of south-western Cameroon. Cameroon can supply

approximately 200 tons annually of *Prunus africana* bark on a sustainable basis. Yet over 3,500 tons were harvested and exported in 1999. Worse, for both *Prunus africana* and *Pausinystalia johimbe*, current 'sustainable' harvesting practices that partially strip bark from live trees exposes them to stem-boring insects that can result in 50-90% post-harvest tree mortality (Cunningham *et al.*, 2000).

There is growing evidence that as NTFPs increase in value there is a trend toward over-harvesting of wild resources, increased on-farm production, and exclusion of resource users by resource managers. Of the 20 most economically valuable NTFPs in Central Africa, 11 are unsustainably harvested and 12 are now cultivated (Wilkie, 1999). This trend suggests that few if any commercially valuable NTFPs can be harvested sustainably from the wild, given present resource access and ownership laws.

Two major options are available to manage NTFPs. The first, domestication and on-farm cultivation is appropriate when wild resources are being over-exploited and at risk of local extinction. In Cameroon, several NTFPs are already grown within farmers' fields (e.g. *Irvingia, Dacryodes, Ricinodendron* and *Piper*) and field trials are demonstrating the potential for on-farm cultivation of *Gnetum* and rattans. The second involves putting in place systems to define who has access to wild NTFP resources in a given area, and to regulate harvest levels. This will require privatization of forest resources at the household or community level – a complex political process that has barely begun in Central Africa.

Without reforms in relation to who has access to NTFPs, most commercially valuable NTFPs will be over-harvested in the wild. On-farm cultivation will increase the economic value of NTFPs to landowner families, but will decrease NTFP access for landless families. On-farm cultivation of high value NTFPs may reduce pressure to harvest from the wild, but may increase incentives to clear forest to cultivate these new crops.

In summary, recent evidence strongly suggests that NTFPs contribute little to household economies relative to agriculture, and are thus unlikely to provide an economic incentive for conserving intact forests.

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MEASURING THE SOCIO-ECONOMIC VALUE OF NTFPs ON A REGIONAL OR NATIONAL LEVEL: CASE STUDY FOR NORTH-WEST AND SOUTH-WEST CAMEROON

By Mark van Dorp, Rudo Niemeijer and Don Offermans

Introduction

This article stresses the need for socio-economic valuation of the NTFP sector on a regional or national level. It presents a recently developed method for NTFP valuation, which has been extensively field tested in Cameroon. It appeared that for North-West and South-West provinces of Cameroon, the economic value of NTFPs amounted to US$ 19 million in 1998, or around 3% of regional income. Major NTFPs included palm wine, bushmeat and bush mango (*Irvingia gabonensis)*. It is recommended to further develop and apply this method for improved decision making in sustainable forest management and conservation.

The value of NTFP valuation

Imagine a traditional healer in Cameroon using the fruits of the *Ricinodendron heudelotii* to treat a woman with pregnancy problems. If she is cured, the value added of this transaction can be expressed in two ways: through the market or non-market value of the goods and services provided at low cost by the ecosystem, and through the opportunity cost of modern medicines, which would have been necessary had the forest been destroyed for alternative economic purposes.

This simple example shows the importance of NTFPs to the economy, especially in poor countries. However NTFPs are usually excluded from national statistical databases (contrary to industrial timber) and, consequently, do not feature in the Gross National Product of a country. By assigning a monetary value to the NTFP sector as a major source of food, medicines and income for the poor, the value of maintaining the forest becomes apparent. This presents local communities and policymakers with a strong argument for forest conservation or wise use. Even in the case of overexploited NTFPs, like bushmeat in Central Africa or Brazil nuts in the Amazon, it is important to know the economic value of the resource as a sustainability indicator.

Description of the NTFP valuation method

Valuation of the NTFP sector is performed in three steps (Van Dorp et al. 1999):

1. Rapid Assessment – in which all relevant general and NTFP data are collected and geographical sample frames are designed, based on the NTFP marketing chain.

2. Producer and Trader Surveys – in which a community-based survey of producers and a market-based survey of traders are carried out to collect and cross-check field data on product volumes, prices, sources, time allocation and cost structure.

3. Data analysis and conclusions – in which all data collected are aggregated to arrive at the value added by the NTFP sector to the economy (and of single products).

Spatial analysis methods are used to reduce survey costs and enhance precision, while the scope of the survey and level of detail are adapted to local conditions and the available budget. Ideally, a complete national survey consists of four sampling periods per year to account for seasonal

variation. In practice, this can be tackled by using recall methods and field checks. Additional data are gathered on home consumption, gender and socio-cultural aspects of the NTFP sector.

Case study for North-West and South-West Cameroon

The NTFP valuation method was field tested in the North-West and South-West provinces of Cameroon during a six-month period (CERUT and AIDEnvironment 1999). The study zone covers about 42,000 km^2 with a population of around 2 million people.

After a period of intensive training and rapid assessment, two local teams of five people each collected field data during hundreds of interviews with local producers and traders in 86 locations. These locations ranged from villages deep in the forest to large urban markets along the market chain. Data on NTFP collection, processing and trade were recorded and later entered into an NTFP database. On the basis of this database, the results of the survey were analysed and reported.

In the study zone NTFPs make up an essential part of local income and household consumption, especially for women. In 1998 the NTFP sector accounted for US$ 19 million or around 2.8% of regional income for the two provinces covered (excluding the value of agro-industrial plantations and cultivated NTFPs). A total of 140 products harvested in the wild were identified and regrouped into 16 NTFP categories. The most important product categories in terms of value added (in % of total value) are palm wine (26 %), bushmeat (11%) and minor animal products (11%) followed by forest conservation projects (10 %) and diverse plant products, e.g. bush mango, kola nuts, spices, medicines and building materials (4-8 %) (Van Dorp et al. 2000). The gender analysis of the NTFP sector showed remarkable differences between different products: for instance production and processing of palm wine were dominated by men, while the marketing chain for bush mango was predominately in the hands of women (from production to retailing). In general men had a larger share of total income from NTFP production (around 63%), while women had a larger share of total income from NTFP trade (around 54%).

Discussion

NTFP valuation and marketing have become important aspects of both forest management and local development programmes. The method presented here offers a standardised method for NTFP valuation for wide application, including improved monitoring of NTFP extraction. Future application will enable the method to include both small-scale surveys of single products and smaller study areas, and large-scale surveys encompassing whole nations. Further field-testing, developing and applying the valuation method as described above, will extend the knowledge base about NTFPs, eventually leading to more balanced decision making. This can be achieved through training programmes for local policy makers and NGOs. This will finally enable people to account and compare the wealth of forests world-wide, and to take accompanying policy measures.

Acknowledgements

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For the list of references and a list of NTFP product categories in terms of value added please contact the authors.

CREATING INCENTIVES FOR CONSERVATION: NTFPs AND POVERTY ALLEVIATION

By R.J. Fisher

Introduction
An incentives approach has been advocated to create linkages between conservation and the economic interests of local people. The theory behind this approach is that generation of income from local forests can provide a positive incentive for sustainable use and can thus contribute to conservation. This article will explore some experiences with this incentives approach, applied to NTFPs, in Asia.

The Incentives Approach in Asia
The incentives approach is being applied and supported in various ways in Asia. For a number of years, the Joint Forest Management programme in India has placed considerable attention on income generation through NTFP production to encourage rural people to participate in government forest conservation activities. IUCN, The World Conservation Union, has NTFP projects in the Lao PDR and Vietnam, which specifically aim to promote NTFP production and marketing as an incentive to forest conservation. An Asia-wide NTFP Network coordinated by IUCN in Bangkok has encouraged and facilitated sharing of experiences in the region. A book on methodologies for NTFP-based income generation has been published by CIFOR (Wollenberg and Ingles 1998). The Regional Community Forestry Training Center (RECOFTC) and the Community Forestry Unit at FAO in Rome have, along with IUCN and other partners, developed a methodological package called 'Market Analysis and Development (MA&D) for Community-based tree and forest product enterprises'. The methodology has been tested in various projects in Nepal, Vietnam and the Lao PDR and a field manual has just been published (Lecup and Nicholson 2000).

Has the Incentives Approach Been Effective?
As far as conservation benefits are concerned, there is so far little clear evidence either way, although lessons have been learned about conditions under which success can be possible. One international study (mainly in Asia, but also including other regions) by the Biodiversity Conservation Network (BCN) was specifically set up to test the incentives approach, which was field-tested in seven countries, twenty different projects, thirty-nine sites and forty-eight different community-based projects over seven years. The BCN report concluded that "an enterprise strategy can lead to conservation benefits, but only under limited conditions... and never on its own" (Salafsky et al. 1999: 37). Among these limited conditions are that the enterprise must be viable and that there must be a linkage between the enterprise and biodiversity such that declines in biodiversity will affect the viability of the enterprise.

While 'the jury is out', there is obviously some potential for achieving conservation benefits in some circumstances. However,

the verdict on the effectiveness of incentives approaches to NTFP-based income generation seems less promising.

In a review of literature including project reports, I was able to find very little clear evidence of people receiving significant economic benefits from NTFP enterprises associated with outside interventions based on the incentives approach. There was literature predicting positive outcomes for *planned or commencing projects*, but I could find no example of a detailed cost-benefit analysis of a *completed* project which demonstrated that project participants had benefitted from interventions overall. Accounts of income from one source, almost invariably ignored loss of other benefits no longer available after interventions. In other words people gain income from collecting one product, but lose because other products are forbidden. Although there was no analysis of the overall economic impacts, there were documented cases of significant income resulting from improved production or marketing of individual products, as in a case of improved bamboo marketing in the Lao PDR, which led to a fourfold increase in family income from bamboo in one village (Foppes and Ketphanh 2000).

There are also examples of community-initiated NTFP production and marketing activities which are clearly dependent on conservation. One example is Pred Nai village in Thailand where villagers collect and sell crabs from a mangrove swamp. The villagers clearly recognise that they need to protect and regenerate mangroves in order to provide food for the crabs. Such cases of indigenous 'sustainable production' systems are quite common throughout Asia, if not always well recognised.
Externally sponsored projects may have been more successful in terms of income generation linked with conservation than has been documented. However, the documented success is certainly not very impressive.

Conclusion: The Potential of the Incentives Approach applied to NTFPs
There is little doubt that, on a world scale, a vast quantity of NTFPs are used by forest communities and that significant cash income is generated. Nevertheless, forest communities generally remain poor and it may be that both market realities and the 'political ecology' of the context within which they live is not particularly likely to be changed by interventions based on the incentives approach.

Income generation from higher value forest products (such as cardamom, yang oil or hemp) is not elastic. Wide promotion of a product is likely to reduce its market value. Consequently, focusing on a particular NTFP may benefit only small numbers of people.
However, the realities in terms of 'political ecology' are perhaps the greatest limitation. As Dove (1993) points out, forest communities tend not to have legal access to valuable forest products. Timber for example, is almost always under the control of forest departments and non-local interests. The collection and sale of NTFPs by Asian communities is often illegal, although collection of low value products is often tolerated. When a product becomes valuable, new restrictions are imposed or existing ones enforced.

The incentives approach attempts to break the poverty-forest degradation cycle by opening new forest-based opportunities for income generation, mainly through NTFPs. It seeks to do this through introduction of marketing and business planning. The problem may be that valuable NTFPs are rarely available to communities.

Note
This paper is based on a longer paper ('Poverty Alleviation and Forests: Experiences from Asia') prepared for the Workshop 'Forest ecospaces, biodiversity and environmental security' at the IUCN World Conservation Congress in Amman, Jordan, 4-11 October 2000.

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NWFPs IN EAST KALIMANTAN, INDONESIA: AN ANALYSIS OF SILVICULTURAL AND SOCIO-ECONOMIC ASPECTS OF THEIR SIGNIFICANCE AND DEVELOPMENT POTENTIAL FOR THE LOCAL PEOPLE IN A FORESTRY CONCESSION AREA

by Carol M. Grossmann

Background
Expectations that an intensified management of NWFPs will increase the income of rural people living near forests, as well as encourage conservation of natural forests, are increasingly being criticised for being based either on insufficiently tested hypotheses or scientific studies with only unilateral sectoral analyses.

Objectives
(i) To elaborate a target group-oriented and interdisciplinary research concept as a contribution to the development of a transferable methodology suitable for analysing the role and development potential of NWFPs in any region with natural forests.
(ii) To answer three fundamental questions relevant to the management of NWFPs in a timber concession area in East Kalimantan, Indonesia:
- How is the supply of NWFPs from natural forests influenced by selective commercial logging?
- How large does the area of natural forest need to be to supply the local population with the types and amounts of NWFPs currently used?
- Do the inspected forest stands provide the potential for local people to intensify market oriented management of NWFPs that will, at the same time, enhance forest conservation?

Setting
The concession area of the timber company Limbang Ganeca in central East Kalimantan (Borneo) and two bordering villages were selected as the research area. The originally predominant ecosystem is Lowland-Dipterocarp-Forest, including primary and logged-over forest. The forest cover has been increasingly reduced by other forms of land use.

Methodology and results
The interdisciplinary concept covered silvicultural and socio-economic aspects.

The **forestry component** consisted of a sample inventory with 340 0.4 ha plots. The species, population densities and regeneration of perennial plants producing NWFPs were investigated. A primary and a logged-over forest stand were compared in order to detect the impact of commercial logging on the supply of NWFPs.

58 tree species, 34 rattan species, 8 other palm species and 4 liana species producing

NWFPs were identified. On average, they were represented by 0.3 to 19.7 adult individuals per species and hectare. Selective logging had a significant impact on the population of about half of these plant species, some benefiting and some being negatively affected.

The **socio-economic aspects** of the use of NWFPs by local people were analysed using the following methods – monthly structured and semi-structured interviews, product counts, food diaries, and participatory observation. Thirty-one households provided quantitative data on the contribution of NWFPs to their income and subsistence from July 1995 to June 1996.

Five percent of the average monetary household income was derived from NWFPs. Of this 5%, about half was obtained through the sale of game at the village-level. Together with income made from edible birds' nests and dried reptile skins, over 80% of cash earned from NWFPs was wildlife-related. The remaining 20% of the NWFP-based income was derived from plants, mainly through village-level sales of rattan articles.

Individual households demonstrated broad variations of total cash income and of the respective contribution of NWFPs, ranging from zero to 100%. Differences in commercial use of NWFPs could be connected to the economic status of the household and to the ethnic affiliation and cultural homogeneity of the household members.

The importance of NWFPs for subsistence was analysed by investigating the contribution of NWFPs to nutrition and the value of durable NWFPs in the form of articles of daily use, based on local market-prices. Faunal NWFPs (game) were identified as the second most important source of protein. Vegetative NWFPs were consumed only with 5.2% of the meals. All households owned articles made partly or completely of durable NWFPs. Their replacement value totals five times the amount of money earned by selling NWFPs.

Conjunction of results

An area of 100,000 hectares of naturally managed forest was estimated to be required to continuously supply the people of the research villages with all plant-derived NWFPs at their current consumption rate. This figure corresponds with the total management area (including primary and logged-over forest) of the timber concession company Limbang Ganeca and surpasses the usual area of forest-related activities by the village people. To supply the need for most NWFPs, but excluding rare and sought species, a total area of about 4,000 hectares of naturally managed forest might suffice.

131 NWFP-producing plant species were identified in the NWFP inventory, of which only 42 species were actually used during the research period; the products of a mere 10 species were traded locally. An under-used market potential could be assumed, in as far as products provided by at least 25 of the locally recorded NWFP-producing species were traded in other regions of Borneo. Several substantial economic and product inherent reasons were identified as to why so many theoretically usable NWFPs were not used at all and why more than 60% of all NWFPs with market prices were not sold commercially.

Conclusions and recommendations

Because of these limitations, the development of an intensified management of NWFPs in these natural forests by local people cannot be expected. Consequently, no significant incentives are being

generated for the conservation of natural forests.

Recommendations were formulated with respect to four different development scenarios for the research area. A sectoral promotion of the management of NWFPs in natural forests is not an issue in either of these options. Nonetheless, the data indicate an increasing demand for particular local NWFPs that, in turn, do have some degree of management potential outside of natural forests, above all in improved traditional agroforestry cultivation systems.
The most important feature of this study lies in its interdisciplinary research conceptualisation, combining methods and results of an inventory and of an in depth socio-economic survey. As the study demonstrated, either approach on its own could have led to an overestimation of the management potential of NWFPs in the research area.

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MOPANE WORMS - A RICH SOURCE OF INCOME IN SOUTHERN AFRICA

By Jaboury Ghazoul

Southern Africa's rural households depend as much on their surrounding forests as they do on their crops. William Cavendish's recent study of Southern African rural livelihoods, 'Empirical Regularities in the Poverty - Environment Relationship of African Rural Households', demonstrates that Zimbabwe's rural families use hundreds of wild plants and animals for food, medicine, fuelwood, building materials, furniture, baskets, livestock fodder, and other uses. Termite mounds and leaf litter provide a major source of fertilizer. Livestock fodder, wild foods, and fuelwood contribute most to household incomes, although, around three quarters of all income comes from a wide range of other natural products. Interestingly, it is the poorest households that most depend on forest products even if, in absolute terms, the richer households consume more forest products.

One of these products, the caterpillar of an emperor moth that feeds almost exclusively on the mopane tree, hence mopane worm, has become the focus of a new 3-year project recently funded by the UK Department for International Development (Forestry Research Programme). Following the initiative of DFID-FRP, Will Cavendish and Jaboury Ghazoul, both of Imperial College, University of London, coordinated

a consortium of research organizations, NGOs, CBOs, and private enterprises, to seek ways of enhancing the potential for both stable and sustainable income generation by sale of mopane worm in local and regional markets. Traditionally, the mopane worm has been harvested for domestic use by rural households and has made a significant contribution to rural diets, but more recently its potential for income generation has become clear. The consortium is seeking ways to promote the sustainable production of mopane worm across mopane woodlands in southern Africa. Through a cluster of studies it aims to highlight the most appropriate opportunities available to poor farmers and landless families to increase the returns from the mopane worm harvest while ensuring that demands for other woodland resources are met. The research will examine the role and potential of mopane worm to improve livelihoods through expanding local consumption and increasing returns from local and regional trade, and will lead to practical actions that local communities can take towards assessing mopane worm production, reducing harvesting impact on the mopane woodland resources, improving harvesting and processing techniques and developing marketing networks.

An important goal of the socioeconomic research being carried out by Peter Frost (Institute of Environmental Studies, Zimbabwe), Owen Shumba (Southern Alliance for Indigenous Resources, Zimbabwe) and Andrew Dorward (Imperial College) on mopane woodland products is to put the value of mopane worm use in the context of the broader household economy and to identify the opportunities and constraints arising from interactions between NTFP based activities and other household activities.

Research on community-based mopane worm farming has the potential to ensure regular and controlled harvests even in areas where the mopane worm seldom occur. Community-based commercial production of mopane worm is being investigated by Frank Taylor of Veld Products Research and Development in close collaboration with Kgetsi ya Tsie women's community group in Botswana and Member Mushongahande (Forest Commission, Zimbabwe). Nigel Poole of Imperial College is leading research on the associated market opportunities for, and constraints to, the sale of mopane worm.

Mopane woodland ecology and management will be the focus of research conducted by Dirk Wessels (University of the North, South Africa) and Member Mushongahande with the aim of producing optimal conditions for the semi-domestication of mopane worms while meeting other woodland uses demanded by rural households.

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NTFP COMMERCIALISATION IN ZIMBABWE

By Oliver Braedt and Bruce M. Campbell

A study of the woodcraft sector in Zimbabwe was conducted to understand the potential role of NTFP commercialisation in rural household livelihoods. Zimbabwe experienced an upsurge in the marketing of woodcarvings and other craft articles during the 1990s. Possible social and ecological impacts originating from this informal commerce have alarmed environmentalists, governmental and non-governmental institutions, and policy makers. Up to the time of the study no clear policy on the woodcarving sector was apparent, with some institutions promoting it as a means to improving income, while other institutions were involved in trying to halt the sector, using the current legislation to guide their actions.

Markets along the major roads in Zimbabwe were monitored and detailed market and household surveys took place in the communal lands of Chivi District. Institutional arrangements controlling tree use were also identified. Participatory appraisal tools were used with groups, semi-structured interviews were held with groups and individuals, and formal questionnaires were conducted with households and key informants. To assess the natural resource base a forest inventory was carried out.

Results indicate that at the end of the 1990s over 200 craft markets existed in Zimbabwe. Since 1990 there has been a momentous rise in the number of these markets, with 88% of all markets surveyed being established in 1990 or thereafter. Wood is the most common material being found in 75% of the markets. The expansion is in part a result of the increased demand by tourists and the need by rural households to find cash income sources. Since the beginning of the 1990s, tourism in Zimbabwe has steadily risen and the role it plays is reflected in the current spatial pattern of the markets, with markets concentrated on the key tourist routes. One major reason for the increase in tourism is the weakness of the currency, with devaluation proceeding throughout the 1990s. Structural adjustment, with its emphasis on the decontrol of the currency, has thus probably played a key role in driving the upsurge in craft production. During this same period, poverty has increased and a number of cash income sources have been reduced (e.g. remittances from urban areas).

Originally the main tree species used in Chivi District were *Afzelia quanzensis* and *Pterocarpus angolensis*. With increasing numbers of woodcarvers and a dwindling resource, carvers shifted to other species and the distances travelled for the collection of trees for carving increased. Tree species prefered by woodcarvers are 'reserved' species, the cutting of which is prohibited by state laws. Traditional rules also prohibit their commercialisation. However, enforcement of both the formal and informal rules is rare. At present an open-access situation prevails and there is a degree of confusion and disorder concerning institutional arrangements controlling forest product use.

Most participants involved in the craft sector are usually only sporadically involved, doing carving or trading in crafts when other livelihood options fail, or in seasons when agricultural activities are low. Results reveal that 16% of households in the study area obtain revenues through the commercialisation of forest products, but the total value was less than 6% of the annual cash revenue in the area. 43% of the participants are women, largely restricted to the final stages of carving production - the finishing and selling of the product. Prior to 1980, women dominated craft production in the study area, largely selling pottery. However, men, who focus on stone sculptures and woodcrafts, currently dominate the sector, and it is

particularly young men that are involved. In the past, labour migration to earn money and remit some of it to the rural household was frequent, but this is no longer the case. The dominance of the sector by young men reflects the current economic situation.
There are clear entry points that may help to develop the woodcraft production and trade, such that participants can continue to rely on it for at least part of their income from this source. Addressing the legal contradictions that exist between local and national laws is one option. There is legislation to try and ensure sustainable harvesting of woodland resources in communal areas, but most of it is ineffective, as there are problems in its content, interpretation, and enforcement. The commercialisation of a finished woodcraft is legal, but the possession of a harvested log is generally illegal as almost no harvesters seek the necessary permits. Local traditional rules governing resource use from the commons are also not respected. Enforcement is difficult and local leaders use their positions to their own advantage. Given the problems in the national legislation and in the local rules, it is difficult to envisage how the resource could be managed on a sustainable basis.

The facilitation of alternative woods and wood supplies is another central theme in developing the woodcraft sector. The selective use of tree species for carving in Zimbabwe's communal areas is likely to drive some species to local extinction. Active management of the current tree resources is at present unlikely and experiences from other countries (e.g. Kenya, Malawi, Republic of South Africa) indicate that the most commonly used tree species for woodcarvings are close to extinction and can only be found in areas far away from markets selling craft products.
Nonetheless, as participants in the woodcraft sector are mostly part-time, and as households have a suite of livelihood activities, the variations in tourist numbers will result in households moving in and out of different income providing activities. This is probably the one constant phenomenon related to the woodcraft sector in Zimbabwe. Providing the right support to this commercial use of NTFPs will increase the opportunities for some participants to derive a larger share for a longer period of time.

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NTFP MARKETS AND POTENTIAL DEGRADATION OF FOREST RESOURCES IN CAMEROON: THE CASE OF *GARCINIA LUCIDA*

By Ousseynou Ndoye, Manuel Ruiz-Perez and Antoine Eyebe

The growing economic and social importance of NTFPs in Cameroon is well documented in the literature (Ndoye et al. 1999; Eyebe et al. 1999; Ruiz-Perez et al. 2000). There is also a growing dependency

of rural households on NTFPs due to various factors (Bikié et al. 2000). For example, the devaluation of the CFA Franc in January 1994 increased the price of beer and whisky, and these were substituted by palm wine and local whisky (Odontol), which is made by distilling fermented palm wine. The pressure on NTFPs increased. One particular NTFP in which trade has increased recently is *Garcinia lucida* bark, which is used to ferment palm wine as well as having medicinal and anti-poison properties. *Garcinia lucida* fruit are also sold in the market. While the bark provides valuable alternative income-generating opportunities for rural dwellers, harvesting practices are not always sustainable. This is also the case for NTFPs like *Gnetum spp*., *Garcinia kola*, *Prunus africana*, and palm wine from *Elaeis guineensis.*

According to Guedje (1996), who identified sites with more than 50% dead trees, *G. lucida* trees cannot recover if the bark is removed over a large surface around the stem. Inventories show that there is a wide variation in available stocks of *G. lucida.* Ntamag's (1997) survey showed *G. lucida* only in virgin forests at an average rate of 4 trees per hectare. In an inventory of 11 complete transects in Southern Cameroon, Van Dijk (1995) did not find a single *Garcinia lucida* tree and suggested that this could be due to high harvesting levels. Guedje (1997) found 6.86 trees per hectare and also found that *Garcinia lucida* grows in dense populations with a preference for undisturbed forest habitats (Guedje 1996).
She discovered that trees with diameters equal to or greater than 10 cm were exploited (debarked) most and estimates that the average sustainable yield per tree is 2.5 kg (Guedje, pers.comm.).

The number of *G. lucida* trees debarked increased from 7,003 in 1996 to 24,756 in 1997. This was followed by a dramatic decline to 13,378 in 1998, possibly due to a reduction in availability of mature trees. Over the same period, the selling price of one bag of *G. lucida* bark (18 kg) rose from 6,200 to 7,100 CFA Francs, while estimates suggest that the area affected by *G. lucida* debarking doubled.

Garcinia lucida is governed by an open access regime, which makes the trees become more vulnerable to externalities created by the opportunistic behaviour of a few forest dwellers resulting from higher market demands for the bark. In a situation of economic crisis and an active search for alternative income-generating opportunities, private gains can override the sustainable social benefits that are obtained from *G. lucida* and lead to depletion of forest resources.

The domestication of *G. lucida* and its cultivation in multi-strata agroforestry systems could be a means to reduce the pressure on forests. However, they are necessary but not sufficient conditions to increase the aggregate production of *G. lucida*. Other important conditions are improved access to market information and infrastructure, reduced transaction costs, and improved institutional support for forest dwellers and traders.

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CROSS-BORDER TRADE OF NTFPs FROM THE KORUP FOREST AREA, SOUTHWEST CAMEROON [1]

By Ruth Malleson [2]

Introduction

Ethnic and historical links, as well as contrasting environmental, economic and social conditions, have encouraged trade between Cameroon and Nigeria. Rapid population increase and forest degradation in Nigeria has meant that the Nigerian demand for non-timber forest products (NTFPs) outstrips national supplies. NTFPs from the Korup Forest Area (KFA) in Cameroon are now major items of cross-border trade. The strength of the CFA Franc compared with the Nigerian Naira and heavy taxes on imported goods make smuggling profitable and the porous border encourages it. As a result the majority of the cross-border trade in NTFPs is part of the 'informal' economy.

NTFPs and the Cross-border Trade

NTFPs commonly harvested in Southwest Cameroon and transported to Nigeria include: bush mango kernels (*Irvingia* spp.) used to flavour and add a mucilaginous consistency to soups; rattan cane (mainly *Eremospatha macrocarpa* and *Laccosperma secundiflorum*); chewstick species *Massularia acuminata* and *Garcinia mannii*, used for dental hygiene; the leaf vegetable eru (*Gnetum* spp); bush pepper (*Piper guineensis*) and *afofo*, distilled palm wine.

The extraction and trade of most NTFPs exported to Nigeria are controlled and organised mainly by Nigerian wholesalers. These traders hire people from their home areas to extract NTFPs on their behalf rather than buying them from local people. The exception is bush mango, which is collected by inhabitants of the KFA but sold on to itinerant Nigerian traders.

Being part of the 'informal' economy, it is obviously very difficult to collect reliable quantitative information about profits made from the NTFP cross-border trade. However, my research and other studies elsewhere in Cameroon (Ndoye *et al* 1998; Shiembo 1999) indicate that these enterprises can be very lucrative. But most of the profits benefit wealthy Nigerians rather than local people.

Given the lucrative nature of the cross-border NTFP trade, it is important to explain why locals of the KFA have not tried to enter into it. Economic disadvantages relating to the fact that Nigerians dominate and control this trade deter local people from becoming involved. Most locals in the KFA argue that they are unable to enter into this trade because they commonly encounter at least one of the following disadvantages: lack of capital, high transport costs, language constraints and/or lack of connections with main trading partners.
Cameroonian policies relating to the residency of foreigners, the Bakassi border conflict between Nigeria and Cameroon, and swings in the CFA Franc-Naira exchange rate have all contributed to wide and unpredictable fluctuations in income from the cross-border trade of NTFPs from the KFA. For example, in 1993, few traders came to buy bush mango because of the relatively high value of the Naira against the CFA franc (140 Naira to 1,000 CFA). But in January 1994, the CFA Franc was devalued and the exchange rate dropped to 65 Naira to 1,000 CFA. This led to a rush of buyers from Nigeria.

The volatile economic and political conditions in the region sometimes provide opportunities for relatively poor people from the KFA to profit from the cross-border trade of NTFPs. Much of the *afofo* produced in the southern end of the KFA is marketed in Nigeria by Nigerians. But in late 1993, and throughout 1994, the Bakassi border conflict prevented Nigerian traders from transporting *afofo* to Nigerian ports. Instead, local people were able to make a profit by marketing it directly to traders and retailers in KFA.

Implications for Forest Management

My research and that of other authors (see for example Ndoye *et al* 1998; Sunderland and Tchouto 1999; Yembi 1999; Sunderland and Obama 1999; Shiembo 1999; Lapido 1999) have shown that some NTFPs are important items of cross-border trade in the humid forest zone of West and Central Africa. With the exception of a few species such as *Prunus africana* (an internationally traded medicinal plant), very little is known about the current harvesting levels of most commercially valuable NTFPs in the humid forest zone of Cameroon. More research is needed into this topic and the impact NTFP harvesting is having on forest conservation.

It is worth noting that many of the protected areas in the humid forest zone of West and Central Africa are located on or near national boundaries (Gartlan 1999: 243), in former boundary wildernesses - areas between states which were purposefully left undeveloped by governments for political-economic reasons and depopulated by war (Richards 1996) or by epidemics, such as sleeping sickness (Sharpe 1998: 80). Until very recently (see Gartlan 1999), biodiversity conservationists have often assumed that such areas are economically remote. But as the case of the KFA illustrates, in reality, the cross-border environment may be very socially dynamic. These are often zones where contrasting ecological, demographic and economic conditions meet and where significant cross-border interactions, such as informal trade and population movements, have been taking place for generations.

Forest conservation and development projects located in these areas have largely failed to acknowledge the importance of this trade or to examine the potential to develop and support cross-border synergies in relation to forest management. Development NGOs are starting to look into the potential to develop cross-border synergies for the benefit of local inhabitants - see Whiteside (1999) for example. Attention needs to be paid to assessing the socio-economic and political trends and official policies that may have considerable impact on local people's livelihoods and specifically on the cross-border trade of NTFPs and other products. If trade in one direction is hindered because of economic, political or strategic factors, this has an effect on the trade in the other direction. Official policies, restrictive regulations and corruption currently increase the costs of the NTFP trade to producers and traders. Conservation and development projects need to incorporate these constraints into their analysis of problems and proposed solutions.

[1] This report is drawn from my recently submitted Ph.D. thesis entitled 'Forest livelihoods in Southwest Province, Cameroon: an evaluation of the Korup experience'. University College London. The research was funded by the Economic and Social Research Council (UK) Global Environmental Change Programme, whose support is gratefully acknowledged.

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CONSTRAINTS, POTENTIALS AND PERSPECTIVES FOR NTFP PROCESSING IN SOUTHERN KYRGYZSTAN

By Gulmira Ismailova

Southern Kyrgyzstan is home to the last remaining natural walnut forests on earth. They constitute a globally unique ecosystem comprising such species as walnut (*Juglans regia*), apple (*Malus* spp.), pear (*Pyrus* spp.), hawthorn (*Crataegus* spp.), Sogdiana plum (*Prunus sogdiana*), dog-rose (*Rosa* spp.) and other plants. They represent an extremely valuable reserve of rich genetic biodiversity, containing over 180 tree and shrub species. The walnut forests produce a large number of NTFPs including nuts, fruits and berries, honey and other bee-keeping products, medicinal plants and mushrooms. The natural conditions of the forest area are particularly favourable for the development of bee-keeping and production of ecologically pure high-quality honey with valuable medicinal properties.

About 48,000 people live in the walnut forest area. Their livelihoods depend directly on the use of forest resources, including the harvesting of NTFPs.

In Soviet times, the main NTFPs were harvested, processed and sold on the internal market of the Soviet Union. Some enterprises specializing in NTFP processing were located in the walnut forests. In addition, NTFPs were processed by other enterprises engaged in processing of agricultural products or pharmaceutical enterprises located elsewhere in the Kyrgyz republic, sometimes even outside it (especially for medicinal plants). Products manufactured by these enterprises were sold in the whole of the former Soviet Union. There were no problems related to marketing as the sale of production was guaranteed by the state within a planned system of production and sale of manufactured production.

After the collapse of the Soviet Union and the gaining of independence by Kyrgyzstan, economic ties with the other republics were broken and the former markets lost. Many processing enterprises were forced to stop their activities, some worked at below full capacity or, in response to market forces, changed their range of manufactured products to producing mainly fruit and vegetable puree, different pickled vegetable products, etc. Their technical equipment also leaves much to be desired, with many enterprises still reliant on Soviet equipment from the 1970-80 era. At that time, many forest areas were accessible for vehicles. Nowadays much of the forest can only be accessed by horse, thus creating additional difficulties for NTFP processing.

Many NTFPs, particularly fruits and medicinal plants, are now no longer harvested or processed. Local people harvest forest products only for their own consumption. Many wild-growing fruits are left to rot in the forest. The forests in Kyrgyzstan are state property but neither the Leshozes (State forestry body) nor local people have any knowledge of processing, business management or marketing.

In 1997, with the support of the World Conservation Union, the Government of the

Kyrgyz Republic and the Swiss Government, elaborated a Walnut Forest Action Plan to ensure the conservation and sustainable use of this unique forest ecosystem. The Action Plan consists of 11 projects including one on "Processing and marketing of non-timber forest products". To implement the project, the collaborators of the Kyrgyz-Swiss Forestry Support Program, LES-IC, have supported a number of different NTFP processing and marketing activities. These include the establishment of several mini-enterprises (private persons or groups of people) engaged in producing jam and dried fruits from wild-growing fruits and berries, harvesting and drying medicinal plants, development and processing of bee-keeping products, extraction of walnut kernels, packaging and grading, obtaining walnut oil and ensuring sales. Service centres have been established to provide consulting and marketing services, conduct training of interested persons in management of production, processing, marketing, etc.

Research is being carried out to identify products having the greatest market potential, sale markets, criteria for defining quality and marketable state of forest products. The ecological purity of the products of the walnut forests is, of course, their main potential sales advantage.

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COMMERCIALISATION OF NTFPs: FACTORS INFLUENCING SUCCESS

By Elaine Marshall

Why is it that commercialisation of NTFPs does not consistently contribute to poverty alleviation? A new 3-year project is being funded by the Forestry Research Programme of the UK Department for International Development to analyse the opportunities and constraints to commercialisation of NTFPs at the household and community level, through comparative analysis of case studies. Market structure will be analysed for selected NTFPs, to identify interventions necessary for successful commercialisation. Gender issues and community perceptions of success will receive particular attention. Outputs will include (i) a manual developed and tested with rural communities, to provide tools for successfully developing NTFP resources, and (ii) an Expert System for use by decision-makers to evaluate the potential for successful NTFP commercialisation.

The main collaborators on this project are the UNEP World Conservation Monitoring Centre and the Overseas Development Institute in the UK; Grupo de Estudios Ambientales, Grupo Mesófilo, Methodus Consultora, Estudios Rurales y Asesoría Campesina (ERA), SEMARNAP and PROCYMAF in Mexico; Universidad Nur, Care-Bolivia and the Superintendencia Forestal in Bolivia; and Fauna & Flora International in Nicaragua.

We are bringing participants from the field of NTFPs to present both successful and unsuccessful case studies at our project inception workshops in Mexico, March 2001, and Bolivia, April 2001. We feel we have as much to learn from case studies which have been successful as those which have failed. During our workshops, we will

undertake a collaborative analysis of NTFP case studies, and facilitate project stakeholder discussion in an attempt to reach consensus on defining and measuring success at community level. Our research methodology for measuring successful NTFP commercialisation, will build upon previous research undertaken by CIFOR (1999). Specifically, we hypothesise that success is associated with:

(i) positive state-sponsored regulations that offer clear rights to people
(ii) a harvesting intensity / technique that does not put excessive pressure on the resource
(iii) a transparent market
(iv) well-organised gatherers
(v) existence of external support groups

The links between these conditions are unclear, and their relative importance has not been evaluated. Based upon the workshop findings, we will further develop and refine our research methodology and collaboratively explore the relationship between these factors, and their respective influences on achieving successful commercialisation at inter and intra community levels, during the 2nd and 3rd year of the project. Field data collected will be used to evaluate the research hypotheses from our workshop, in two different areas each of Mexico and Bolivia. In parallel to these activities we will collect data along the market chain, on selected traded NTFPs, to explore the potential for market intervention strategies.

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ECOLOGICAL AND ECONOMIC ASPECTS OF NTFPs

By Gerald E. Wickens

Unfortunately there is a conflict between sustainable development of the world's natural resources to meet an ever increasing global population and that of sustainable conservation to safeguard genetic resources for the future. The developed countries expect the less developed countries to maintain flora and fauna forest services regardless of the local economy. The situation is not helped where the less developed countries occur in regions inherently poor in natural resources, especially in the arid and semi-arid tropics.

These arid ecosystems well illustrate the problems that inevitably arise between managing the environment and social needs. Improved health care from the 1930s onwards has led to a dramatic increase in human and livestock populations which were formerly held in check by wars, famine and disease. This has resulted in ever increasing requirements for locally grown food, grazing and fuelwood and has led to over-cultivation, over-grazing and deforestation, i.e. desertification, a situation that has been even further aggravated by drought associated with climatic change. Over-cultivation results in lower productivity.

"Whereas 30 years ago farmers were able to grow sufficient crops for subsistence plus a surplus for sale, they are now often cultivating from three to five times as much land in the uncertain hope of a yield that will provide enough for their subsistence" (Cross & Barker, 1993, cited in Wickens, 1997). Later and poorer sexual maturity, fertility and meat production from livestock arise from over-grazing, leading to more and more animals being required in order to meet the demands for meat.

Deforestion has forced people to travel further and further afield for their fuelwood and other tree products. All three factors have led to increased wind and water erosion, lower water tables, etc. It is a degradation cycle that the present population pressure and economy is unable to control.

The changing use of NTFPs by the Mbeere of Embu District, Kenya, between 1970 and 1987 has been documented by Riley and Brokensha (1988). It is a scenario that represents the changes also found in other developing countries. Over-utilization and the degradation of the vegetation, soils, water resources, etc., have imposed changes on the use of NTFPs and even their substitution by, for example, imported products including their chemical analogues in medicine, dyes, pest control, etc.

The use of NTFPs follows the rule of supply and demand. Supplies depend on seasonal or annual availability in terms of quantity and quality and the presence of suitable alternatives. Since the dawn of agriculture, cultivation has been the response to wild sources being unable to meet demand. For example, 2 tons of fresh leaves from *Catharanthus roseus* (Madagascan periwinkle) are required to produce 1 g of the anticancer alkaloid needed to treat a leukemia patient for 6 weeks. Supplies are now from cultivated plants (Sukh Dev. 1989; Robbins, 1995).

While demand can be related to actual need, a product is not necessarily utilized throughout its distribution range. For example, the field mushroom, *Agaricus campestris*, is often the only edible fungus people will gather in the UK and even then it is eaten with extreme caution, yet in Europe a wide range of wild fungi are consumed. For example, in the Garfabnana region of Tuscany the local people use 19 species for food (Pieroni, 1999). Many of these edible European fungi also occur in the UK and are readily eaten when imported. The reasons for such different attitudes to wild fungal food sources are obviously complex and poorly understood but certainly involve education, urbanisation and local customs.

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GROWTH AND PHYSIOLOGY OF *IRVINGIA GABONENSIS* SEEDLINGS UNDER DIFFERENT ENVIRONMENTAL CONDITIONS

By Christiane Then and Wolf- Ulrich Kriebitzsch

Introduction

Irvingia gabonensis (Irvingiaceae) or *bush mango* is an arbuscular mycorrhizal tropical rain forest NTFP- producing tree which is widely distributed and abundant all over Central Africa. The fruits are used by local

communities for subsistence and for sale on local and regional markets.

As pressure on natural resources has been increasing, attempts have been made to include this species into programmes for domestication or for enrichment planting inside the forest. To ensure success, basic information on the species' light and nutrient demands, as well as the drought resistance of the seedling stage, are needed. In this greenhouse experiment we germinated seeds from *Irvingia gabonensis* from SW Cameroon and grew seedlings in a poor sandy soil (pH 4.8) under controlled conditions. Three different light intensities and fertiliser levels were used:

- 2%, 17%,100% of greenhouse radiation which is equivalent to 1%, 8.5% and 50% of natural radiation

- control (K), fertiliser mix without phosphorus (-P), and with phosphorus (+P)

The response of the plants to the various treatments was evaluated by gas exchange and growth parameters.

Characterization of *Irvingia gabonensis*

This species has very large leaves and generally produces extremely high leaf areas (LA). The total dry weights (DW) as well as the DWs of leaves, shoots and roots are also high. In the shade (2%) this is already visible, but total DW is tripled in slight shade (17%). In full light (100%), total and leaf DWs and total leaf area (LA) decrease significantly because of leaf fall caused by light damage. In fact, both leaf damage and numbers of fallen leaves rise from slight shade to light. Actual leaf number as well as the totally formed leaf number (including fallen leaves) follow the same patterns as the DWs. Only the +P treatment increases leaf number at 100%, by providing, among other parameters, better resistance against leaf fall. At 100% light there is a decrease of the totally formed leaf number with time. This proves that the decrease in DWs from slight shade to light, mentioned above, are not only caused by leaf fall but by a growth preference for the 17% light intensity. This finding is supported by shoot-DW, as well as height growth and internode lengths, which are significantly higher with +P, and have their growth maxima at 17% decreasing to 100%. As a consequence, the shoot/root (S/R) ratio is greatly reduced from shade to light. This means an improved water uptake from the soil. Specific leaf areas (SLA) and branching patterns react the same way. The generally low specific leaf area in all three light treatments indicates a good adaptability of *I. gabonensis* to dry conditions. In this context the abscission in light must be considered as a protection against high water loss.

The species demonstrates generally low maximum photosynthetic capacity rates (Pn_{max}) – typical for shade adapted plants – with an increase from shade (2%) to slight shade (17%) by 20%, and a decrease to light (100%). In comparison to other investigated rainforest species, however, Pn_{max} is relatively high. In conjunction with the high leaf area mentioned above, this allows for fast biomass production in the seedling stage. Pn_{max} is tendentially higher with –P. Quantum efficiency (Q) values prove that *I.gabonensis* can make use of very low light intensities - a characteristic adaptation for seedlings on the very shady forest floor. Values typically rise from light to shade, with maximum at 17%. Maximum Pn_{max} at 17 % and the high quantum use is also reflected by a high productivity of DWs and LA especially at this light level (see above). +P nutrient supply increases the light demands of the plants as proved, for example, by the light saturation point (I_S)

which is significantly enhanced with +P.

Transpiration rates (Tr) are particularly low and tendentially higher at 17% shade. Water use efficiency (WUE) also tends to increase with light. Relatively high Pn_{max} rates together with low water losses produce a high WUE, which results in particularly effective biomass production relative to water loss. Tr significantly increase with the fertilizer treatments. The increase of photosynthesis caused by a higher nutrient supply raises water use efficiency (WUE) values in the fertiliser treatments which are tendentially highest with +P.

As for drought resistance, water demands are high. Drying out experiments to examine the development of Pn_{max} under water shortage over several days, show a positive relationship between increasing light and the initiation of drying out, survival rate and recuperation. Experiments indicate that the danger of drying out is most pronounced at the 17% light level and lowest for 100%. This suggests that *I. gabonensis* is limiting transpiration – in addition to leaf abscission – by closing stomata at higher light levels to avoid water loss. The closing of stomata is also indicated by the decrease in Pn_{max} and DWs from 17% to 100%. A negative fertilizer effect is most pronounced for +P and –P whereas the controls are less susceptible to drought. This may be a consequence of wider opened stomata for the fertilizer treatments than for the controls as also indicated by Pn_{max} (see above).

Conclusions

We resume that all investigated parameters show a great impact of irradiance on *I. gabonensis* seedling development. Seedlings of *I. gabonensis* are very well adapted to the shady conditions in the understory of rainforest. Water demands are high and there is a good adaptability to dry conditions. *I. gabonensis* is distinguished by a high productivity, which is conform with the high nutrient and water demands.

Recommendations

Based on the above results, we recommend partial shading similar to our 17% treatment (which corresponds to 8.5% of natural radiation) for this species at the seedling stage to achieve optimal growth and leaf development. Regularly applied fertilizer including +P would be useful but is costly. We recommend arbuscular mycorrhizal inoculation as experience points not only to increased growth and nutrient uptake but also to improved water supply (as indicated, for example, by higher SLA). This would stimulate even further the above-mentioned high adaptability to dry conditions.

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OPPORTUNITIES AND CONSTRAINTS FACED BY RESOURCE-POOR FARMERS IN INVESTING IN THE PLANTING AND IMPROVEMENT OF INDIGENOUS TREES FOR INCOME GENERATION

By K. Schreckenberg, RRB Leakey and Z. Tchoundjeu

The domestication of indigenous trees for the production of non-timber forest products within agroforestry practices has been suggested as a sustainable means of promoting the reduction of poverty in tropical countries (Leakey and Simons, 1998). This DFID-funded project was established in Cameroon and Nigeria, to:-

- Understand the contribution of on-farm indigenous trees to rural livelihoods,
- Analyse the constraints to, and opportunities for, the greater management and use on-farm of *Dacryodes edulis* (African Plum / Safou) and *Irvingia gabonensis* (Bush Mango / Dika Nut),
- Identify appropriate development and research interventions.

Project sites (4 in Cameroon and 2 in Nigeria) were selected to represent a range of agroecological conditions, species abundance, market access, population pressure and land availability. Biophysical and socio-economic studies were carried out at each site and market studies implemented in adjacent or other relevant markets.

The socio-economic team implemented community level work in the Cameroon communities and household interviews in all six communities. The principal findings are that out of the average of 80 fruit trees per 3-6ha farm, *D. edulis* is the most commonly planted species, accounting for 65 % of all planted trees. Half of the planted species are indigenous, the vast majority being located within other perennial tree crops (eg. cocoa and coffee), with indigenous exceeding exotic species. Land tenure, which is commonly perceived to be a constraint to planting tree crops, was found not to be and preliminary data analysis found no clear differences between the tree stocks of wealthy or poor farmers, although male headed households had twice the numbers of female-headed households. Labour was not found to be a major constraint for tree planting or maintenance, but bottlenecks may occur at harvest time.

Income from indigenous fruits was the primary source of income for 11% of households, especially in August – October, when other income is scarce. It is also seen by farmers as an important buffer against other financial risks and against falling prices for major commodities, like cocoa and coffee.

The biophysical studies were particularly targeted at an understanding of the variability of fruit and kernel characteristics. Thirteen different characteristics (fruit, nut and kernel mass; fruit length and width; flesh taste and fibrosity; skin and flesh colour, fat content of kernels, and the viscosity and elasticity (drawability) of food prepared from kernels) were measured. The relationships between tree height and dbh showed that the population structures of *D. edulis* were similar in both countries, both were populations planted on farm, while the *I. gabonensis* population in Cameroon was a mature relic of a natural population and that in Nigeria a relatively young planted population.

As expected, very considerable tree-to-tree variation was found, indicating the appropriateness of a village-based tree domestication programme (being implemented by ICRAF / IRAD), that also conforms to the Convention on Biological Diversity, by promoting the rights of farmers over their indigenous knowledge and germplasm. For example, a few *I. gabonensis* trees in Nigeria were found to be considerably bigger than those in

Cameroon, while in Cameroon, a few trees had better kernel traits. From the results so far, it is possible to identify the traits that should be selected for cultivar development in both species. In *I. gabonensis* in particular it will be important to select a combination of traits that form either a fresh fruit ideotype, or a kernel ideotype in response to consumer preferences.

In an attempt to quantify the extent of domestication already achieved by farmers' own tree selection activities, there is evidence that in both species traits of little importance to farmers are normally distributed, as in wild populations, and that others of importance to farmers may form a separate sub-population outside the curve formed by wild populations. This illustrates the way in which such data can be used to identify the best individual trees for cultivar development using vegetative propagation, so taking the domestication process forward more rapidly.

For farmers to really benefit from the further domestication of these species, it is important that the trade recognises the genetic variation between cultivars in terms of the market price. Attempts to ascertain market preferences have identified that traders favour skin colour as a trait in *D. edulis*, while consumers prefer taste. The odour of *I. gabonensis* kernels seems also to be a factor of importance to consumers. The market analysis to date has not yet, however, taken into account the apparent differences between the requirements of wholesalers and retailers.

A recent stakeholder workshop in Cameroon, was very enthusiastic about the results of the project and the new emphasis being placed on the domestication of the traditionally important, and previously-ignored, indigenous fruits. In particular the results were seen to be a major contribution towards the work of ICRAF and IRAD to develop land use systems that also provide a step towards poverty reduction and sustainable livelihoods.

Outputs from this project will include 4 already submitted MSc theses, 10-20 peer-reviewed research papers (the first is published), policy guidelines, a synthesis in book form, posters and media presentations.

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APPLICATION OF MOLECULAR MARKER TECHNOLOGIES FOR THE GENETIC CHARACTERISATION OF NON-TIMBER SPECIES

By Marie Baucher, Sylvia Burssens, and Marc Van Montagu

The stability of an ecosystem is largely determined by the intraspecific genetic diversity of the different interacting species, because this diversity holds a reservoir of potential adaptations to changing environmental conditions. A low genetic variability as a consequence of biodiversity loss may lead to the disappearance of endangered species. Although measurements of visual traits reveal the existence of genetic variation, they do not give a good indication of the structure of diversity within populations or how this population is maintained.

Biotechnological advances in the analysis of genetic variation can revolutionise our ability to conserve and improve forest species by accelerating knowledge gathering. The use of molecular markers technology, such as Amplified Fragment Length Polymorphism (AFLP) (Vos *et al.*, 1995), associated with the measurement of quantitative characters, enables the measurement of the genetic variation of a species or a population. As DNA analysis allows for the direct visualisation of genetic information, independent of environmental factors, tissue development or developmental stage, these methods can be used for species identification and the development of general sets of molecular markers with which to assess genetic diversity. Furthermore, the genetic mapping of quantitative traits closely linked to molecular markers is a very efficient tool to analyse the outcomes of crosses in marker assisted breeding programmes.

The Institute of Plant Biotechnology for Developing Countries at the Department of Molecular Genetics, Ghent University, is participating in an INCO-DEV project, supported by the European Community since 1999, to assess the levels and dynamics of intra-specific genetic diversity of tropical trees with molecular tools. In addition to studying the biodiversity within 10 different species from Central America, Costa Rica, French Guiana, Brazilian Atlantic rain forests and the Carribean Islands, the aim of the project has been to assess human impact on the genetic diversity of tropical trees. For example, the AFLP technique was used to study biodiversity within and among three neighbouring natural populations (Guaritiba, Grumari and Barra) of *Eugenia uniflora* (pitanga), each of which has experienced different degrees of human impact (Margis *et al.*, in preparation). *E. uniflora* is a colonizing plant species endemic to the Brazilian Atlantic rain forest. It plays an important role in the maintenance of the woody coastal ecosystem, especially in disturbed sites. Its ecological importance is reinforced by the fact that pitanga fruit are a feeding source for a wide variety of birds and mammals. Because of the sensitivity and high resolution of the AFLP method, significant genetic variation could be detected between populations which are geographically very close together. Intra and inter genetic diversity analysis showed that more than 86% of diversity resided on the intra population component, suggesting that gene flow among the populations is intense (Margis *et al.*, in preparation).
The same partners plan a continuation of the project, focusing on the impact of different human activities (e.g. logging, fragmentation and land degradation) on the genetic diversity and gene flow within several tropical plant species in Latin America.

Thanks to the development of

methodologies such as HPLC, capillary electrophoresis and mass spectrometry, it is now possible to obtain information on metabolite levels in individuals of a population (Fiehn *et al*., 2000). These high throughput technologies allow the study of the effect of the genetic background, but also of environmental conditions, on the production of secondary metabolites in medicinal plants and can be applied to capture the value of biodiversity of tropical forests. Other applications of the use of molecular approaches in non-timber species are gene engineering of desired traits, such as the modification of particular phytomedicinal pathways. This might include manipulation of both the quantity and quality of metabolites produced through the introduction of targeted genes.

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DEVELOPING NEEDS-BASED INVENTORY

METHODS FOR NTFPs
Report of the ETFRN research workshop held 4-5 May 2000 at FAO in Rome

By Jenny Wong

The ETFRN workshop was one of the activities in a pre-project supported by the Forestry Research Programme of the United Kingdom Department for International Development. The pre-project was intended to examine the biometric basis of current resource assessment methods used for NTFPs. The background paper for the workshop represented a review of English language NTFP literature. The workshop was asked to comment on the review and to assist in the identification of key areas where biometric research is needed.

Biometrics can be defined as the 'application of statistical methods and principles to the study of biological organisms'.

Not all disciplines use the term 'NTFPs' and so the criterion for including a study was that it should be concerned with human harvesting of some forest-based plant or animal resource. Resource assessment was here interpreted as the quantification of some characteristic of the resource, e.g. its abundance, growth rate or yield or as a description of quantitative monitoring methods. In all, 126 case studies were identified from a wide range of disciplinary approaches (see Table 1).

In order to examine the biometrics of these studies it was first necessary to establish a set of criteria to define biometric quality. These are all concerned with statistical aspects of the *design* of the studies and are:

Table 1. The biometric qualities of the reviewed studies Jenny Wong

Study type	Number	Protocols (%)	Biometric (%)
Biodiversity	3	66	0
	Often subjective but justifiable?		
Demographic	9	44	22
	Often based on single study plots or stands		
Ethnobotany	10	50	20
	Including quantitative ethnobotany		
Experiments	5	80	80
	Insufficient replication of treatments		
Harvesting	5	80	60
studies	Insufficient replication of treatments		
Resource	42	69	57
inventory	Insufficient plots		
Mapping	3	0	33
	Biometrics not a major concern?		
Market studies	2	50	0
	Econometric criteria apply		
Methodology	11	64	55
	Often use pseudo-replication		
Monitoring	12	50	25
	Different biometric criteria apply		
Rapid	1 0	10	0
assessment	Rapidity and rigour not compatible?		
Remote sensing	2	0	0
	No sampling protocols reported for ground truthing		
Use of	6	10	17
secondary data	Did not report original protocols		
Social surveys	2	50	50
	Sociometric criteria apply		
Yield studies	13	46	8
	Often sampling is subjective		
TOTAL	126	56	38

- *objectivity* in sampling design - the plots should be selected using a design designed to be objective (i.e. random, systematic etc. sampling); subjective choice of a plot to 'represent' an area of forest cannot be considered biometric,
- *number* of plots used - to be able to perform statistical tests and generate sampling errors there needs to be a minimum of 5 plots and preferably more than 30 plots sampled,
- *independence* of plots - the plots need to be well spaced so they represent separate observations of the resource, this means that plots should not touch (the use of touching plots as if they were independent is termed pseudo-replication).

In addition, in order to be able to judge these criteria it is necessary for the protocol used to be clearly reported, so this was included as a further factor. The results of the evaluation are shown in Table 1.

Generally, it would appear that most (60%) NTFP studies have some biometric shortcomings. Many of the 56% that did not report their protocols could, of course, be well designed studies but without the details it is impossible to judge. Also, to be fair, some of these studies may not need to be biometrically rigorous. As in all forms of inventory the methods used should be matched to the information needs of the management system and need not be biometrically rigorous as long as objectives are met.

What is perhaps of more concern is that 43% of resource inventory and 90% of yield studies failed in some way. These are studies that usually have quantification as a primary objective and it seems clear that there is a serious problem in the methods currently used for NTFP resource quantification.

The review concluded that the principal difficulties with NTFP quantification are:

- The variety of life forms and population distributions of forest products mean that traditional forest inventory techniques cannot be easily adapted and may not always be appropriate for use with NTFPs.
- There is a lack of properly researched NTFP-specific sampling designs.
- There is little guidance available on development of appropriate NTFP measurement (mensuration) techniques.
- There has been little or no application to NTFPs of sampling designs tailored to monitoring needs.
- Lack of a strong theoretical basis to NTFP resource management.
- There has been little application of novel sampling strategies to NTFPs.
- There has been little cross-disciplinary exchange of ideas and methods suitable for use with NTFPs.
- There is no service that provides effective communication of advice to field workers and communities.
-

The workshop itself was concerned with identifying priority research areas from the perspective of different 'needs' for NTFP quantification.

At the species level, information is needed to guide appropriate management of individual products. Here the main difficulties are technical as little is known about the best methods to use to sample, measure, monitor and analyse (including yield determination) individual products. Research is needed into all of these

aspects for most products though emphasis was given to resource inventory as other studies build on sound initial inventory of the resource.

At the community level any improved methods for studying a specific product will need to be participatory in that they should enhance and build on local knowledge to be effective. Much NTFP management is traditional and based on local knowledge but often this is not formally acknowledged by regulatory authorities. The workshop identified an urgent need for the development of participatory techniques which are accessible and meaningful to local communities *and* which will produce results acceptable to regulators, that is, usually, government agencies.

At the macro level the difficulties of studying individual species are compounded by the expense of undertaking studies on individual species forcing the use of a single design for a range of products. This severely restricts the ability to tailor designs to the peculiarities of individual products and there needs to be some investigation of the implications of this in the context of multi-purpose resource inventory. A further consideration is that there needs to be some means of integrating information from all NTFP studies within a country. Such information is required for government level strategic planning for the regulation of harvesting, issuing of export permits, incentives for NTFP livelihoods etc.

The workshop concluded that there is a need for focused research on NTFP biometrics. In particular, the urgent need for a source of biometric advice for fieldworkers and for better reporting of protocols by those publishing NTFP resource studies were emphasised.

For further information and to download the workshop review paper and proceedings visit the workshop web page at: http://www.etfrn.org/etfrn/workshop/ntfp

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COMMUNITY-BASED WILDLIFE POPULATION ASSESSMENT IN THE KORUP PROJECT AREA, SW CAMEROON

By Lien, M Waltert, K Faber, K von Loebenstein, M Mühlenberg

The Korup Project Area (KPA) is made up of the Korup National Park (1260 km²) and the Support Zone (5360 km²), which includes three Forest Reserves (Ejagham, Nta Ali and Rumpi Hills Forest Reserve) situated to the north, east and south of the National Park, respectively. The human population is 45,000 people in about 180 villages. The global objective of the Korup Project is to conserve the biodiversity of the KPA. Its purpose is that the different actors should protect, develop and use the natural resources in an ecologically and economically sustainable and socially acceptable way.

The majority of the people living in and around the protected areas depend on animal wildlife, which is one of the main sources of protein. Vertebrates also play an active role in the ecology of the forest, e.g. as important seed dispersers. Moreover, the Support Zone still harbours populations of some highly endangered and range-restricted species such as Drill (*Mandrillus leucophaeus*) and Preuss's Red Colobus (*Piliocolobus preussi*). Up until now, there have not been enough data to assess the sustainability of human pressure (hunting and poaching) on animal wildlife or the impact of logging activities and changes in land use. Based on experiences from Ivory Coast, the Korup Project, in collaboration with the Centre for Nature Conservation (CNC, Göttingen University, Germany), has therefore developed a methodology involving the local communities in the assessment of wildlife. This programme intends to assess the densities of key species in selected areas and their changes over time. The focal species are duikers (four species), primates (seven species) and three groups of birds (hornbills, touracos and selected understorey bird species). The key species are surveyed from permanent line transects covering the forested parts of five village areas, in the northern and eastern part of the Support Zone. In the near future, a similar programme will be carried out in parts of the National Park.

Transects are surveyed by carefully selected and trained local staff. Direct observations and indirect cues (tracks, dung) are recorded both for diurnal and nocturnal key species. The personnel of the programme consist of 15 Eco-staff divided into five teams (three staff per team), one field supervisor, one co-ordinator, one advisor and non-permanent consultants. Data collection and analysis follow standard Distance Sampling procedures. The collection of data started in February 1999. In one year of biomonitoring, four teams have covered 379 km during morning observations, 311 km during night surveys, and 350 km during footprint surveys, collecting 9827, 185 and 4294 data-sets, respectively. For most focal species this has provided sufficient data for calculating densities.

The community-based approach ensures long-term monitoring and is financially affordable. It also increases the level of awareness on conservation issues of local communities and some key stakeholders such as the Government of Cameroon. The programme is a member of the Cameroon Biomonitoring Network (CBN), the objective of which is to exchange experiences among its members.

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ASSESSMENT OF NTFPs IN COMMUNITY FORESTRY: EMERGING PARTICIPATORY INITIATIVES FROM THE HILLS OF NEPAL

By Hemant R Ojha

Introduction

Nepal has a very rich floral and faunal diversity due to its topographical, climatic and edaphic variations. About 100 NTFPs are extracted for trade, and 800 more find subsistence uses as foods, spices, herbal medicines, incenses, oils, fibres and construction materials (Edwards, 1996). Increasing subsistence as well as commercial expectations from non-timber forest products (NTFPs) has necessitated more careful assessment of the resource base and sustainable harvesting schemes in the hills of Nepal. This paper reviews some participatory NTFP resource assessment initiatives with commercial medicinal herbs and fibre-yielding shrubs.

Currently most of the operational plans (OPs) for managing community forests (CF) lack provisions for NTFPs. However, Forest User Groups (FUGs) are not authorized to use and manage NTFPs unless they are included in the OP. Growing awareness of the value of NTFPs has now highlighted the need for better NTFP resource assessment and their incorporation into OPs.

The fundamental parameters that need to be assessed while planning sustainable management of NTFPs at operational level are: existing growing stock, productivity, quantity of sustainable yield that can be prescribed for harvesting, and sustainable harvesting techniques. In Nepal, very limited documented knowledge on species as well as ecosystem level is a major constraint in seeking appropriate answers to these questions. In view of this, FUGs and foresters are increasingly required to work together to generate more information, often using indigenous knowledge and beliefs as a preliminary basis.

Case Examples

Binayak FUG in **Bajhang** in the western hills of Nepal was formed in 1995 and a patch of 25 hectares of community forest was handed over primarily for the fulfilment of timber and fuelwood needs. In 1999, the Asia Network for Small Scale Bioresources (ANSAB) assisted the FUG to expand the community forest area to include NTFPs. The participatory planning exercise identified Lokta *(Daphne* spp.) as one of the main commercial products. Lokta (a 3-4m high shrub) is one of the main sources of traditional Nepali handmade paper, and has an attractive local as well as international market.

The participatory resource assessment started with preliminary mapping of Lokta resources in the forest. The forest was divided into various blocks following boundary survey and area calculation. Sample plots were then laid systematically in each of the blocks, and counting of Lokta plants by diameter class was done and the total growing stock was projected. Using secondary information, cutting cycle and the minimum size for cutting were determined to estimate annual sustainable harvest levels.

Bhitteri Pakha FUG in **Dolakha** district in central Nepal offers another example of NTFP assessment. Argeli (*Edgeworthia gardeneri*), which is a fast growing shrub with a unique triangular branching pattern, was identified as the main commercial NTFP. Whiteskin is extracted from Argeli stems and exported to Japan, where it is converted to a high quality paper that is also used for currency making.

As argeli is not uniformly distributed in the community forest, habitat mapping was carried out to determine the sampling

frame. From this, an estimation of number of clumps as well as stems was made. It was very time consuming to count individual stems as a clump contained as many as 80 stems. To expedite the process, stem diameter distribution was assessed from a sample of 1000 stems across several clumps, and the estimated number of clumps was combined with a diameter distribution curve to estimate the number of stems across various diameter classes. Participatory wisdom suggested 30% mortality from one class to another, and based on this, population size was projected for 10 years. Annual sustainable yield was calculated on the basis of a predetermined minimum size of cutting.

In the western Himalayan district of **Humla,** communities had long experiences of collecting plant products for local as well as commercial use. ANSAB staff wanted to verify whether indigenous harvesting practices were optimal in terms of productivity and conservation impact. To address this, ANSAB (1999) designed a participatory action research plan to identify best harvest intervals and collection methods for four commercially harvested medicinal plants, including Jatamansi (*Nardostachys grandiflora*). This is an erect perennial rhizomatous herb growing 10-60cm long and used both locally for medicines and commercially for medicines and perfumery.

For the purpose of quick assessment, patches harvested in 1993/94, 1994/95, 1995/96 were discernible, and two more patches were identified for subsequent harvest treatments. By applying the same level of harvesting, the five patches were harvested on a five, four, three, two and one year rotation. Yields of fresh Jatamansi roots and rhizomes from these harvests were recorded. The results were analysed to assess the effect of harvest intervals across the two habitat types. A harvest interval of five years was found to be optimal.

Experience with Jatamansi and other high value NTFPs in Humla has indicated new dimensions of sustainability and management of medicinal plants. In addition to quantity of harvest, methods, seasons and techniques of harvesting were found to be equally important.

Discussions and Conclusion

A wide range of assessment techniques for NTFPs has to be considered to address variations in terms of plant form, life cycle and product type. The examples presented demonstrate that Lokta and Argeli, although similar shrubs, were assessed using two different techniques. Methods of assessment have to be site and product specific. Understanding ecological regularities of species as well as ecosystems can facilitate speedy inventory of NTFPs. Mapping Argeli habitats minimised the sampling frame, and hence the costs, while maintaining accuracy. Indigenous knowledge may provide a basis for scientific inquiry as well as for provisional harvesting plans. Thus both the Jatamansi experiments, and determination of the cutting cycle and mortality of Argeli were achieved through participatory wisdom. The diversity of techniques needed for NTFP assessment can be designed, tested and refined through the use of local as well as scientific knowledge.

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ANALYSIS OF THE SPATIAL

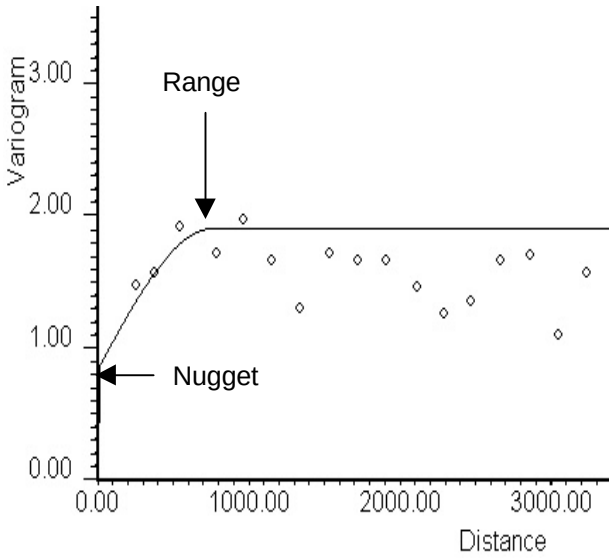

Figure 1 Example of a variogram.

DISTRIBUTION OF NTFPs IN THE TROPICAL FOREST OF GHANA

By Emmanuel Tabi-Gyansah

Introduction

In Ghana, NTFPs are an important source of income to the majority of rural dwellers. Main products are cane (*Calamus* spp.), rattan (*Lacosperma* spp.) and chewsticks (*Garcinia afzelii*). These products contribute 2 % (in comparison with the forestry sector's 6%) to the country's GDP. Furniture production and other processing activities from cane and rattan have expanded. Cane-processing enterprises were actively promoted.

Although the development of NTFP-based industries has helped economic development, it has also caused an increased demand for raw materials. The growing depletion of forest resources has generated interest in conservation-oriented projects, but these cannot successfully be implemented without knowledge of the current status and rates of change in the spatial distribution of the principal species.

In Ghana, 'conventional' forest inventories generally have been based on stock surveys of compartments. Such inventory data are essentially non-spatial. At best, the results are combined with remote sensing data to display forest patterns and produce forest maps. Because the smallest mapped unit is a compartment (often several hundreds of hectares in area), detailed information on the local spatial distribution within map units is not presented in maps. Recent research (Acharya, 1999) has shown that geostatistics offers a promising method for characterising large and small scale variations of both species richness and forest structure parameters. This paper describes further research to investigate whether geostatistical methods can be used to produce reliable information about the spatial distribution of NTFPs - cane, rattan, and chewstick - in part of the Subri River Forest Reserve, one of the largest forest reserves in Ghana (Tabi-Gyansah, 2000).

Geostatistics

Most people know intuitively that two values that are close together in space tend to be more similar than those far apart. Such variables are known as *regionalized variables*. A regionalized variable y(x) is considered at all pairs of location x and x + h, *i.e.* at locations separated by the distance vector h. *Geostatistics* allow the correlation between any two values separated in space to be quantified and used to predict the values at unsampled locations. Geostatistics are therefore a powerful tool for the study of spatial distributions.

In geostatistics, a so-called *variogram* is used to model the way two values are spatially correlated. The spatial variance usually increases with distance, and levels off at a certain distance beyond which observations appear independent (Figure 1). This is the so-called *range*, beyond which the variogram value remains constant. Between locations separated by a distance smaller than the range, the regionalized variables are dependent. When the variogram is extrapolated back to zero distance, it may approach a non-zero variance or non-zero y-intercept. This is known as the *nugget* variance, and represents unexplained spatial dependent variation or purely random variance.

Table 1. Schematic presentation of the proposed method to identify populations of bromeliads that may be exploited with sustainability of yield. After Wolf & Konings (in press), reproduced with permission of the editor.

Reconnaissance

Select a group of species of host trees, of similar bark characteristics, that support dense bromeliad populations.
Map the area.
Lay out several parallel transects, covering the total area.
Establish at least 35 random sampling points on the transects.

Inventory

Select the four nearest trees to each sampling point, one per quarter, with DBH >5 cm, (point-centred quarter method).
Record for each tree: Mean Distance, MD, to sampling point (cm), species, DBH and no. of branching points
Record for the bromeliads: species, no. of rosettes >20 cm tall (in some cases smaller species may also be included), and the no. of rosettes in the lower forest stratum, i.e. up to a height of six m or ± 1/3 of the canopy height.

Analysis

Calculate the host tree density per ha, TD; TD = 10000/((MD/100)*(MD/100)).
Calculate per bromeliad species the average occupation, O, per host tree; O = total no. of rosettes/number of trees.
Calculate the standard error of the average occupation; SEO = standard deviation/square root number of trees.
Calculate per bromeliad species the average density per ha, BD; BD = TD*O.
Calculate the lower limit of the 95% confidence interval of the bromeliad density, LLBD; LLBD = TD*(O-SEO*1.96)
IF LLBD <10.000 THEN STOP
Standardise for all trees the DBH and the no. of branching points; standardised X = (X-mean)/standard deviation.
Plot Tree Size (= sum of standardised DBH and no. of branching points) against no. of rosettes.
Define low sustaining trees, LS, that support <50% of expected maximum no. of rosettes IF LS >50% THEN STOP
Exclude low sustaining trees from the analysis.
Calculate Index of Spatial Homogeneity, ISH; ISH = squared correlation coefficient between Tree Size and square root of no. of rosettes. IF ISH <0.90 THEN STOP

Exploitation

Harvest bromeliads in the understory, up to six m, in a four year –depending on the species- rotation cycle.
Implement a monitoring program, applying the described method.

Some general results
A multi-level sampling design was used to collect data on various tree parameters and on the abundance of NTFPs in 500 m² sample plots along 1200m transects on either side of a predetermined base-line. Subsequent analysis involved two main steps: *i)* analysis of the observations, without considering their spatial locations, and *ii)* estimation of variograms and contour mapping to provide information on spatial dependence and variations in the distribution of timber and NTFPs.

In summary, the research revealed that timber and NTFPs have some inherently different spatial characteristics:

- timber was found to have a relatively long range of spatial dependence and spatial variation, confirming the locally-homogeneous nature of the tropical forest
- the spatial distribution of NTFPs was found to be very erratic, with relatively short scale variation.

Conclusion
Although further work is required, this research suggests that geostatistics may play a useful role in the survey of NTFP resources which, by their very nature, can only be studied on the ground. Not only may geostatistical methods help forest resource managers to better understand the spatial distribution of NTFPs but they may also support the selection of appropriate sampling designs to inventory this increasingly scare resource.

Further information
The research described in this paper was undertaken in partial fulfillment of the requirements for an MSc degree in Geoinformation for Forest and Tree Resources Management at the International Institute for Aerospace Survey and Earth Sciences (ITC), in the Netherlands. The work was supervised by Prof. Dr. A. de Gier and Dr. M. Weir, and is one of several research projects dealing with applications of geostatistics carried out by ITC's Forest Science Division. For further information, contact: weir@itc.nl.

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EPIPHYTIC BROMELIADS: TOWARD THE SUSTAINABILITY OF YIELD FROM NATURAL POPULATIONS IN THE HIGHLANDS OF CHIAPAS, MEXICO

By Jan H.D. Wolf and Cornelis J.F. Konings*

Direct economic benefits of conservation efforts may be attained when forest products can be harvested for commercial purposes while at the same time maintaining the ecological integrity of the forest. Recently, a concept known as canopy farming© has been proposed for

this purpose. Vascular epiphytes are just one of the potential NTFPs in the canopy and of these the bromeliads are often the most abundant, particularly in areas with a pronounced dry season.

Bromeliads are traditionally used by highlanders of Mayan origin in Chiapas, Mexico, for ceremonial purposes and for the decoration of sacred sites. The western world has only recently 'discovered' the potential of bromeliads for (home-) decoration, and species in the genus *Tillandsia* are now regarded as a valuable cash-crop in several countries. Thus, between 1993 and 1995, Guatemala exported 14.5 million *Tillandsia* plants annually. Rauh, a specialist in Bromeliaceae, estimates that at least 75% of the plants in *Tillandsia* farms are collected from the wild and holds such activities responsible for a decline of bromeliads, casting doubts upon the sustainability of this harvesting practice.

In a study in pine-oak forest of the highlands of Chiapas we aimed to obtain criteria for the sustainable harvesting of a natural population of bromeliads. For details, we refer to Wolf & Konings (under review).

Two approaches may be followed to attain sustainability of yield. By means of demographic and/or genetic studies and modelling we may attempt to establish the minimum viable population size and propose management interventions accordingly, based on population viability analysis. A reliable analysis, however, requires observations over a long period of time and has no universal value. For the immediately threatened forests and bromeliads in Chiapas we therefore suggest an empirical approach in which we start with an arbitrary definition, though based on generally accepted principles, of the most strict criteria for sustainable removal. Exploited species must then be monitored over time to see whether the initially stringent thresholds may possibly be lowered. We propose that harvesting should only be permitted from populations (i) with a high population density, (ii) that are evenly distributed in space, and (iii) for which the reproductive potential will not be affected by the removal.

Harvesting from a small population might negatively affect the local survival of a species, since small populations may experience reduced offspring fitness and a loss of genetic variability through inbreeding or genetic drift. In addition, they are considered to be more vulnerable to demographic and environmental stochasticity, and to natural catastrophes. We suggest the use of a minimal population density limit for exploitation of 10.000 large rosettes/ha, a threshold ten times higher than that applied in a stable *Tillandsia circinnata* population in Florida.

We consider that populations that are spatially evenly dispersed within a homogeneous habitat are at carrying capacity, for which the extinction risk is also smaller. We presume that for three-dimensional epiphytic populations at capacity this implies that over the entire forested area the abundance of epiphytes on trees of a larger inhabitable size is nearly proportionally greater than the abundance on smaller trees. On the basis of a pilot study in three forest stands at 'La Florecilla' along a disturbance gradient, we propose to employ the squared correlation coefficient (r^2) of a linear correlation of Tree Size against epiphyte abundance as an index of spatial homogeneity (ISH) of the population. The variable Tree Size is a linear combination of DBH and number of branching points. At the least disturbed stand, the ISH was 0.901 and accordingly we suggest that at La Florecilla harvesting

should be limited to populations with an ISH >0.90 ($p<0.001$).

To assure that the removal of rosettes does not affect the reproductive capacity of the population, we propose exploiting only that part of the bromeliad population that grows in the lower stratum of the forest, including the forest floor. Population densities in the lower stratum of the forest are likely to depend on a seed supply from the canopy. In contrast, canopy colonisation by wind dispersed seeds from lower strata seems unlikely and plants that grow near the forest floor are not likely to play an essential role as providers of progeny for populations of bromeliads that seem best adapted to survive in the canopy.

For a second study at 'La Florecilla' we developed a user-friendly transect method that aimed to identify populations of bromeliads that may be harvested sustainably (Table 1). We found one species, *Tillandsia vicentina*, with both a satisfactory average population density of about 24,000 rosettes of over 20 cm/ha on oaks and an ISH of 0.91, after excluding oaks (40%) that sustained few *Tillandsia* plants. We allow the exclusion of up to half of all host trees that support few bromeliads, since in the structurally heterogeneous forest we expect a high variability between trees due to the random sampling design. Less than 20% of the population occurred in the lower stratum of the forest, up to a height of 6 m. In compliance with the proposed prerequisites and taking into account certain quality considerations, we estimate that it is possible to sustainably harvest about 700 rosettes of *T. vicentina* /ha/yr from the understorey and forest floor, in a 4-year rotation cycle; equivalent to an annual yield of 112,000 rosettes from the entire forest at La Florecilla. The implementation of a monitoring programme that makes use of the transect method is a necessity for any management plan. We hope that the exploitation of bromeliads as an alternative NTFP will contribute to community economic development and conservation of both the bromeliads and the forests they grow in.

Acknowledgements
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CERTIFICATION OF NTFPs : AN EMERGING FIELD

By Patrick Mallet and Marion Karmann

Certification is a market-based tool that is becoming a hot topic in many natural

resource sectors. A certification logo or label enables potential customers to differentiate products, based on the social and environmental 'qualities' of the commodity they decide to buy. This market opportunity is motivating many producers to adapt their management practices to meet certification criteria.

The harvest of non-timber forest products (NTFPs) is coming under increasing scrutiny from certification programmes because of the key role that it plays in the sustainable management of community agriculture and forest resources worldwide. NTFPs are presenting many new challenges and opportunities in certification due to the wide range of management practices and difficulty in monitoring their harvest and processing.

While NTFPs have been certified through organic certification and, to a lesser extent, under fairtrade systems, the primary focus of recent work to develop certification has been through the Forest Stewardship Council (FSC). FSC promotes well-managed forests by applying criteria that address ecological, social and economic issues. The NTFP Working Group of the FSC has been undertaking field trials and interpreting the FSC Principles and Criteria to make them more appropriate for the harvest of NTFPs.

The following categories of criteria are included within the FSC and are useful in measuring the sustainability of all types of production systems:

- management plan, monitoring, evaluation;
- ecological harvesting and management activities;
- biodiversity conservation;
- regulating the use of chemicals;
- tenure and customary use rights;
- fair returns, adequate benefits;
- safe and healthy working environment;
- impact on local and indigenous communities; and
- economic viability.

While FSC is most closely associated with NTFPs, it is also the most expensive certification programme to implement. In addition, the FSC system is difficult to apply to the vast majority of informal community-based NTFP operations that constitute the bulk of NTFP harvesting worldwide. FSC is beginning to look at new models of community-based certification where a number of harvesters are certified as a group or where a resource manager is certified to oversee multiple harvesting operations. Despite this recent progress, FSC certification is probably still most appropriate for large scale industrial NTFP operations.

For small scale NTFP operations, as is the case for most food and medicinal product harvesting, organic agriculture certification provides a reasonable alternative. The range of criteria addressed under organic certification is narrower than under FSC, with an explicit focus on building soil fertility and crop management techniques. However, organic certifiers are beginning to look at landscape level issues as well as social concerns. Given the relatively low cost of certification and strong consumer recognition for organics, this certification may be most appropriate for many NTFP harvesting operations.

Fair trade is also an option for NTFP certification although only for southern producers. Fair trade is beneficial for small producers since its primary focus is on ensuring that they receive a fair deal for their products. Secondly, the costs of certification are borne by the retailer and consumer rather than by the producer. The current scope of products covered under

fairtrade only includes a few agroforestry products although it is likely that this product base will grow to include NTFPs.

One issue on which all certification programmes can agree is that certification specific to NTFPs is still very recent and largely untested. However, the recent work of the FSC NTFP Working Group has gone a long way to refining certification for NTFPs. Trial certification assessments for specific NTFPs like chicle gum, Brazil nuts, and chestnuts have resulted in product specific interpretations of the FSC Principles and Criteria. In another case, SmartWood, an FSC-accredited certifier has developed a generic addendum to their criteria that will be used as the basis for all their future NTFP assessments. Finally, IMAFLORA, an organisation in Brazil is assessing the possibility of certifying a forest region from which a wide range of medicinal plants are harvested, based on the individual management plans developed for each species.

There are a number of challenges facing NTFP certification. Among the most critical are the following:

- Lack of ecological knowledge about individual species, including baseline data, sustainable harvesting levels and resiliency levels. This knowledge is often only relevant to specific ecological niches and is held in part by local harvesters. The threat to sustainable harvesting comes when a market value is attached to the individual species and harvesting rates increase.

- Possible negative impacts of certification on small producers and subsistence users, including their need to prove or formalise customary tenure and access rights and even the potential loss of subsistence use rights due to increased market demands.

- Difficulty in realising market benefits from certification. Markets for certified products are not well developed and tend to occupy niche markets for high quality products. Often quality control measures in NTFP harvesting / processing need to be developed. Additionally, it has yet to be shown whether certified NTFPs are able to command a higher price in the marketplace.

- Lack of overall experience with NTFP certification including absence of skills in assessing the characteristics of specific NTFPs, lack of standard policies and the difficulty with integrating timber and NTFP certification.

The primary goal of certification is to bring about positive environmental and social change in resource stewardship. Certification criteria can be used by producers and harvesters everywhere as a model for best practices. It must be remembered that the time and financial costs associated with undergoing a certification assessment often outweigh the benefits derived from being certified. When considering NTFP certification, the best option may be not to pursue a formal assessment.

Certification is only one tool among many to move towards more sustainable production systems. It will take further refinement of certification programmes to meet local realities, more producers and harvesters willing to test the certification market, and increased demand by

consumers for certified products before the full benefits of NTFP certification are felt.

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NTFP CERTIFICATION: CHALLENGES FOR RESEARCH

By Jelle Maas and Mirjam A.F. Ros-Tonen

Background: the emergence of NTFP certification

Various organisations have taken up the issue of NTFP certification (Dürbeck, 1999). This issue has gained a more pronounced place on the international agenda since the NTFP Certification Workshops organised by the Falls Brook Centre (Canada) in Oaxaca, Mexico. Although there are only a few officially certified NTFP products to date, an increasing number of initiatives are being taken to develop standards for NTFP certification. Mallet (1999) distinguishes three types – or fields – of NTFP-related certification initiatives.

Sustainable forestry

Certification of sustainably managed forests is mainly based on principles for Sustainable Forest Management. Many sets of criteria and indicators prepared for timber certification could partly be applied to NTFPs. Specific sets for the management of NTFPs from natural forests are those of the Forest Stewardship Council's (FSC) NTFP Working Group and the Rainforest Alliance/Smart Wood (Rainforest Alliance, 1998; Shanley *et al.* 1998). Within this group of sets, an important issue is the definition of NTFPs and the distinction between products from forests and anthropogenic (human-made) vegetation types. Organisations such as the Institute of Forestry and Agricultural Management and Certification (IMAFLORA, Brazil), the Consejo Boliviano para la Certificación Voluntária (CFV), Estudios Rurales y Asesoria (ERA, Mexico) and the WWF Mediterranean Programme in Greece are undertaking field tests of standards for NTFP certification (FBC, 1998; Mallet, 1999; Lintu, 2000).

Certification of forest management in a defined area is based on performance requirements. Another option is to certify the environmental management system (EMS) of a forest organisation, which is typically made according to the respective international standards (ISO 14001/14004). EMS does not lead to product labelling (Demidova and Alhojarvi, 2000).

Organic agriculture

Certification systems for NTFPs from human-altered vegetation types are partly being developed by organisations in the field of organic agriculture. The most important among these are the International Federation of Organic Agriculture (IFOAM), the Organic Crop Improvement Association (OCIA) and ECOCERT International, which deals with the EC2092/91 regulation for organic agriculture. These certification schemes mostly focus on principles of organic production, addressing other criteria to a lesser extent.

Fair-trade
Fair-trade based criteria sets mainly focus on socio-economic criteria, with only general emphasis on ecological and management issues. The Fairtrade Labelling Organization (FLO) coordinates 17 national Fair-trade systems.

In addition to these basic types of certification, there are a number of other initiatives and procedures developed or under development among which *Analogue Forestry*. Analogue Forestry is a type of complex agroforestry developed by the Neo Synthesis Research Centre (NSRC) in Sri Lanka. The system encourages farmers to mimic the structure and ecological functions of the local natural forest ecosystem using species that provide them with a range of products for personal consumption or sale in the marketplace. Farmers benefit from the diversity of products that they harvest while also restoring the natural environment and supporting key ecological processes like soil retention and water purification (Senanayake and Jack, 1998).

Research priorities in NTFP certification
While most of the aforementioned organisations focus on the development and testing of standards for certification, NTFP certification-related research is still in its infancy. Worth mentioning are the research-oriented activities of the Rogue Institute for Ecology and Economy (RIEE) in Ashland, Oregon, USA, and the NTFP Network for Sustainable Forest Management in the Mediterranean by the WWF Mediterranean Programme Office. The RIEE is focussing its research efforts on the education and training of NTFP harvesters in the USA and has developed a manual of sustainable harvesting guidelines for 27 NTFP species in Oregon (RIEE, 2000). The WWF project aims at the conservation of important Mediterranean forest areas through the promotion of rural community development in and around these areas and sustainable NTFP production (FBC, 1998).

As was indicated during the meetings in Oaxaca, Mexico (FBC, 1998), and in the literature (Pierce, 1999), many aspects of NTFP certification require specific research. The outline below, which builds on one presented in Maas (2000), is an attempt to categorise these needs. It follows the three main objectives of NTFP research distinguished by Ros-Tonen (1999), i.e. forest conservation, participatory natural resource management and improved livelihoods. A forest-oriented approach, aimed at forest conservation, focuses on the development of an ecologically sustainable extraction system. From a people-oriented perspective, research should be supportive to participatory forest management and improved livelihoods. The introduction of certification has a significant impact on the social structures of a community (emancipation of specific groups like harvesters or traders), but will also influence the availability of the certified product on the local market. Arnold and Pérez (1998) mention the importance of some kind of balance between subsistence needs and the commercialisation of NTFP resources.

The following makes clear that there is a challenge ahead for continued collaborative NTFP research for the benefit of tropical rainforests and the people who depend on them for their livelihood.

1. Forest-oriented approach
1.1 Forest conservation
- Identification of suitable products
- Identification of suitable forest areas/forest types
- Identification of key ecological information for sustainable

extraction methods
- Identification of key ecological information for sustainable harvesting levels (inventories)
- Development of tools to monitor the sustainability of the extraction at species and ecosystem level

2. People-oriented approach

2.1 Participatory management
- Recovery of traditional knowledge on which to base management decisions
- Development of "easy to understand and apply" management tools
- Provide scientific data for the development of criteria for "culturally appropriate" management of NTFP resources

2.2 Improved livelihoods
- Market feasibility studies
- Development of market monitoring tools for NTFP products ("chain of custody")
- Provide scientific data for the development of criteria for "socially just" NTFP extraction (fair returns, equitable labour and trade relationships, etc.)
- Assessment of the impact of NTFP certification on the stakeholders' social and economic environment
- Insight into the legislation relating to NTFP certification (taxes; intellectual and other property rights)
- Insight into appropriate and "ecological friendly" domestication, propagation and yield raising methods and techniques of potential commercial attractive NTFP and their integration into (human modified) forestry systems as a scientific basis for the development of criteria for NTFP resource management

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PROPERTY IN NTFPs

By Louise Fortmann

In this, the briefest of discussions of property and NTFPs, I discuss what property is, complexity, and the beneficiaries of property rights. If you have specific questions, please contact me at the address below.

What is Property?

To understand property in NTFPs we need to dispel four commonly held assumptions about property. First, we often think of property as being things – our house, our clothes, our bicycle. This commonsense notion is misleading. Property is actually a social relationship among people. It is an enforceable claim to rights in something. That is, my cattle are my property because other people (or the state) recognize my right to them and will enforce my property rights against would-be cattle rustlers. A second common mistake is to think that the property rights regimes in the North are universal. To the contrary, there is significant variation in what can be claimed as property and what sorts of things are

bundled together in a single property right. In particular, people often think that every thing that is found on a piece of land – water, trees, plants, wildlife, minerals – is owned along with the land. In fact, property rights in trees and so on are not infrequently held separately from the land. Third, we often assume that if you own something, no one else has rights to it. Actually, multiple people can have rights to different uses of the same object. For example, I may own the timber in a pine tree, but you have the rights to all the needles and cones until I harvest the tree. Finally, we tend to think that property is what the government says it is; that property rights have to be recognized by the state. To the annoyance of many governments, local people create their own enforceable property regimes all the time.

Property Rights in NTFPs Can Be Complex!

NTFPs take at least three different forms – products of trees, e.g., firewood, fruit, bark, roots; products from the understorey, e.g., grass, berries, mushrooms; and fugitive resources that live in or move through a forest/tree – wildlife, insects, birds. Thus, thinking about property in NTFPs raises three kinds of questions about what property rights give rise to other property rights. Who owns the trees and does s/he therefore own all parts of the tree, everything in or on it, and/or the land on which it is growing? Who owns the land and does s/he therefore own all the trees, everything in the understorey, and/or everything passing through? Who owns the fugitive resources and does s/he therefore own the land and/or trees on/in which these resources are found?

We must also ask, what, in the absence of a title from the government, creates what kinds of property rights? And for all rights to NTFPs we must ask under what circumstances do what categories of people have what rights, where, for how long? Obviously for any aggregation of trees, be it a forest, a woodlot, or small numbers of individual trees, there is potential for a complex array of overlapping rights in NTFPs.

Just Who Benefits from NFTPs ?

Property rights are important because they increase the likelihood that a person can secure a livelihood from an NTFP. Discussions of livelihoods and livelihood strategies often focus on resident households This makes the often erroneous assumption that all members of the household benefit equally from household assets including NTFPs. In some circumstances, women and children are significantly less likely to benefit than men. Focusing on residents excludes regular mobile users from the picture.

In terms of household inequity, a fundamental problem lies in the distinction between access, ownership and control. This is most often a problem for women. The economist Bina Agarwal has shown that male family members may control land even though legally it is owned by a woman in the family. The same principle applies to NTFPs – access or ownership without control reduces the likelihood that a woman can earn her own livelihood from the NTFP. An independent livelihood is not only important for providing subsistence, but also affects a person's status and power within a household, including for a woman whether or not she is likely to be beaten by her husband. Another example comes from the geographer, Dianne Rocheleau. Men and women used the same tree, men for swine food and women for handicraft materials. But since women did not own or control the trees, when swine food was no longer needed, men cut the trees down, destroying a resource that women needed.

The question of intra-household entitlements also arises for NTFPs managed as a common pool resource particularly in the case of divorce or death of a household head. Decisions about the management of NTFP commons may also exclude the seasonal users such as nomadic pastoralists, migratory mushroom pickers. This has two implications for the migratory users. First, they may be excluded from access to the NTFP altogether. Second, for any number of reasons, management by resident users may not maintain an adequate level or quality of the NTFPs.

A Final Caution

Property rights are rarely a tidy set of rules. Property rights have histories that have effects in the present. Property rights change as informal arrangements emerge that may or may not be formalized but that, nonetheless, have clear effects on the ground. Thinking clearly about property rights in NTFPs requires a careful eye on the past and how it affects the present, a clear understanding of the different kinds and seasonalities of users and uses, as well as a grasp on the distribution of benefits.

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THE INTERNATIONAL FORESTRY RESOURCES AND INSTITUTIONS (IFRI) RESEARCH PROGRAM AND THE SEARCH FOR COMMUNAL MANAGEMENT OF FOREST RESOURCES

By Amy R. Poteete

The International Forestry Resources and Institutions (IFRI) research program is a network of collaborating research centres in Africa, Asia, Europe, Latin America, and North America. Members of the IFRI network use standardized methods to collect data on a common set of biophysical, socioeconomic, and institutional variables. Researchers return to forest sites every three to five years to conduct repeat studies. By building an international database of comparable repeat studies, IFRI scholars gain the ability to draw comparisons across a large number of cases and over time.[1]

IFRI studies suggest that the perceived value of a resource is the most important factor affecting the emergence and success of institutions for self-governance. The use of forest resources shapes perceptions of forest value and condition. Non-timber forest products (NTFPs) loom large in assessments of forests by local users of forest resources. The IFRI research protocols are sensitive to the multiple ways in which people interact with forests. We collect data on the use of a wide range of forest products including trees, bushes, grasses, leaves on the ground, climbing leaves (e.g., vines), soils, stones, minerals, and wildlife. Of the pairings of user groups and forests in our database, nearly all (87.4%) use at least one non-tree forest product. In fact, the most commonly used forest products for our study sites are grasses (70.5 %) rather than trees (compare parts of trees: 67.2 %; parts of bushes: 56.5 %; leaves on the ground: 35.9 %; climbing leaves: 32.2 %; soils, stones and minerals: 34.9 %; wildlife: 34.6 %)! The availability of NTFPs clearly influences assessments of forests by the people who use them, and thus affects their willingness to take action to protect their forest resources.

The ease with which the condition of the resource can be determined also influences perceptions of values associated with the forest (Gibson, McKean and Ostrom 2000). Reliable indicators of not only the condition of the forest, but also of links between the forest and its indirect services, are especially important. IFRI studies in several countries find that local people fail to take the actions needed to protect their forest resources when they are not aware of intangible forest services (e.g., watershed protection) that are at risk (Becker 1999; Becker and León 2000; Gibson 2000). The information that IFRI researchers collect on changing forest conditions and their consequences can be used to help increase local awareness of indirect forest services, and thus bolster local efforts at forest conservation (Becker 1999).

Recognition of a forest's value provides a motivation for working collectively to protect it, but does not guarantee collective action or its success. Collective action is costly. In addition to obtaining information, actors must overcome coordination problems, distributional struggles, and the incentive problems associated with shared resources. Characteristics of groups, such as their size and degree of homogeneity, gain importance because they influence the severity of coordination problems and distributional struggles. External recognition and support for local self-governance are also important factors. If the benefits of mobilization are high enough, a community may develop rules for resource management in the absence of external support. Official recognition of local autonomy lowers the transaction costs of self-governance.

Once established, institutions alter the importance of conditions that affect their survival. Institutions limit the effects of population pressure (Agrawal and Yadama 1997), population growth (Varughese 2000), and variable proximity to forest resources (Varughese and Ostrom, 2001).

By paying attention to biophysical, socioeconomic, and institutional factors, IFRI furthers our understanding of forest systems. We better understand the role of perceptions of forest value and condition, the importance of institutions in mediating the effects of social and economic changes, and the conditions for successful organization for forest management by the people who use forest resources. Of course, many questions remain. As our network grows and the number of repeat studies in our database accumulate, IFRI brings increased leverage to on-going efforts to untangle the relationships among people, their institutions, and forest resources.

[1] As of December 2000, there are fourteen IFRI collaborating research centers in twelve countries. The first were established in 1993. Revisits have begun in Nepal, Uganda, and the USA. For more information, see our website (http://www.indiana.edu/~ifri).

A complete set of references is available from the IFRI website:
http://www.indiana.edu/~ifri/publications.htm

or as a separate PDF file:
http://www.indiana.edu/~ifri/poteetereferences.pdf

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FORGING (UN)DEMOCRATIC RESOURCE GOVERNANCE SYSTEMS FROM THE RELIC OF ZIMBABWE'S COLONIAL PAST

By Alois Mandondo

This article reviews natural resource governance in Zimbabwe's peasant sector from colonial to post-colonial times, with special emphasis on woodland resources. Governance is considered within the framework of power, process and practice and how these have shaped access, control and use of natural resources.

Zimbabwe's policy thrust seeks to empower peasant communities through decentralized entrustments to the use and management of natural resources. A careful examination of what is being decentralized to whom, how and with what effect shows that decentralization can have very little to do with democratization of forest management despite rhetoric implying decentralized structures and arrangements and democratic governance. For instance, founded upon the expropriation of land, resources and power from indigenous communities the colonial system of decentralized indirect rule of chiefs and allied "traditional" institutions, which were presided over and controlled by native commissioners to impose colonial administration, was very much about extending the power of the central state. This was justified in terms not unlike those advocating decentralization today, e.g. respect of local cultures; fiscal accountability; and giving people a voice in their own governance. Colonial natural resource governance systems were crafted in the context of conquest and subjugation and the extension of the power of the central state resulting in over-centralization of natural resource governance systems. Centrally-directed legislative controls were implemented in a highly authoritarian manner resulting in restricted access of peasant communities to natural resources.

Much of the colonial legislation was inherited piecemeal into post-colonial times. Although local government reform in the post-colonial period was purportedly adopted to give a democratic orientation in planning for local development, such reforms neither genuinely decentralized nor democratized local government. Instead, such reforms appear designed to ensure one-party political domination. Post-colonial amendments to over-centralized controls on peasant access and use of natural resources to date have largely deracialized the colonial acts and policies without democratizing them – most acts still feature the criminalizing, and command and control postures and approaches of their colonial antecedents. Natural resource governance systems have thus, by and large, resulted in weakening of the peasant stake in access, use and control of natural resources, from colonial through to post-colonial times.

Various strands of peasant disempowerment are evident. The first form is reflected through structures that deny peasant communities accountable forms of representation. For instance, the "traditional" chiefly institutions were founded on the undemocratic principle of fusion of legislative, executive and judiciary powers. Although the creation and reinforcement of such structures ran under the pretext of building on the legitimacy of existing structures, their design enhanced racial domination and the ascendancy of colonial administration, resulting in a decentralized despotism. Over the years

chiefly institutions have been used to legitimize external (mostly state) agendas that further weakened the peasantry, including the extension of the state's influence or reviving its political mileage. The chiefly institutions existed in tandem with new institutions created by the state in the immediate post-independence period, ostensibly to democratize the process of planning for local development, but these also served to further the interests of one-party political domination.

The second form of disempowerment has been practised through the over-centralization of power and decision making in environmental regulation systems. A trend towards concentrating power in the executive, especially the presidency and bureaucracies under executive direction, was entrenched from colonial through to post-colonial times. In spite of aspiring to extend far-reaching control, the state and its bureaucracies lack the resources and capacity to effectively enforce most controls Third, over-centralization was justified through yet another form of disempowerment associated with discourses of "science" that justified a command and control approach to environmental regulation. The peremptory approach to environmental regulation was inherited piecemeal into post-colonial times, in which later amendments to colonial acts fell far short of democratizing the regulation systems. A fourth, and procedural form of disempowerment occurs through the use of alienating languages in local government bodies that are characterized by decision-making frameworks that override the visions of lower constituencies. Fifth there is fiscal disempowerment through urban biases in investment priorities, externalization of locally-collected revenues and also through the burdens imposed upon tax-payers by a multiplicity of bloated organizational hierarchies. Lastly there is a generalized disempowerment associated with presence at the local of many organizations, essentially sharing the same broad goals but with different and often “predetermined” visions of how, when, for whom and through whom to achieve them.

Lastly, pioneering efforts at decentralizing entrustments over use and management of resources to the peasant communities have largely resulted in recentralization at the district level, where such efforts are still practised in the top-down manner. This is in part because the policy thrust seeking to empower the peasant communities is supply-led, and thus defined according to the terms and processes of external agents, including funders of projects and central governments and their functionaries. Most forms of disempowerment reflect the dangers of supply- led decentralization in which states enjoy a free reign in defining governance systems, and the nature and extent of the entrustments to be devolved to local communities. There appears to be general reluctance on the part of the state to decentralize meaningful entrustments to local communities. Supply-led decentralization, therefore, needs to be complemented by demand-driven decentralization, conceivably championed by civil society to ensure genuine democratization and empowerment in natural resource management.

Incremental strategies could, because of a general absence of a vibrant civil society or social movements, particularly from the local settings, provide the initial front of engagement including advocacy for transparency and accountability within supply-led decentralization. As civil society and advocacy movements gain strength the agenda could be broadened to include advocating for reforms in governance structures and arrangements. Tactically, meaningful entrustments already secured

for the community should be consolidated , whilst advocating for the expansion of the existing sets of entrustments. Most decentralization initiatives, including the CAMPFIRE programme, Zimbabwe's flagship for peasant empowerment in natural resource management, are nevertheless being implemented within a broader national political economy of racial inequities in the distribution of land. They therefore carry the stigma of "delaying tactics" or "diversionary pursuits" to the more fundamental question of land redistribution, which represents potentially the most important direction towards genuine empowerment of local communities. The major challenge of the unfolding land drama to civil society is the high polarization and the politically charged nature of the issue.

Community-based or CAMPFIRE-type approaches are also premised on the deep green ethos and values of a global (western) environmental discourse and scientific culture – participation for environmental conservation. Decentralization conceptualized within the framework of that culture is supply-led – guided by the values of that culture, and inherently top-down. That culture offers limited room for community empowerment without instrumentalizing it just for participation for environmental conservation. The challenge to civil society is to demand decentralization on the terms and definitions of beneficiary communities.

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THE ROLE AND DYNAMICS OF COMMUNITY INSTITUTIONS IN THE MANAGEMENT OF NTFPs IN CAMEROON

By Jolanda van den Berg, Han van Dijk, Guy Patrice Dkamela, Yvette Ebene and Terence Ntenwu

Introduction

Most ongoing research on NTFP production focuses on the potential for nature conservation, particularly in terms of economic and ecological sustainability. Less attention has been given to the dynamics of indigenous NTFP management systems, although it is widely acknowledged that the capability of communities to manage and control NTFP exploitation is of major importance for sustainable extraction. Indigenous management systems tend to be responsive to external factors such as demographic, economic, political and ecological change, which may lead to an increase of tenurial insecurity and to destructive harvesting practices.

The study

This study aimed to gain insight into the role and dynamics of community-based institutional and regulatory frameworks related to NTFP resource exploitation and management in the humid forest zone of Cameroon. It was focused on the relations between increasing commercial value of NTFPs and exploitation and management intensities, on the one hand, and the social sustainability of community-based NTFP management institutions on the other hand. A comparative study on six pre-selected NTFP species was undertaken. Three research sites were selected: Dja Biosphere Reserve, Lékié district and the Tropenbos-Cameroon site. These are comparable with

regard to ecological conditions and local utilisation of these species, but different in respect to four factors that can have an impact on the intensity of NTFP resource exploitation and management: (a) availability of NTFP resources; (b) market access; (c) population density and (d) presence of non-governmental and private agencies (e.g. development and conservation organisations, logging companies). In each site, three representative villages were chosen. The selected NTFP species were expected to occur commonly and to be used and marketed in at least two of the three sites. They had to be extracted from various habitats (ranging from natural forests to plantations) and their exploitation had to represent different levels of risks for unsustainable harvesting. The following NTFP species were included in the study:

(1) *Irvingia gabonensis*
(2) *Elaeis guineensis*
(3) *Baillonella toxisperma*
(4) *Garcinia lucida*
(5) *Garcinia kola*
(6) *Coula edulis*

The survey included interviews with individual villagers based on questionnaires. In total 237 villagers (109 men and 128 women) were interviewed. The questions covered NTFP utilisation and its purposes, the relative and absolute importance of the selected NTFP species, and the construction of different sets of property rights to these NTFP species. Also, information was gathered on socio-economic conditions and the social and political organisation. The fieldwork took place end 1999.

Main results

No cases were recorded where exploitation of the selected species was legitimised or constrained by external regulatory frameworks. Customary tenure in NTFP resources in south Cameroon can be depicted as a variable combination of group rights to manage or control access to, exploitation and production of NTFP resources on the one hand, and individual user rights on the other. Four factors were identified that determine the distribution of such property rights, as well as the social unit in which these rights are established: (1) land types; (2) the way land was acquired (inherited versus self-acquired through forest clearance or purchase); (3) the nature and intensity of improvements to land or resources; and (4) the type of resource concerned.

In all areas, land right holders are limited by secondary user rights to NTFP resources on their land. The distribution of secondary user rights differs between and within the research areas, but the group of people holding user rights to NTFP resources is always larger than the group who holds the right to control and manage access, exploitation and production, except for oil palm (*Elaeis guineensis*). In cases of self-acquired land resources, particularly cash crop plantations, the group of user right holders is the most restricted. Planting NTFP trees creates the most individual rights, including exclusive user rights. Among Badjoué people in the Dja area, for all land use types involved, user rights are the most widely distributed.

There exists considerable variation in NTFP utilisation, commercialisation, exploitation and management practices and tenure between different areas in southern Cameroon as well as between the selected NTFP species. In the most densely populated and most accessible area (Lékié), there is a tendency to abandon the exploitation of commonly used NTFPs and to buy these products instead. However, the level of NTFP commercialisation is higher

compared to the other areas. There is also a shift in production areas from natural forests with predominantly communal NTFP management and broad distribution of user rights to NTFP resources, to man-made production systems with more individually based management and use of NTFP resources. But a broad distribution of user rights during peak production periods in the Lékié area suggests a strong resilience of customary property perceptions and relations. Moreover, the level of application of management techniques in this area is as low as in other areas. This is in contrast with the expectation that increasing exploitation pressure and reduction of suitable forest habitats will lead to more intensive management in modified forest-like systems.

Conclusions

The study did not reveal that the extent of forest degradation and related decrease in availability of wild NTFP resources, or the presence of favourable economic conditions, influences the level of applied NTFP management techniques. The variation between particular NTFP species in terms of management practices and intensities, calls for the establishment of species-oriented NTFP development approaches and not only a production system approach. Further research is needed to evaluate the importance of land use conditions (in particular land availability and tenure security) and cultural factors (in particular local perceptions of NTFP management and ownership) in relation to specific resources in order to optimise the impacts of NTFP based development efforts.

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NTFPs IN THE BOLIVIAN AMAZON: SOCIO-ECONOMIC IMPACT IN VIEW OF INSTITUTIONAL DEFICIENCIES

By Dietmar Stoian, Carmen Gottwald, Sergio Ruiz, Wil de Jong, Michel Becker & Alan Bojanic

Since 1996, the Institute of Forest Policy (IFP), Markets and Marketing Section, of the University of Freiburg has been collaborating with CIFOR in a research project on NTFPs in the northern Bolivian Amazon, co-funded by the German Federal Ministry of Cooperation and Development (BMZ).

The first phase of the joint project focussed on the socio-economic impact of northern Bolivia's Brazil nut and palm heart

industries on regional development. Employing a livelihoods perspective, it could be demonstrated that the gathering, processing, and marketing of Brazil nut and palm heart is an indispensable source of household income in both rural and peri-urban areas. Contrary to what the literature suggests, NTFP extractors are not generally marginalized in the extractive economy. Rather, the benefits captured by those at the very beginning of the marketing chain are subject to considerable variation; these depend on access to the resource base, transportation and market information, as well as the contractual arrangements governing the extraction process and the family labour available.

Though also subject to variation, benefit sharing in the palm heart industry is even more in favour of the extractors: gatherers, intermediaries and processing plant operators gain typically 40%, 22% and 38% of the F.O.B. price, respectively. In sum, NTFP gatherers in northern Bolivia's extractive economy pocket the highest profits per production unit, followed by owners of large estates or processing plants, the plants' labourers, itinerant traders, and contractors.

It was found that rural households carefully balance the trade-offs between extractivism, agriculture and wage labour. Rural dwellers in more remote settlements emphasize extractive activities whereas those in the proximity of town gear a larger share of their agricultural produce to the market. The persistence of NTFP extraction is thus rooted in a varied NTFP portfolio and flexible responses to market opportunities and decline, rather than the deliberate management of NTFP resources with a long-term view for sustained production. Extraction-based livelihood strategies further entail seasonal or circular migration in accordance with times of low or high demand for labour, e.g. residence in (peri-) urban areas from where they set out to the forest only in times of the Brazil nut or palm heart season. A strong rural-urban nexus underlies various extractive activities, without which neither the extractive economy nor (peri-) urban livelihoods could be sustained.

The ultimate rubber decline in the early 1990s led to a further diversification of the regional economy: along with increased agricultural activities, the region's Brazil nut, palm heart and timber industries have been notably expanded. Given the region's poor soils, scarcely developed infrastructure, low market access, lack of capital and human resources, and general political neglect, it is anticipated that northern Bolivia will have to rely on the exploitation of (non-timber) forest resources for a long time to come.

The research revealed that the institutional arrangements governing their extraction are poorly understood. To address this shortcoming, a second phase will highlight the institutional arrangements, constraints and conflicts in northern Bolivia's extractive economy. One of the hypotheses is that adequate institutional arrangements are of major importance in promoting sustained use and benefit capturing in extractive economies. It is presumed that present institutional arrangements need modification to work toward this end.

The theoretical framework will draw on the concept of New Institutional Economics (NIE), whereby institutions are understood as the rules of the game in a society or, more formally, the human devised constraints that shape human interaction; in consequence, institutions structure incentives in human exchange, whether political, social, or economic (North 1990).

NIE is an interdisciplinary approach to explain phenomena which have not been adequately addressed by Neoclassical Economics. It implies aspects such as property rights, transaction costs, asymmetric information and power relations. In addition to NIE, the analytical framework will draw on the concepts of Political Ecology and Social Capital.

Institutional analysis in the case of northern Bolivia will emphasize the profound legal reforms the country has experienced in the last decade with a wide impact on natural resource use. At local level, there is also a range of institutions other than laws (e.g., a system of advance payments called *habilito*, or customary rights related to land tenure) which play a crucial role in the extractive economy. Being informal or private, these institutions complement or, in some cases, conflict with formal institutions such as laws. Thus it will be crucial to distinguish between *de jure* and *de facto* institutional arrangements when analysing the institutional underpinning of (non-timber) forest use.

Research is coordinated by Dr. Wil de Jong (CIFOR) and Prof. Dr. Michel Becker (IFP). PhD students in the first phase are Alan Bojanic (University of Utrecht) and Dietmar Stoian (IFP) and, in the second, Carmen Gottwald and Sergio Ruiz (both IFP).

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NTFPs AND DEVELOPMENT CO-OPERATION – PERCEPTIONS AND STRATEGIES OF DECISION MAKERS

By Jochen Statz

International discussions see the promotion and marketing of Non-timber Forest Products (NTFPs) as a promising approach to reconcile the dual aim of protecting tropical forests and promoting societal development. Yet, in practice, use and trade of NTFPs still plays a subordinate role in the field of development co-operation. A growing number of NTFP-related studies document a wealth of positive aspects of this form of forest use. It remains uncertain, though, how these isolated aspects can contribute to a development that integrates economic, social and ecological aspects.

A PhD-study published recently at the University of Freiburg/Germany looks into potential benefits of NTFP-based forest use. In two South American countries it analyses how decision-makers involved in national development policy and international development co-operation perceive this potential.

Decision makers working in development co-operation determine how prominent a role NTFPs play in forest based development co-operation. It is therefore crucial to understand how they perceive the potential for the use and trade of NTFPs. To answer this question 60 experts (15 in Paraguay and 45 in Bolivia) representing the research sector, policy making, administration and trade, as well as development co-operation, were interviewed. They were asked about their development paradigms and their assessment of the possible contributions of NTFP-based forest use to development. Furthermore, they were asked to outline strategies for the promotion of NTFPs use in accordance with their individual understanding of development.

These interviews were semi-structured and took between one and two hours each. Statements made during the interviews were grouped thematically. Key hypotheses about the successful promotion of NTFP use and trade were derived in a second step. Subsequently, a reference group of the experts discussed and further refined the preliminary findings, leading to a set of five key approaches to successful NTFP promotion. They comprise: 1) intensifying NTFP related research; 2) promoting the concept of sustainable development at the national level, 3) sustaining substantial economic returns from use of NTFPs 4) gaining support of the private sector and 5) promoting NTFP trade stepwise (with marketing of selected products first locally, then regionally and at a later stage internationally). Potential benefits of each of these strategies are not cumulative, i.e. combining as many approaches as possible will not automatically lead to ever more successful strategies.

For further analysis of the verbal data, a Qualitative Comparative Analysis was carried out, an analytical tool developed for comparative social science research by RAGIN. As a result key features of strategies to promote NTFP trade were determined and then combined with each other. The interviewed experts saw a number of combinations as promising for the promotion of NTFPs, each being a very specific combination of the strategic elements listed above. Amongst them, economic success in the marketing of NTFPs appears to be crucial, yet only if accompanied by a political and economic setting committed to "sustainable development".

The analysis of the verbal data reveals that none of the five approaches is seen as *sufficient* or *necessary* in itself for a successful promotion of NTFPs. All of them can lead to success if combined with certain other characteristics, yet can lead to undesirable results if combined with others. To cite an example, introducing NTFPs to international markets is not seen as beneficial *per se*. It is rather the specific combination with other approaches (in some cases even their absence) that is expected to result in societal development.

Strategies developed for Paraguay and Bolivia differ in some key traits: while applied research combined with a market oriented approach is seen as promising in Bolivia, experts in Paraguay fear that an intensified marketing of NTFPs might lead to further depletion of forest resources. For Paraguayan experts, intensified forest use is not justified until "sustainable development" is well established in the country.

According to the interviewed decision-makers, two prominent key positions commonly held in the international debate ("conservation through commercialisation of NTFPs" and "development through

empowerment of NTFP users") only prove adequate under very specific conditions.

In translating the results of the studies into concrete strategies it needs to be born in mind that the general approach to development co-operation has shifted from "transitive development assistance through projects" to "support for reflexive, autochthonous initiatives pursuing development". In line with today's conception of development assistance this process should not be unilinear and teleological (i.e. bound to a predefined purpose) but rather open as far as the specific outcomes of such initiatives are concerned.

Furthermore, a universal approach to the promotion of NTFP-based forest use and societal development is elusive due to the very diverse natural, economic and social conditions in the various regions of both countries.

Strategies derived in this study can serve as a point of departure for the promotion of NTFPs, but they are only preliminary. Bearing in mind that development is more a process than a target, constant reflection and revision of development strategies based on the use and trade of NTFPs will be required. To this end, the QCA applied in the study can serve as a monitoring tool.

The dissertation concludes with a set of theses regarding the "Promotion of NTFPs in development co-operation" which go beyond the narrow geographical focus of the study.

Please contact the author with comments or for a copy of the dissertation (written in German):

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GLOBAL ASSESSMENT OF BAMBOO AND RATTAN RESOURCES

Over 1,000 known bamboo and rattan species grow over wide areas of Africa, Asia, the Caribbean and Latin America and contribute to the livelihoods of millions of people. Despite its economic significance, statistics on bamboo and rattan resources, especially in natural stands, are very poor. Classified as "non-timber forest products", bamboo and rattan are not routinely included in resource inventory. A good and transparent estimate of bamboo and rattan resources has yet to be developed.

As a first step to improve the information available, the International Network for Bamboo and Rattan (INBAR) and the UNEP World Conservation Monitoring Centre (UNEP-WCMC) are jointly initiating a project to estimate the magnitude and distribution of bamboo and rattan resources within natural stands. In the first instance, the project will combine information on the distribution of individual taxa with floristic data and global data on forest cover to generate a global distribution and estimated total area of forest containing bamboo and rattan. For this reason, we are seeking advice and information about bamboo and rattan occurrence and distribution. We would be grateful for any information you might be ableto provide concerning:

- the species of bamboo and rattan present in your area;
- physical factors that determine their distribution;
- the abundance of bamboo and rattan resources;
- the abundance of bamboo and rattan within particular forest types;
- additional sources of information or contacts we should make.

Please contact us with comments and questions:

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By Jelle Maas

In the Directory of information resources for non-timber forest products, compiled by David Russo, an array of information is made available on NTFPs in the literature and on the web. **http://www.conservation.org/ library/books/pdf/ntfpdir.pdf**

The promotion and development of Non-Wood Forest Products (NWFP) is a priority area of the FAO Forest Products Division. At their homepage **http://www.fao.org/ forestry/FOP/FOPW/NWFP/nwfp-e.stm**) information on their publications and activities can be retrieved as well as an electronic version of their newsletter (Non-Wood News). Very interesting are the database on institutes involved in NTFP matters, including research, their bibliographic database and the linkage with the Forest Resource Assessment 2000 (FRA) which, for the first time, includes NWFPs in its assessment.

At **http://www.ntfp.org** ProFound advisors in development present their definition of NTFPs, as well as a bulletin of the NTFP exchange programme Southeast Asia newsletter with interesting articles titled 'Voices from the Forest'.

The research programme of the Tropenbos Foundation has a significant NTFP component. Several research projects concentrated on NTFP in Cameroon, Guyana, Colombia, Côte d'Ivoire and Indonesia. This resulted in various publications available from Tropenbos offices in the countries and Tropenbos Head Office in Wageningen, the Netherlands. Orders can also be placed through the Internet: **http://www.tropenbos.nl**

The International Network for Bamboo and Rattan (INBAR) is an international organization created by 21 Member States of the United Nations, and has Headquarters in Beijing, China. INBAR is dedicated to improving the social, economic, and environmental benefits of bamboo and rattan (**http://www.inbar.org.cn/**)

Plant Resources of South East Asia (PROSEA) is approaching its final stage (**http://www.bib.wau.nl/prosea/home.html**), but the approach was found so useful that a new initiative has been developed 'Plant Resources of Tropical Africa' or PROTA (**http://www.prota.org**)

APFT, Avenir des Peuples des Forêts Tropicales, is a multi-disciplinary project sponsored by the European Community which aims to investigate and document the future of the peoples of the rainforest. Started in 1995 the project runs for five years, and involves over 30 EU and ACP researchers (senior and trainee) in three principal areas: the Caribbean, central Africa and the South western Pacific.
http://lucy.ukc.ac.uk/Rainforest/.

PROMAB, Programa Manejo de Bosques de la Amazonía Boliviana, is a research programme of Utrecht University in the Netherlands in close cooperation with Universidad Tecnica del Beni, Bolivia and Instituto para el Hombre, Agricultura y Ecologia, Bolivia and University of Freiburg, Germany in association with CIFOR. The focus is on NTFPs such as palm heart, Brazil nut and Rubber, which are the major products of the Riberalta region in Northern Bolivia. For more information: **http://www.bio.uu.nl/promab/promab.htm**

The NYBG Institute of Economic Botany (IEB) focuses a portion of the Garden's research enterprise on applied botanical questions of great human concern. The field of economic botany, with its allied discipline ethnobotany, involves the study of the relationship between plants and people. Economic botanists pursue research projects on useful plants, from a variety of interdisciplinary perspectives. Information on their current projects and working countries is available at:
http://www.nybg.org/bsci/ieb/

For more information on Economic Botany the Society for Economic Botany (**http://www.econbot.org/**) is a useful source with many links to organisations, people and publications. Amongst the publications is the journal 'Economic Botany' published by the New York Botanical Gardens.

The Royal Botanical Gardens of Kew participate in several projects involving Economic Botany **(http://www.rbgkew.org. uk/scihort/ecbot.html**). One of these projects is the People and Plants Initiative, in close cooperation with UNESCO and WWF International.

(**http://www.rbgkew.org.uk/peopleplants/**).

For a full overview of sites on economic botany or ethnobotany please refer to the Internet directory for Botany at **http://www.helsinki.fi/kmus/botecon.html**.

The Institute for Culture and Ecology (IFCAE) in the US has a special site on NTFPs maintained by Eric T Jones (former editor of the NTFP-biocultural digest). This website contains conservation and development information on commercial, recreational, and subsistence extraction of NTFPs. Areas covered include cultural, ecological, economic, geographic, and political issues. **http://www.ifcae.org/ntfp/index.shtml**

The Falls Brook Centre in Canada pays attention to the Certification of NTFPs. They play an active role in the discussions and meetings organised on this subject by FSC in Oaxaca, Mexico. **http://www.web.net/~fbcja/programs/certmark/certmark.html**

The Centre of Minor Forest Products is geared toward promoting sustainable NTFP development with an emphasis on India. The website lists many publications on NTFPs and contains other useful databases. **http://www.angelfire.com/ma/MinorForestProducts/**

The Special Forest Products Website - Virginia Tech (USA) is a national clearing house focused primarily on NTFP products and markets. **http://www.sfp.forprod.vt.edu/**

Medicinal NTFPs

At **http://www.cieer.org/** the Centre for International Ethnomedicinal education and research has a special interest in medicinal plant products (**http://www.cieer.org/backup_index.html**). Another organisation involved in medicinal plant research, but specifically in relation to trade and conservation is TRAFFIC (**http://www.traffic.org**).

The Amazon Conservation Team (ACT) is dedicated to pioneering new conservation strategies by combining indigenous knowledge with Western science to understand, document and preserve the biological and cultural diversity of the Amazon. **http://www.ethnobotany.org/** or **http://www.amazonteam.org/**

The EthnoMedicinals Home Page: A page dedicated to the transfer of information on the use of herbs and other natural products in biochemistry, pharmacology, and traditional medicine. **http://walden.mo.net/%7Etonytork/**

Rainforest Medical is a Dutch NGO with a focus on medicinal resources from tropical rain forests (**http://www.xs4all.nl/~rainmed/**).

PLANTLAX in Mexico has an emphasis on organic herb products under sustainable management. PLANTLAX aims to conserve our wild flora through its rational exploitation and its ecological recovery. It cultivates species with high national and international demand for the organic, herbal, pharmaceutical, nutritional and cosmetic market. **http://www.geocities.com/florbach/red.htm**

THE INTERNATIONAL FOUNDATION FOR SCIENCE - CALL FOR RESEARCH GRANT APPLICATIONS FROM DEVELOPING COUNTRY SCIENTISTS

The International Foundation for Science (IFS) provides support to young scientists of merit in developing countries by awarding research grants and providing grantees with additional services such as travel grants and purchasing assistance.

Research grants are awarded up to a maximum value of USD 12,000 for a period of one to three years and may be renewed twice. They are intended for the purchase of equipment, expendable supplies, and literature. Applicants must be citizens of, and carry out the research in, a developing country. They should also work at a university or national research institution in a developing country (countries in Europe, including Turkey and Cyprus, or the former Soviet Union do not qualify for support). As well as being under the age of 40 (under 30 for applicants from China) and at the start of their research career, candidates must possess a higher academic degree, which should be at least an MSc or equivalent.

The IFS supports projects dealing with the management, use, and conservation of biological resources. The Foundation organizes its activities into six Research Areas, viz Animal Production, Aquatic Resources, Crop Science, Food Science, Forestry/Agroforestry, and Natural Products.

For further information and application forms in English and French write to:

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Website: http:// www.ifs.se

INTERNATIONAL EXPERT CONSULTATION ON RATTAN DEVELOPMENT

FAO's Forest Products Division, in close cooperation with the International Network on Bamboo and Rattan (INBAR), has invited a panel of internationally renowned experts to Rome to seek their advice and guidance to develop a "Plan of action towards the sustainable development of the rattan sector".

This "International Expert Consultation on Rattan Development" took place from 5 to 7 December 2000 at FAO HQ and attendance has been restricted to 20 experts from governmental and non-governmental organizations, and private sector agencies.

The FAO Expert Consultation will provide a unique forum where representatives of key stakeholders in the rattan sector and experts in the field can meet to discuss and propose a plan of action to steer a more sustainable development of the rattan sector.

The first Agenda item will be an overview of the rattan resource, its uses and present action programmes. Papers will be presented on how rattan is a versatile raw material for the 21st century and INBAR and CIFOR will make presentations on their rattan programmes.

This overview will be followed by three sessions:

Session 1: Status of rattan resources and uses in Asia and Africa

Presentation and discussions on country papers from: Indonesia, Malaysia, Philippines, Indo-China, Thailand, South Asia and Central and Western Africa

Session 2: Review of Policy, Institutional and Socio-economic Aspects governing the Rattan Sector

Rattan in the 21st century - an Outlook
Required Policy and Institutional Framework for a sustainable use of rattan
Socio-economic and ecological opportunities and constraints to sustainable management of wild rattan

Session 3: Identification and discussion on required actions to enhance the sustainable development of the rattan sector

Presentation of discussion paper on "Key issues for required actions" Discussions on required actions and by whom, and elaboration of a draft action plan (and including investment/funding proposals).

The Expert Consultation will conclude with an Agreement on the Recommendations for a Rattan Action Plan.

FSC NTFP WORKING GROUP

Workshop on NTFP Guidance to Certifiers. Oaxaca, Mexico, Nov. 2000

As part of its international Certification and Marketing program, Falls Brook Centre took the opportunity of the second FSC Annual Meeting to bring together members of the FSC Non-Timber Forest Product (NTFP) Working Group, and other interested individuals, to discuss common issues. The focus of the one day workshop was to review recent progress and concerns in the development of certification for NTFPs and to provide guidance to FSC-accredited certifiers on how to interpret the Principles and Criteria more consistently when assessing NTFPs.

Twenty-five participants took part in the event, including many who have been active in the NTFP Working Group and others who are active in the field to implement certification for NTFPs. The motivation for the workshop was that the FSC Secretariat had asked the NTFP Working Group to use its collective experience in NTFP certification to develop additional guidance for certifiers that would

enable objective and consistent evaluation of NTFPs. New developments and key issues are highlighted in the summary report of the workshop. Recommendations and follow-up actions are included at the end of the report, as is participant contact information.

For further information and copies of the summary report please contact Patrick Mallet at: pmallet@web.ca

SECONDARY FORESTS IN ASIA - AN UPDATE

A satellite meeting to initiate the formation of a network on tropical secondary forests in Asia was held at the IUFRO Congress in Kuala Lumpur,August 2000. The meeting was attended by scientists, forestry department officials, the private sector, and bilateral and international agencies. It was decided that Dr. Appanah, FORSPA, Bangkok, would head a task force to initiate the formation of the network. To this end, FORSPA will facilitate a meeting in which the practicalities for the Network will be decided.

We plan to publish the papers arising from the secondary forest workshop as a special issue of a journal and are working towards this goal. Thanks to all who worked on the manuscripts. There will be 18 chapters including an introduction, a conceptual framework paper, 11 country papers, 4 regional syntheses papers for the common secondary forest types, and conclusions. We will keep you informed on the progress.

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FORESTS AND LIVELIHOODS NEWSLETTER

Forests and Livelihoods is a journal for the forestry sector in Nepal to be published from April 2001 in English and distributed nationally and internationally. It is published by Forest Resources Studies and Action Team, Nepal (ForestAction) in collaboration with the Agricultural Extension and Rural Development Department of (AERDD) of the University of Reading, UK. The Newsletter is being launched to improve forests and rural livelihoods through the promotion of pluralistic approaches in the management of forest resources and the conservation of biodiversity. It provides an interactive forum to policy makers, foresters, social scientists, forestry projects, NGOs, university teachers, researchers, forestry entrepreneurs, and other actors in the forestry sector. The Newsletter focuses on themes related to forestry sector policy, community forest management, biodiversity conservation, agro-forestry, private forestry, watershed management, Terai forestry, NTFP management and marketing, and National Parks and indigenous people. Priority will be given to original articles written specifically for it using systematic processes of inquiry in the subject. Articles may be submitted in English or Nepali, and should be around 1500 words in length. The authors may submit short abstract before sending the full paper. First three issues in the first year will be distributed for free, and some prices will be levied beginning the second year for sustainability.

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By Peter Sips

MONOGRAPH ON THREATENED AFRICAN MEDICINAL TREE - *PRUNUS AFRICANA*

By Emma Youde

Prunus africana or *Pygeum*, also known commonly as the African Cherry, is an evergreen forest species, limited essentially to montane regions of Africa. Its distribution is disjunct, made up of isolated populations in the mountain areas of Central and Eastern Africa, from the Gulf of Aden to South Africa, with outlying populations in West Africa and Madagascar.

The bark, leaves and fruit of the species have a long history of use by traditional healers for the treatment of infections, fever and urinary tract problems. It is for treating the last of these that extracts from the bark of *Prunus africana* have been developed to meet an international herbal market demand as a remedy for Benign Prostatic Hyperplasia, a disease causing non-cancerous enlargement of the prostate in older-aged western men.

Bark harvesting rates have reached high levels in countries where European pharmaceutical companies are involved in commercial processing and transportation, namely Cameroon, Madagascar and, more recently, Kenya. Although traditional methods of harvesting bark were non-destructive, the international market demand has led to illegal and destructive harvesting. Product certification, domestication, and community-based management initiatives are actively receiving consideration as ways to alleviate the current unsustainable pressure on the wild resource.

A comprehensive monograph on the species is now being produced. Chapters in this monograph have been contributed by various organisations concerned with *Prunus africana* research and management, including the University of Wales, Bangor, the International Centre for Research in Agroforestry, The Mount Cameroon Project, Birdlife International, and the Kenya Forestry Research Institute.

The monograph provides an overview of how the resource is being used and of the policy and regulatory frameworks in the different Range States. The ecology and biology of the species is described (including a definitive distribution map), and current management practices and domestication potential are discussed. Recommendations for sustainable management and use of *Prunus africana* in relation to each of these aspects are provided, making the monograph a useful resource for professional agriculturalists, foresters, rural development staff and policy makers. Extension materials and policy briefs will also be available as outputs from this project.

The monograph on *Prunus africana* is the latest in a series produced at the University of Wales, Bangor, on multi-purpose tree species. The other monographs in the series cover *Acacia seyal, Balanites aegyptiaca*, *Parkia biglobosa*, and *Vitellaria paradoxa*. A monograph is now being prepared on *Sclerocarya birrea*, the widespread Marula tree of great significance in maintaining rural livelihoods throughout Africa, and especially in southern Africa. This will be available in 2001.

To obtain a copy of the forthcoming monograph on *Prunus africana* or for information or copies of any of the other monographs named above, please contact Emma Youde at the University of Wales,

Bangor, Gwynedd LL57 2UW, United Kingdom. Tel: +44 1248 382631,
Fax: + 44 1248 382832,
Email: e.l.youde@bangor.ac.uk

The monographs on Prunus africana and Sclerocarya birrea are outputs from a research project funded by the United Kingdom Department for International Development (DFID) for the benefit of developing countries. The views expressed are not necessarily those of DFID.[R7227 Forestry Research Programme].

THEME STUDIES SERIES

The Theme Studies Series discusses innovative forest-related themes which are high on the international agenda. The purpose of the series is to collect and synthesise information and knowledge on these themes, and to present concrete directions for policy development and implementation in the framework of international co-operation. They are intended for anyone involved in international co-operation in the field of forests and nature management.

The Theme Studies Series is published jointly by the International Agricultural Centre (IAC) and the National Reference Centre for Nature Management (EC LNV) under the aegis of the Forests, Forestry and Biological Diversity Support Group of the Ministry of Agriculture, Nature Management and Fisheries (LNV) of the Netherlands. The themes were developed at the combined request of the Department for Nature Management of LNV and the Directorate General for International Co-operation of the Ministry of Foreign Affairs.

Theme Studies No. 1-5 have been reprinted and are still available:

1. **"Non-Timber Forest Products (NTFPs); their role in sustainable forest management in the tropics"**
by Jeanette van Rijsoort (see below)
2. "Natural forest management by local groups in the humid tropics" by Arend Jan van Bodegom

3. "National forest programmes; from political concept to practical instrument in developing countries"
by Herman Savenije
4. "The challenge of including forests as sinks within the clean development mechanism" by A.J. van Bodegom, H.J.F. Savenije and G. van Tol
5, "The Management of Bufferzones" by Arthur Ebregt & Pol de Greve

These reports can be downloaded for free from the Internet at: http://www.minlnv.nl/inm

Hard copies can be ordered from:
EC LNV Information Desk, P.O. Box 30, 6700 AA Wageningen, The Netherlands
Tel: +31-317-474801, Fax: +31-317-427561, Email: balie@eclnv.agro.nl

NON-TIMBER FOREST PRODUCTS (NTFPs): THEIR ROLE IN SUSTAINABLE FOREST MANAGEMENT IN THE TROPICS

Jeannette van Rijsoort, 2000

Theme Studies Series 1 of the Forests, Forestry and Biological Diversity Support Group. National Reference Centre for Nature Management (ECLNV) and International Agricultural Centre (IAC), Wageningen, the Netherlands

The exploitation and management of "Non-Timber Forest Products" (NTFPs) is increasingly proposed as a potential means of ensuring sustainable management of

forests and of biodiversity. Up to now, however, no overview has been available of the experience, the practicalities and the impracticalities of such use, although it has become increasingly clear that it represents a diverse and complex matter. The aim of this document is to provide such an overview. It is intended for policy-makers and those implementing government and non-government policy – both in the Netherlands and elsewhere – who are involved in identifying, formulating, assessing, monitoring and evaluating forest conservation and NTFP activities.

Section 1 includes a description of the concept of NTFPs and a specification of just what it includes. NTFPs are taken to mean all products removed from forests, except for industrial timber: foodstuffs, medicines, roofing materials, aromatic substances, flavourings and colourings, and animals as trophies and for international trade. People make use of these products to support themselves and for healthcare purposes, and they also constitute a source of income and employment. Some NTFPs even play an important role in the national economy. International trade in NTFPs is estimated at USD 11bn. The European Union, the US and Japan together account for 60% of world-wide imports of NTFPs. Besides their socio-economic importance, it is often stated that harvesting NTFPs has no influence on the structure and function of forests. This assumption is the basis for the belief that the use and management of NTFPs in forests can potentially contribute to sustainable forest management and to combating poverty. In this context, combating poverty is also taken to mean improving capacity and control with respect to the management of natural resources ("empowerment").

The document then goes on to provide an outline of policies (both Dutch and international) on forest management in general and on NTFPs in particular. Section 2 deals with a number of categories of NTFPs and indicates the differences between the use and management of NTFPs in Latin America, Africa, and Asia.

Sections 3, 4, 5, and 6 outline current experience in the use and management of NTFPs in tropical forests from the ecological, socio-economic, socio-cultural, and political-institutional perspectives. Such experience varies significantly, depending on a large number of factors specific to the location and species concerned. Several general lessons are drawn and the reader is encouraged to fill in the details according to region and situation. Although the subject is treated from a variety of different perspectives in separate sections, it becomes clear that only an integrated approach can be succesful. For example, marketing NTFPs can only provide a sustainable source of income and thus make the forest a more valuable resource if it is based on an ecologically sustainable extraction system. Furthermore, without user and property rights to NTFPs, none of those involved will be motivated to support the long-term conservation of forests. It also becomes clear that women play a major role in harvesting, processing and marketing NTFPs. The success of NTFP extraction systems will therefore be greatly enhanced if women are actively involved in their development.

Section 7 discusses the potential for the use and management of NTFPs as an instrument for sustainable forest management, as well as their limitations, on the basis of experience already outlined. A number of areas are suggested where NTFP use has the greatest potential: bufferzones around protected areas; flood plains; mountainous areas; forest fringes; and degraded forest. A proposal is also made for further investigation of the

potential for the combined extraction of NTFPs and timber in sustainably managed forest concessions.

Finally, section 8 (Conclusions) presents a number of components which should be included in projects and programmes for the development of NTFPs in sustainable forest management. Given the diversity of NTFPs and situations, the document makes no claim to completeness. It should be seen as an initial attempt, one that can provide a basis which can then be worked out and put into practice for each particular region and situation.

This text can be downloaded for free from the internet at: http://www.minlnv.nl/inm

Orders: EC LNV Information desk, PO Box 30, 6700 AA Wageningen, Netherlands. Tel: +31-317-474801, Fax: +31-317-427561, Email: balie@eclnv.agro.nl

RECENT NTFP-RELATED PUBLICATIONS FROM PROSEA

PROSEA 2. EDIBLE FRUITS AND NUTS, CD-ROM

E.W.M. Verheij and R.E. Coronel (Eds)

This CD-ROM testifies to the great wealth and diversity of fruits and nuts in South-East Asia. The appreciation of the fruits and nuts is reflected in the many ways they are put to use and in their role in cultural tradition. Present yields are low, but developments in South-East Asia suggest that traditional skills can provide the necessary clues for a breakthrough towards much higher yields. In addition to information presented in the original book, many colour photographs have been added to illustrate the species dealt with. Moreover, navigation of the content is easy and a hyperlinked and illustrated glossary makes this CD-ROM an attractive product with the usual high standard of PROSEA publications.

Prosea 2. Edible fruits and nuts. CD-ROM, Macintosh & Windows Version 1.0. ETI, Amsterdam, the Netherlands/Springer Verlag, Berlin, Germany. 1999. ISBN 3-540-14845-0 (Macintosh & Windows).

PROSEA 5: TIMBER TREES, CD-ROM

L.T. Hong, R.H.M.J. Lemmens, S. Prawirohatmodjo, I. Soerianegara, M.S.M. Sosef & W.C. Wong

The multimedia databases in this CD-ROM hold detailed information on 400 genera and 2900 timber-yielding species of South-East Asia, including full descriptions of trees, silvicultural aspects, timber properties, photos and botanical drawings of trees, and high-resolution wood anatomical photographs. An enhanced search facility for wood properties has been developed for this CD as well as an interactive wood anatomical identification system for all genera treated. Fast and easy access to the databases is warranted by powerful search engines. A hyperlinked illustrated glossary of technical terms and a reference database are part of the system. The 2100 printed pages of the 3 PROSEA Handbook volumes are now fully searchable and available in 1 CD-ROM.

PROSEA 5: Timber trees. CD-ROM. ETI, Amsterdam, the Netherlands/Springer Verlag, Berlin, Germany. 1999–2000. price € 229.95, ISBN 3-540-14773-X (Macintosh) and 3-540-14771-3 (Windows).

PROSEA 6 & 7. RATTANS AND BAMBOOS, CD-ROM

J. Dransfield, N. Manokaran (Editors Prosea 6 Rattans), S. Dransfield and E.A. Widjaja (Editors Prosea 7 Bamboos).

This CD-ROM regroups two particular commodities from South-East Asia: rattans and bamboos. Rattan in South-East Asia represents the most important forest product after timber. It is used for the cane-furniture industry and for a wealth of minor purposes locally. Bamboos have for centuries been of great importance in rural communities, being used intensively as a sustainable resource for numerous purposes. Being largely under-estimated in the past, in recent years the commercialization of bamboos shoots, bamboo boards, chopsticks, pulp for paper and bamboo handicrafts, has caused an increase in the demand for the raw material. Two videos from IDRC will be included in this multimedia publication, apart from the many colour photographs of the different species. The CD counts a total number of 129 rattan and 77 bamboo species.

Prosea 6 & 7. Rattans and Bamboos. CD-ROM. ETI, Amsterdam, the Netherlands/Springer Verlag, Berlin, Germany. (In print).

PLANT RESOURCES OF SOUTH-EAST ASIA NO. 16 : STIMULANTS
H.A.M. van der Vossen and M. Wessel, 2000

This volume deals with the plants of South-East Asia that are cultivated or collected from the wild for their stimulating properties. Three types of stimulant plants may be distinguished, based on their general use: plants used to make beverages, masticatory plants and plants for smoking. The beverage plants include coffee, tea, cocoa and maté; their dried or processed seeds or leaves are used to make infusions. Most people drink tea or coffee, or both, on a daily basis to banish fatigue and refresh the mind, but South-East Asians drink more tea than coffee. The masticatory plants include areca nut and kola: the stimulating effect is obtained by chewing the fresh or dried seed. These plants are primarily of regional importance and often also have cultural and social functions. Finally, there are plants for smoking, such as tobacco: its leaves are dried and processed for smoking. Although opposition to tobacco consumption is growing in Europe and North America, because of the potential harm to public health, tobacco consumption is still on the increase in Asia.

In this volume, 20 major stimulant species are treated in 17 papers and there are brief descriptions of 34 species of minor importance. A further 250 species with a secondary use as a stimulant or in association with stimulants are also listed.

Plant Resources of South-East Asia No 16. Stimulants. Backhuys Publishers, Leiden, the Netherlands. 201 pp. ISBN 90-5782-053-6.

PLANT RESOURCES OF SOUTH-EAST ASIA NO. 18 : PLANTS PRODUCING EXUDATES
E. Boer and A.B. Ella, 2000

Exudates are generally obtained by tapping trees (latexes, resins, gums). A few of them, such as rubber and pine resin, are economically very important: in South-East Asia, rubber is a major source of income for well over 1 million households. Other exudates, however, have not been able to compete with synthetic substitutes and have declined in importance or have fallen out of use. Of the exudates that are still commercially important, resins are applied in paints and varnishes, yield essential oils and are transformed chemically into a variety of products, whereas latexes yield rubber, prized for its elasticity, and gutta-percha, a non-elastic but thermoplastic product. In this volume the former, current and potential uses of plant exudates are

discussed, in the hope that this may revitalize production systems that include exudate-producing plants. In the introductory chapter, in addition to the botany, ecology and management of exudate-producing species, the different tapping techniques are highlighted and put into perspective. After the introduction 15 papers deal in detail with individual species, including those yielding copal, pine resin, damar, elemi, benzoin, gurjun balsam, sepetir wood oil, jelutong, rubber, and gutta-percha. About 40 minor species producing exudates are treated briefly.

Plant Resources of South-East Asia No 18. Plants producing exudates. Backhuys Publishers, Leiden, the Netherlands. 189 pp. ISBN 90-5782-072-2.

Orders: PROSEA Handbook volumes can be ordered from: Backhuys Publishers, P.O.Box 321, 2300 AH Leiden, The Netherlands. Tel: + 31 71 5170208, Fax: + 31 71 517 18 56, Email: info@backhuys.com

PROSEA CD-ROMs can be ordered from: ETI, University of Amsterdam, Mauritskade 61, 1092 AD Amsterdam, The Netherlands. Tel: +31 20 5257239, Fax: + 31 20 525 7238, Email: info@eti.uva.nl

For information on prices, discounts for developing countries and ordering PROSEA CD-ROMs: visit http://www.eti.uva.nl/Products/Products.html and on ordering PROSEA books: visit http://www.euronet.nl/users/backhuys/

MANAGING THE DRY AFRICAN SAVANNA. OPTIONS FOR CONSERVATION AND SUSTAINABLE USE

Hans H. de Iongh and Herbert H.T. Prins (2000)

This volume contains 9 papers presented at the seminar "Managing the dry African savanna. Options for conservation and sustainable use", held on the 19th of September 1998. Papers deal with research and management, wildlife utilisation and management by local communities and the private sector, livestock, nomads and pastoralists, and conflict management. Some general conclusions drawn at the seminar are:

-savanna area and savanna wildlife are decreasing rapidly;
-growing population increases pressure on savannas (e.g. growing livestock, overgrazing, deforestation);
-conservation and management of wildlife can improve the livelihood of rural communities;
-wildlife management seems best feasible through ranching for tourism and safari hunting.

Mededelingen No. 36. 70 pages. ISSN: 0923-5981. Orders: Centre for Environmental Science Leiden, PO Box 9518, 2300 RA Leiden, the Netherlands. Tel: +31 71 5277 431, E-mail: iongh@rulcml.leidenuniv.nl

FINANCIAL COSTS AND BENEFITS OF REDUCED IMPACT LOGGING IN THE EASTERN AMAZON

P. Holmes et al. (2000)

The study provides a detailed comparison of the costs and revenues of a typical reduced impact logging (RIL) system relative to a conventional logging (CL) system. The analysis focuses on financial, operational, and technical aspects of CL in relation to RIL techniques and procedures.

RIL uses techniques and guidelines that adapt best harvesting techniques to existing

ecological and economic conditions. These techniques include: pre-harvest inventory and mapping of trees, pre-harvest planning of roads and skid trails, pre-harvest vine cutting; directional felling; cutting stumps low to the ground; efficient utilization of felled trunks; constructing roads and skid trails of optimum width; winching of logs to planned skid trails; constructing landings of optimal size; and minimizing ground disturbance and slash management. Some of the findings of the study are:

- Wood wasted in CL operations represented about 24% of the recovered harvest volume, compared to only 8% in RIL operations;
- For every 100 trees felled on a CL block (100 hectares), 38 trees (commercial or potentially commercial) were fatally damaged, compared to only 17 trees in a RIL block;
- Ground area disturbed per tree harvested was about 60% greater on the CL block relative to the RIL block;
- Tractor and log storage productivity increased dramatically for the typical RIL operation and led to a 37% reduction in cost relative to the CL operation;
- Better recovery of potential marketable timber volume on the typical RIL site decreased direct cost associated with waste by 78%, and decreased stumpage costs by 16%.

Orders: Tropical Forest Foundation, 225 Reinekers Lane, Suite 770, Alexandria VA, 22314, USA. Tel: +1 703 518 8834, Fax: +1 703 518 8974, Email: tff@igc.apc.org, Http: www.tropicalforestfoundation.org

ICMAP NEWS

The newsletter of the International Council for Medicinal and Aromatic Plants (ICMAP) aims to be an international interdisciplinary forum for medicinal and aromatic plants. The newsletter contains several sections including country reports; projects; reports on meetings; articles and forthcoming events and information sources.

For more information and/or free copies contact: ICMAP, c/o Boulevard de Montmorency, 75016 Paris, France, or check the website at: http://www.icmap.org

SEED MANAGEMENT OF 100 TREE SPECIES FROM LATIN AMERICA (VOLUME 1)

R Salazar, C Soihet and J Miguel Méndez

The "Proyecto de Semillas Forestales (PROSEFOR)" promotes and supports the capacity and technical assistance of forest(ry) institutes in Central America, Panamá and the Dominican Republic. It aims to improve the physical and genetic quality of seeds and their distribution among reforestation programmes in the region.

PROSEFOR has to date published 116 Technical Notes on Forest Seeds. These summarize basic information on seed distribution, botanic characteristics, as well as production and management. This information is very important to assure best results on seed management.

This publication includes the first 100 technical notes. Per species the book gives a botanical description and a drawing. It provides information on distribution and habitat, flowering and fruits, seed collection and processing, germination, growth and diseases in the nursery.

Orders: Serie Técnica, Manual Técnico No. 41. ISBN: 9977-57-3492. CATIE, PROSEFOR, 7170-137, Turrialba, Costa

Rica. Tel: + 506 556 1933, Fax: +506 556 7766, Email: prosefor@catie.ac.cr

FIFTY YEARS OF ASIA-PACIFIC FORESTRY COMMISSION

Jörg Balsiger (2000)

The Asia-Pacific Forestry Commission (APFC) was created in 1949 as one of the six FAO Regional Forestry Commissions and thus is now in existence for over 50 years. APFC is a forum for advising and taking action on key forestry issues to promote environmentally sound and economically efficient technologies and to encourage implementation of appropriate policies in line with changing trends in forestry, focussing on aspects pertinent to the Asia-Pacific region. APFC's objectives are to:

- provide advice on forest policy formulation;
- review and coordinate implementation of forest policy at the regional level;
- exchange information on suitable practices and solutions for technical problems; and
- develop appropriate recommendations, for member governments and FAO, on forestry-related issues.

Some major activities are:

- the facilitation of the transition from large-scale corporate/government forestry to a more balanced approach including small-scale community-based and developed forest management systems;
- the facilitation of discussions among national forest programme coordinators and donors to induce investments for integrated forestry development, supporting livelihood strategies and alleviating rural poverty without compromising the environmental integrity of the region's forests;
- promotion of sustainable forestry development by involving various stakeholders in environmental conservation, and enhancing incentives in economic, social and ecological products and services derived from forests;
- the development of a code of practice for forest harvesting in order to reduce the negative impact of harvesting and enhance sustainability of forest resources;
- execution of the forestry sector outlook study, assessing the current state of forest utilization and conservation, and providing insight into likely key developments in the sector until the year 2010.

Taking a chronological approach, the book "FAO Asia-Pacific Forestry Commission: the first fifty years" describes the Inaugural Session, the period 1950-1960 (moving forestry to a regional plan), the period 1960-1970 (changing forestry priorities), the 1990s (pursuing sustainable development), and the constraints and opportunities for 2000 onwards.

For more information on the APFC contact: Patrick B. Durst, Regional Forestry Officer, FAO Regional Office for Asia and the Pacific, Maliwan Mansion, 39 Phra Athit Road, Bangkok 10200, Thailand,
Tel: +66-2-281-7844, Fax: +66-2-280-0445,
E-mail: patrick.durst@fao.org

THE EFFECT OF INDONESIA'S ECONOMIC CRISIS ON SMALL FARMERS AND NATURAL FOREST COVER IN THE OUTER ISLANDS

W D Sunderlin, I A P Resosudarmo, E Rianto, and A Angelsen (2000)

A random sample survey of 1,050 households was conducted in five outer island provinces (Riau/Jambi, Lampung, West Kalimantan, East Kalimantan, Central

Sulawesi) to obtain insights into the effects of the economic crisis on the wellbeing of forest villagers and on their agricultural and forest clearing practices.

Some key-findings of the research are: (1) two-thirds of the study households reported they were worse off, one-fifth reported that they were better off during the crisis than in the year before the crisis; (2) this happened in spite of the fact that three-quarters of study households had export commodity income; (3) clearing of forest land increased in the first year of the crisis and greatly in the second; (4) land was cleared increasingly for export tree crops; and (5) those who perceived themselves as worse off or better off were more likely to have cleared land during the crisis, and have cleared a larger area, than those who felt their wellbeing did not change significantly.

CIFOR Occasional Paper No. 28(E). 36 pp. ISSN: 0854-9818. Orders: CIFOR, PO Box 6596 JKPWB, Jakarta 10065, Indonesia. Phone: +62 (251) 622 622, fax: +62 (251) 622 100, E-mail: cifor@cgiar.org, website: http://www.cgiar.org/cifor

THE HESITANT BOOM: INDONESIA'S OIL PALM SUB-SECTOR IN AN ERA OF ECONOMIC CRISIS AND POLITICAL CHANGE

Anne Casson (2000)

From 1967 through to 1997, oil palm was one of the fastest growing sub-sectors of the Indonesian economy. However, the enormous growth has posed an increasing threat to Indonesia's natural forest cover and local communities. This publication describes the reasons behind the slowdown in the palm oil area expansion, the prospects for renewed growth and the impact on the forest cover. Unless fundamental changes are being implemented in the way forest land is allocated, the further expansion of the oil palm sub-sector will pose an increasing threat to Indonesia's nataural forests and local communities.

CIFOR Occasional Paper No. 29. 50 pp. ISSN: 0854-9818. Orders: CIFOR, PO Box 6596 JKPWB, Jakarta 10065, Indonesia. Phone: +62 (251) 622 622, fax: +62 (251) 622 100, E-mail: cifor@cgiar.org, website: http://www.cgiar.org/cifor

FAO GLOBAL FOREST PRODUCTS OUTLOOK STUDY : OUTLOOK FOR WOOD SUPPLY FROM FOREST PLANTATIONS TO THE YEAR 2050

As part of FAO's Global Forest Products Outlook Study, FAO has just produced an outlook for wood supply from forest plantations to the year 2050.

This paper is the result of a concentrated effort to collect reliable forest plantation statistics for all of the countries with significant forest plantation resources (more than 20,000 ha of forest plantations), to critically review the data and make corrections where necessary, and to make it available in a form that is comparable with all of the existing information about forest plantations held by FAO. The modelling of potential roundwood production from forest plantations is also a significant advance on previous efforts in this field. The study includes information about over sixty countries that, combined, account for about 98% of the global forest plantation resource.

Orders: Electronic and printed copies of the report can be obtained from: Adrian Whiteman, Forestry Officer (Sector

Studies), FAO, Room D423, Via Terme di Caracalla, 00100 Roma, ITALY. E-mail: adrian.whiteman@fao.org

IMPLICATIONS OF THE KYOTO PROTOCOL FOR TROPICAL FOREST MANAGEMENT AND LAND USE: PROSPECTS AND PITFALLS

Koskela, J., Nygren, P., Berninger, F. & Luukkanen, O. (2000)

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