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Global patterns and trends in NTFP development

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SUMMARY

Understanding of the role and potential of NTFPs in livelihood strategies has been hindered by a lack of a clear theoretical framework and a functional typology of cases and the conditions that characterize each of the groups. To help fill this gap, we undertook a large comparative analysis of cases of NTFP commercialization. The analysis followed the method developed by Ruiz-Perez and Byron (1999). It was designed to help to find patterns among divergent cases, to develop typologies, to identify key contextual variables, and to analyze the relationships with observed development outcomes. The comparison included a total of 61 cases from Africa, Asia and Latin America. The cases were selected to represent a range of kinds of products (animals, plants, plant products, fungi), of production systems (from pure extractive to cultivated) and market systems (from local markets to export markets). The variables were organized into categories describing various aspects of the production-to-consumption system, including: geographic setting; biological and physical characteristics of the product; characteristics of the raw material production system; ecological implications of production; socio-economic characteristics of the raw material production system; institutional characteristics of raw material producers; policies affecting raw material production; characteristics of the processing industry; characteristics of the trade and marketing system, and; outside interventions. Bi-variate and multi-variate analyses were used to group cases by kind and context. A strong relationship emerged between the NTFP contribution to household income and the integration of households into the cash economy, best modeled as a logarithmic orthogonal regression. This was combined with variables characterising the degree of NTFP management to group cases into four classes representing distinct household strategies. We analysed the relationships between these groups and case context variables (external, independent conditions), household economic strategy variables, and forest/product management strategy variables. The analysis is done at the global level, indicating general patterns and trends. We also did a regional analysis, showing differentiated, regionally-specific patterns and trends. The paper summarizes the key findings and offers recommendations for positive interventions based on the findings..

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INTRODUCTION

Alarming rates of deforestation, increased awareness of the multiple products and services provided by forests, and new commitments to address rural poverty, have converged in efforts to link conservation and development through the commercial development of forest products. Non-timber forest products (NTFPs) in particular have a high profile in this, based on a perception that they are more accessible to rural populations, and especially to the rural poor (Saxena 1995), and that their exploitation is more benign than timber harvesting (Myers 1988). Moreover, there is an assumption, often implicit, that making forests more valuable to local users can encourage forest conservation (Plotkin and Famolare 1992; Evans 1993). The Forest Stewardship Council, for example, says: "Harvest of NTFPs usually has lower impacts on the forest ecosystem than timber harvesting, can provide an array of social and economic benefits, particularly to community operations, and can therefore be an important component of forest ecosystem management." (FSC 2002).

Leading national and international organisations launched projects and whole programmes to capitalize on these apparent win-win situations. As a result, there is extensive experience with research and interventions in the NTFP sector. The early high expectations (Peters et al, 1989) have been modulated with more realistic assessments (Sheil and Wunder 2002; Godoy and Bawa 1993; Simpson et al 1996; Godoy et al. 2000) and experience.

However, the category "NTFP" is broad, encompassing many different kinds of products and production systems in a wide range of social, economic and ecological contexts. Moreover, the research and development experience comes from many different disciplines, addressing different questions, for different purposes. For these reasons it remains difficult to conceptualize and communicate the key lessons. As increasing emphasis on forestry-livelihood links is leading to a new wave of interest/investment in forest-product-based development, there is a need to identify and analyse general patterns and trends in forest product commercialization to improve the effectiveness of further interventions.

We set out to do this through a comparative analysis of 61 cases of NTFP production and trade. We deliberately focused on commercial products to help understand the implications of commoditization. In this paper we provide a summary of the approach and explore the results of the analysis. In particular we look at a classification of cases based on the role of an NTFP in the household economy of producers, and at a regional analysis, and explore the development/livelihoods and biodiversity implications.

We begin with a brief description of the data and the methods used. This is followed by a section exploring the results of two main analyses. In the first we grouped cases according to the role of the NTFP in household economic strategies and explored their relationships with other variables. In the second we analyze regional patterns and associations. We then discuss the implications of the results in terms of livelihoods and in terms of biodiversity conservation respectively, with reference to some supplementary analysis. We conclude with a summary of the key lessons.

DATA AND METHODS FOR A COMPARISON OF CASES

The study follows a production-to-consumption system approach (Belcher, 1998) and builds on a methodology proposed by Ruiz-Pérez and Byron (1999) to analyze divergent cases. Cases were selected to meet two key criteria: 1. the product has a demonstrated commercial value³; 2. the production to consumption system has been researched and documented, with data available for a large proportion of the variables. We included a broad range of cases to represent different kinds of products (animals, plants, plant products, fungi), production systems (from pure extractive to cultivated) and market systems (from local markets to export markets) from a variety of geographical settings. The comparative analysis included 21 cases from Asia, 17 from Africa and 23 from Latin America, with a total of 25 countries represented. Product uses include food (18), medicinals (14), fibres and furniture (13), resins/dyes (3), fuelwood (2) and ornamental (11). A list of the cases is provided as appendix 1.

The study is based on cases that had already been studied and for which data were available. Therefore, while the cases included reflect the interests of a broad range of researchers, the sample is not a truly random selection of commercial NTFP cases.

Cases were documented using 114 nominal, ordinal, interval and ratio variables organized in categories describing various aspects of the production-to-consumption system, including:

1. geographic setting
2. biological and physical characteristics of the product
3. characteristics of the raw material production system
4. ecological implications of production
5. socio-economic characteristics of the raw material production system
6. institutional characteristics of raw material producers
7. policies affecting raw material production
8. characteristics of the processing industry
9. characteristics of the trade and marketing system
10. outside interventions

Financial data were converted to US\$ values at the current official exchange rate. For some analyses these data were transformed using the UN purchasing power parity index (PPP) to facilitate cross-country comparisons. Some new variables (e.g. population density, ratio of local to national income or US\$ production per ha per year) were derived using indices, estimates and ratios from the original data.

A descriptive narrative report was prepared by each case author, providing context and supplementary qualitative information.

We used exploratory analysis to look for patterns and relationships among variables and to find associations between variables and different groups of cases. We used bi-

³ The focus of the study is commercialisation. There are of course many other forest products that are used for subsistence and safety net purposes.

variate analysis with the Kruskal-Wallis test for significance for interval and ratio variables and Multi-correspondence Analysis (HOMALS in SPSS) for nominal and ordinal categorical variables.

A detailed description of the methodology and variables can be found in Belcher and Ruiz-Pérez (2001)⁴.

NTFP IN HOUSEHOLD ECONOMIC STRATEGIES

Classification and characterization of household strategies

In a subsistence economy, people devote their available resources to producing food and maintaining shelter and security. In a cash-based economy, households have the opportunity to specialise in those activities that offer the best economic opportunities. In other words, if food and other necessities can be purchased, people are able to concentrate their efforts on those activities that provide the highest rewards. This implies that a household's integration into the cash economy will both influence and be influenced by the way they use forests and other resources.

We explored this relationship in our sample with a regression of the percent contribution of the forest product to the total (subsistence plus cash) household income as a function of the percentage of local household income earned in cash. This relationship is best modeled for each of the regional data sets and for the global set of 61 cases as an exponential curve with a high level of fitness (R-sq. 0.86, p=0.000): $ln y = 0.044 x [y=e^{0.044x}]$.

We grouped cases by quadrants (Figure 1), initially yielding three groups (an almost identical grouping was produced using cluster analysis): 1. low contribution of the product to household economy in the context of low integration into the cash economy; 2. low contribution of the product in the context of high integration to the cash economy, and 3. high contribution of the product with high integration to the cash economy.

Because we focused on traded NTFPs we had no cases in the fourth quadrant (product contributes more than 50% of household income in households that are primarily subsistence oriented). This situation would only occur where an NTFP serves as a staple in household consumption, most likely as a food source.

We analyzed the relationships of the three groups of cases to other variables in the data set and found clear and understandable patterns associated with the first group and the third group. However, the intermediate group (low contribution of the product in the context of high integration to the cash economy) was less clear – most variables tended to fall between the other two groups, but not in a predictable or theoretically consistent way. We then considered NTFP management strategies and recognized that the intermediate category included cases in which NTFP were cultivated and cases where they were harvested from wild resources. We used these fundamentally different strategies to sub-divide the intermediate group into two groups: those where the NTFP is predominantly cultivated and those in which the

⁴ Available on line at:
<http://www.cifor.cgiar.org/scripts/default.asp?ref=publications/workingpapers.htm>

NTFP is predominantly harvested from wild resources. We used the resulting four groups as the basis for further analysis.

Table 1. Significant associations with household economic strategies (median value)

VARIABLES	HOUSEHOLD STRATEGY				p-value
	COPING	INTEGRA-TED	SUPPLE-MENTARY	SPECIALI-SED	Kruskal-wallis
Average household size	5.5	5.0	5.8	4.5	0.087
Land price at ppp (US\$/ha)	417	1520	1032	1286	0.088
Production technology intensity (US\$/ha/yr)	0.9	27.2	0.1	10.0	0.008
Production labour intensity (person-days/ha/yr)	13.0	60.0	2.3	15.0	0.045
Average annual local household income (US\$/year)	690.0	570.0	1258.0	1625.0	0.054
Local labour rate (US\$/day)	1.4	2.1	3.0	3.5	0.043
Average annual income of producers household at ppp (US\$/year)	2575	2610	3589	5158	0.045
Average annual income of producer household (US\$/year)	650	600	1353	1918	0.010
Ratio of producers income relative to local average	0.9	1.0	1.0	1.1	0.055
production per ha (estimated production area)	0.8	13.1	1.9	49.1	0.011
Price of raw material (US\$/kg)	0.1	0.4	0.3	0.6	0.042
Raw material trade in case study area (US\$/year)	14250	18000	29000	400000	0.023
NTFP production area per producer household (ha/household)	188.6	5.9	49.7	8.3	0.023
Road density (km/km ²)	0.13	0.58	0.11	0.325	0.081
Proportion of product on private land	6	90	2	31	0.038
Number of economically harvestable individual per hectare	44.475	400	14.75	128	0.088

Figure 1 shows the distribution of cases. Table 1 lists the median (a central tendency measure more robust to outliers than the mean) for interval and ratio variables with significant differences ($p \leq 0.10$) between groups. Figure 2 shows the relationship of a number of nominal and ordinal variables with the four groups that we have labeled according to the apparent use of the NTFP in the household economic strategy: 1. Coping strategy; 2. Supplementary Strategy; 3. Integrated Strategy, and; 4. Specialised Strategy. A summary of the characteristics of these four groups follows:

Coping Strategy

Economic Characteristics: Households in the case study area tend to have low integration into the cash economy (i.e. a high proportion of income is subsistence goods). Household income tends to be low (the lowest of the four groups) and NTFP producers tend to be poorer than their neighbors (the median ratio of producers' income to local income is 0.9). The NTFP contributes a relatively low proportion of total household income (less than 50%) but it is the main or the only source of cash income. These NTFP producers also tend to use a larger number of other NTFPs, either for their own consumption or (less often) for trade. This situation is very much like that described in the non-farm rural economy literature (Lanjouw and Feder 2001), from which we borrowed the term "coping strategy" where off-farm activities, such as NTFP harvesting and sales, help make ends meet and provide important sources of cash, but often prove insufficient to lift people out of poverty.

NTFP Management: These households tend to invest very little effort in NTFP management. The products are harvested from natural forest or fallow fields, in extensive systems. The median production area per household is approximately 200 ha.. Annual labour and technology investments are very low per unit area. In some cases there are traditional rules governing access, but in many the resource is open access and the resource base is being depleted.

Economic Geography: These cases tend to be located in relatively remote areas – the median road density, a proxy for the level of development, is just 0.13 km./ha.. They are associated with the lowest land prices, lowest opportunity costs of labour, lowest price for the NTFP, and lowest total value of trade in the product. Very little production is done on private land (median = 6%) – it is mainly done on land that is designated as state land and/or treated as open access. As noted above, these NTFP resources tend to be over-exploited, and dissipation of rents prevail.

The NTFPs and their markets: This group includes several cases of palm fibre collecting, wood collecting for woodcarving and fuelwood, rattan collecting and medicinal plant collecting. The products have relatively low value, but they do have a market. Some are used by the same people who do the collecting for weaving or carving. People are able to supplement their agricultural incomes by collecting and trading these NTFP, and through artisanal activities.

Interestingly, this group of cases, along with the *integrated* group, is also associated with a greater tendency to have outside interventions in the form of project or other support (discussed below).

Supplementary Strategy

Economic Characteristics: Producer household incomes (PPP adjusted) in this category tend to be relatively high, with only the *specialised* cases being higher. Households in the case studies are well integrated into the cash economy, with more than 50% (most are 60% and above) of household income earned in cash, but the NTFP contributes less than 50% of household income.

NTFP Management: As in the *coping* group, the target NTFP tends to be harvested from wild sources, with little effort to manage production – labour intensity and technology intensity per ha. are lower than in the *coping* group. NTFP production per

ha. is low, but people collect from relatively large areas (median 50 ha. per household).

Economic Geography: Households in these cases tend to earn a larger proportion of their income in cash. Labour rates in the area tend to be higher than in the *integrated* or *coping* groups, and NTFP prices per kg. tend to fall between the *coping* and the *specialised* groups of cases. Road density is similar to that in the *coping* cases, indicating low levels of development. This indication is supported by the finding that median land prices are lower than in the *integrated* or *specialised* cases, but higher than in the *coping* group.

The NTFPs and their markets: This group includes most of the fruit cases and several wood (for woodcarving) cases. These are products for which there is a good local market, probably because it is a more cash-oriented economy, and households have income to purchase fruit and condiments, or because there is a local industry that requires a supply of raw material. Other products in this group, such as the medicinal plants, are less perishable and have high value_to_weight ratio, and so are economical to transport to more distant markets.

Integrated Strategy

Economic Characteristics: This category includes cases where people earn a large proportion of their household income in cash, but the NTFP is not the main source of income. People are farmers, and they combine NTFP production with other commodities and with off-farm activities. Household incomes tend to be low, with a median only slightly higher than that of the *coping* strategy. These households tend to use many other NTFPs (second only to the *coping* group), with 33% using more than 6 other NTFP and 56% using between three and five other NTFP.

NTFP Management: The NTFP is cultivated and managed intensively. This group tends to have the highest labour and technology inputs per ha, though on a smaller area than the specialized cases. Indeed, this group tends to have the lowest area per household used for NTFP production. NTFP production per ha is higher than the two wild harvested categories, but substantially less than the *specialised*.

Economic Geography: Prices per kg. for NTFP are intermediate (second highest category) but the total NTFP market in the area is relatively small. Land prices in the case area tend to be higher than in any of the other categories. This probably reflects the fact that there is more private land in these cases. Indeed, NTFP production is predominantly on private land (median = 90%). Road density is also highest in this group, indicating relatively high levels of development. Local labour rates are higher than in the *coping* cases, but lower than in the other two groups. NTFP trade in the case areas is also intermediate - more than in *coping* but less than the others.

The NTFPs and their markets: This group includes several cases in which the NTFP is used as a raw material in well-developed processing industries (Bamboo – China; Wood carving – Bali; Woodcarving – Sukabumi; Mulberry paper – Lao PDR; Benzoin – Indonesia), indicating again the importance of local markets.

Specialised Strategy

Economic Characteristics: As the name indicates, the NTFP provides the majority of total household income in households that are well integrated to the cash economy. These producers tend to have the highest PPP-adjusted incomes of the four groups, and also tend to have higher incomes than their neighbors in the case study area. This is the only category in which the NTFP is the mainstay of the household economy

NTFP Management: These products are managed relatively intensively. Some are cultivated (defined as “planted”), but the majority are managed in naturally-regenerated systems. The high management inputs in combination with the high value of the products (NTFP in this group tend to have the highest value per weight) combine so these cases also tend to have the highest value of forest-product production per ha..

Economic Geography: Local labour rates tend to be highest in this category. Road density and land values in the area tend to be relatively high, but not as high as in the *integrated* cases. We interpret this as an indication that there are limitations on agriculture (e.g. soil fertility, climate, topography or infrastructure limitations, or regulatory limitations). A median of 30% of production was from private land. NTFP production tends to be economically attractive, with many active producers - this group has the highest value of trade in the NTFP in the case study area, with a median value for NTFP trade one order of magnitude higher than the other three groups. *Specialised* households tend to use fewer other NTFPs than the other categories.

The NTFPs and their markets: This group includes a number of specialist food products – high value mushrooms, Brazil nuts, fruits – and medicinal products. Many of them are traded regionally or internationally. Overall, the characteristics of the *specialised* group of cases portray a situation of stability and mature markets, offering good incomes for producer households.

Table 2. Characteristic Tendencies in HH Economic Strategy Groups

HH Strategy	Economic Characteristics	NTFP Management	Economic Geography	Products and Market
COPING	<ul style="list-style-type: none"> - low HH income - <50% income in cash - NTFP < 50% HH income - Use many other NTFP 	<ul style="list-style-type: none"> - wild harvested from forest or fallow - large harvest area - low management - weak tenure - more common trad. rules - low NTFP prod./ha. 	<ul style="list-style-type: none"> - remote, undeveloped - low land and labour prices - production on state land or open access 	<ul style="list-style-type: none"> - palm fibres, low-value wood carving, fuelwood, med. plants - mainly low value products - local processing, often in same HH
Integrated	<ul style="list-style-type: none"> - low HH income - HH income from farming, off-farm and NTFP - large % HH earned in cash - NTFP < 50% HH income - use many other NTFP 	<ul style="list-style-type: none"> - NTFP cultivated, managed intensively - NTFP on small area - intermediate NTFP production/ha 	<ul style="list-style-type: none"> - high land prices - mainly private land - high road density - intermediate labour prices - intermediate NTFP trade in area 	<ul style="list-style-type: none"> - bamboo, high-value wood carving, fruits, mulberry paper, resin - NTFP mainly traded in local/domestic markets - local processing or direct consumption - intermediate NTFP prices
Supplementary	<ul style="list-style-type: none"> - Intermediate HH income - >50% income in cash - NTFP < 50% HH income 	<ul style="list-style-type: none"> - NTFP wild harvested - lowest labour and technology inputs - low production/ha - intermediate harvest area 	<ul style="list-style-type: none"> - intermediate labour rates - low land prices - low road density 	<ul style="list-style-type: none"> - fruits for local processing or consumption - med. Plants for regional market - intermediate NTFP prices
Specialised	<ul style="list-style-type: none"> - High HH income > 50% income in cash - NTFP > 50% HH income - fewest other NTFP used by HH 	<ul style="list-style-type: none"> - Intensive management - cultivated and natural regeneration - highest value NTFP/ha 	<ul style="list-style-type: none"> - high labour rates - high land prices - intermediate road density - intermediate private land - high total NTFP trade in area 	<ul style="list-style-type: none"> - specialty food products and med. plants - regional and international markets - stable, mature markets

Regional Characteristics

Clearly, local conditions and opportunities are important in determining how people use their resources. We looked for regional patterns by repeating the analysis with the cases grouped by region (table 3). We report here on the patterns that emerged within our sample.

Table 3. Region analyses

Variables	Region			p-value
	Asia	Latin America	Africa	Kruskal-Wallis
Human population density (people/km ²)	75	22	11	0.005
Elevation of study area (m.a.s.l)	600	200	400	0.016
Road density (km/km ²)	0.44	0.17	0.12	0.062
Precipitation (mm/year)	1859	1950	943.5	0.004
Percentage of product harvested from wild population	40	97	100	0.018
Percentage of product harvested from cultivated population	60	0	0	0.003
Length of effective harvesting season (months/year)	4	7	9	0.003
Production labour intensity (person-days/ha/yr)	30	2	4	0.058
Land price at ppp (US\$/ha)	2640	675	368	0.000
Time to harvesting maturity (years)	7	10	15	0.032
Reproductive period	5	7.5	20	0.001
Average annual local household income	643	1805.48	670	0.000
Average household size	5	5.5	6	0.015
Proportion of producers per household	0.36	0.25	0.33	0.026
Local labour rate (US\$/day) at ppp	6.552	10.25	5.62	0.073
Average HH income of producer household	700	2000	600	0.000
Density (individual/ha)	400	23	17	0.017
Value of raw material production in US\$ per hectare	6.82	2.74	0.43	0.009
Revised value of raw material trade in case study area	220000	70000	8900	0.007
NTFP production area per household (hectare/household)	6	46	132	0.005

African cases tended to have lower household incomes and smaller volumes of trade in the forest product relative to the other two regions. Human population levels are growing in the case study areas and there is an increasing market demand for the NTFP. This translates into increasing pressures on the resource base. Most production still comes from wild sources, with relatively little cultivation/domestication represented. Producer's organisations tend to be informal, with weak knowledge of their rights and little government interventions and private investments to increase production.

Asian cases reflect higher and more stable economic conditions, with less population growth in the case-study area, resulting in stable NTFP markets and more stable resource bases. In most cases this "stability" is achieved through intensified management (cultivation/domestication) of the resource. Formal producer's

organisations are more common in Asia and producers have better knowledge of their rights. There tend to be more frequent government interventions, and also the highest % of cases with private investment. As noted above, most of the cases with higher than average household incomes are found in Asia. These findings are consistent with our experience in the region, with many NTFP having been traded nationally and internationally for long periods (centuries in some cases).

Latin American cases correspond to intermediate economic conditions and population trends, and were more varied than the other regions. NTFP market trends in the region are variable, with a higher frequency of unstable cases (typical of boom and bust situations) than in the other regions. Products are produced from a diversity of sources and there is no apparent tendency in terms of pressure on the resource base. Producers have a medium level of organisation, and their knowledge of their rights is high. There is some government and NGO support but little private sector investment in these cases. Again, these patterns (or the lack of a clear pattern) are consistent with our understanding. Trade in many of the products has developed much more recently. New products are coming to the market each year, and many of the Latin American cases in our set have been the focus of recent market development activities.

This gross generalisation has to be qualified by the local context of each case and the large diversity of conditions prevailing. The overall pattern may, however, help to clarify some of the divergence found in the literature. That is, authors with an African experience might tend to stress the safety net and subsistence functions of NTFP; those with Asian experience, with a high level of market integration and specialisation, could be led to focus on the market push and appropriation by elites; Latin American experience, with very diversified opportunities, would be more likely to consider the new markets and dynamic conditions facing NTFP, leading, for example, to the green-market arguments for NTFP conservation and development of the “Rainforest Crunch” and Body Shop kind.

COMMERCIAL NTFP PRODUCTION AND THE POOR

These groupings and associations allow us to consider the role of NTFPs in livelihoods (and later, in biodiversity conservation) in aggregate, and to identify general patterns and trends. Of course each group contains a great deal of diversity, and there are often exceptions. But there are strong patterns. Here we examine income patterns associated with the the different household strategies, compare the livelihood benefits of different approaches to intensified NTFP production, discuss the importance of considering NTFPs in the context of overall household economies, consider the importance of land/resource tenure, and discuss the potential of investment in NTFPs to benefit the poor.

NTFP for poor people?

Even commercial NTFP producers tend to be poor or very poor relative to national averages. There are no surprises in this. It reflects the very common, pronounced disparities between urban and rural livelihoods (true even in developed countries but much more exaggerated in developing countries).

It is more relevant to compare household incomes of NTFP producers with local incomes (in our data, this is the average of producers and non-producers in the study area). Overall, the distribution of the ratio of NTFP producer/local household incomes follows a normal distribution centred around 1 (Fig.3). In the typical situation, NTFP production represents one among several income sources, and does not result in a critical economic differentiation between NTFP producing and non-producing households in the same locality. But there are 27 cases (44%) in which NTFP producers earn higher incomes than other households in the surrounding area and, in a few cases, they have incomes that approach or exceed the national average. Some NTFP in some circumstances can offer good livelihood opportunities.

Looking at the four ‘strategies’ we find that *coping strategy* households tend to have lower incomes than the local average. This is consistent with the idea that some NTFPs, and especially wild-gathered NTFPs, are resources of the poor. This characteristic, in conjunction with the more remote locations, presumably with higher conservation value, has attracted donor interest – this category had higher incidence of receiving “outside interventions” in the form of financial support from NGOs. However, other characteristics of these cases may limit the potential for NTFP-based development. Most importantly, they tend to be remote, with weak markets for NTFP, and weak resource tenure. Many of these NTFPs are used as inputs in local processing industries that face thin markets and, because the entry barriers are low, heavy competition that limits profitability.

The *integrated* and *supplementary* cases are distinguished from one another by whether or not the NTFP is cultivated (yes and no respectively). Producer households in both groups tend to have average incomes for their locality, but the *supplementary* cases tend to have substantially higher absolute incomes than the *integrated* cases. At first glance one might expect the opposite because the *integrated* producers invest much more in NTFP management, on a per ha. basis. The higher incomes in the *supplementary* cases arise because those households have better opportunities for off-farm income (which provides a larger proportion of household income), with higher labour rates. Moreover, the NTFPs produced in the *integrated* cases tend to be lower value products, and each household devotes only a small area to production. The *integrated* cases are mainly agroforestry systems producing low value agricultural products and NTFPs.

The specialized category includes more cases where producers have higher than local-average incomes. Markets are well developed, tenure is secure and the producers are able to concentrate their efforts with reasonable confidence. In these cases the high level of management pays off in high productivity of relatively high-value products.

Intensification Options

Improving income from a product requires increased production and/or price. An individual or group of producers can do this by improving the quality, quantity or timing of production through more intensive management (there may also be scope for improvements through stronger bargaining and improved marketing). Intensification in cases in the study used two clearly differentiated approaches: 1. cultivation and management in “plantations” (either monodominant stands, or more diverse agroforestry systems); 2. intensified management of “wild” resources from forests.

We compared these two strategies within the specialized group. Twice as many specialised cases rely on naturally-regenerated resources as from cultivated resources

However, the cultivated group has significantly higher economic and market opportunities than the other group (figure 4). Cultivation is associated with:

- substantially higher household incomes
- a higher ratio of local household income to national average household income
- higher total value of local trade in the product
- higher value of production per unit of land

Where conditions allow for specialization and intensified management, the producer households have absolutely and relatively better incomes. Key conditions are secure land tenure, strong markets.

NTFP as components of economic systems

It is striking that in all cases the traded NTFP contributes only a portion of household income, and in most cases it is a relatively small portion. As many of the collaborators in the study emphasized from the perspective of their case studies, NTFP must be considered in terms of systems – people use them in various ways, but most often in combination with other economic activities. The role of NTFP changes according to circumstance and opportunity.

In the *coping strategy* cases people tend to use the commercial NTFP as a primary source of cash income in otherwise subsistence oriented economies. And these households tend to use a larger number of other forest products in their overall economic portfolio. The households in the *supplementary* category have more access to cash income through wages, trading, and producing other products for sale, but the NTFP is important as an additional source of cash income. And in the *integrated* strategy people actively cultivate NTFPs, in combination with a range of agricultural commodities, as part of their overall land-management system.

There are good reasons for households to use multiple sources of income. For many, there is little choice – no one source of income is sufficient. But beyond that, using various NTFP in an economic portfolio allows households to spread risk and to modulate the timing of income. Where the resource tenure is reasonably secure, using longer-lived species is a way to accumulate “savings” or provide “insurance” for emergencies (Belcher et al, forthcoming). And, NTFP markets are often thin and unpredictable, so poor people (especially) are naturally reluctant or unable to concentrate, or “specialise”, on any one product. Diversification also allows households to balance seasonal labour requirements. And, in situations where the cost of market transactions is high, production for self-consumption is sensible, and a diversity of products is desirable (Angelsen, pers. com.).

This almost universal characteristic of diversified economic portfolios of NTFP producers (and the poor in general) needs to be kept in mind in any efforts to develop NTFP. On the one hand, people will be reluctant to specialize if it increases their exposure to risk (from a failed crop, a fire, or low prices for a commodity). On the other hand, increased pressure on a resource from one group is likely to hurt others

that also rely on that resource for part of their income or as a “safety net” in tough times.

The ‘specialized’ group of cases are distinctive. These cases involve mainly products that have good markets and high value such that people can concentrate their efforts on producing them. On average they provide the highest incomes. It is important to note, however, that specialization is not always associated with absolutely high incomes. These households tend to be better off than their neighbors, but some of the cases are found in relatively poor areas.

Land and Resource Tenure

Whereas an open access resource offers opportunities for people with limited resources, the same lack of “exclusivity” often prevents producers from making a good living. Particularly in areas with limited alternative opportunities, new entrants quickly dissipate profits if, for example, prices for a product rise. Angelsen and Wunder (2003) provide a simple but effective model to illustrate this. A cardamom collector in the Vietnam case explained it well when asked about the potential for cultivating cardamom. She noted that as long as the resource, and the land it grows on, is open to everyone, the cardamom is attractive. It needs no management and everyone benefits from cardamom harvesting. But it doesn’t make sense for her to plant cardamom, as others will take it. And if the land belonged to her, she said, there are better things to use it for, like rice or other field crops.

In our cases there is a strong association between tenure and intensified management. The cases in the *integrated* group are all cultivated on predominantly private land. Similarly, the cases of cultivated production within the specialized group use private land or land with strong local tenure rules.

NTFP Investment to Benefit the poor?

It is tempting to think of the different categories of cases as a development continuum, in which a product or case may shift upwards, to yield higher value and greater benefits to the stakeholders involved. Indeed, many interventions in the NTFP sector have attempted to do this. Integrated conservation and development projects (ICDPs) and focused NTFP projects have attempted to improve NTFP production or processing technology, to develop markets, or to support improved management through improved institutions, with the objective of increasing the creation and capture of NTFP-based value by the intended beneficiaries.

The finding that *coping* and *integrated* cases tended to attract the most outside interventions is interesting in this context. These cases may be attractive to donors and development agencies because they typically involve poor people living in relatively remote areas with (especially in the *coping* cases) large areas of forest. The NTFP’s are identified as important and investments are made with implicit or explicit objectives to improve livelihoods and/or encourage conservation.

However, NTFPs in these cases do not always offer the best opportunities either for livelihood improvement or for encouraging conservation. Even with commercial NTFP production, these households remain poor. There are constraints to forest-product-based development. In open access conditions there is uncontrolled

competition for resources. This leads to inefficient and damaging harvesting practices. In many cases harvesters lamented the fact that they were forced to harvest immature specimens, or harvest beyond sustainable levels. Their explanation is simple and rational – “if I don’t take it, someone else will.” And profits for harvesters are pushed to the minimum. There is always someone willing to undercut the selling price, especially if the product is perishable and the market is thin, and when access to markets is limited by poor infrastructure, or various “social barriers” that give middlemen a competitive advantage in the trade.

Some of the cases may represent “poverty traps” in that, as more people get involved and/or as prices drop, harvesters are compelled to harvest more, just to break even.

There are also important constraints operating outside the forestry sector as normally defined (e.g. infrastructure, market access, property rights, health care). This is consistent with findings in the non-farm rural economy literature that highlight the role of poor rural infrastructure and education facilities and weak skills in limiting people’s potential to engage in new and more productive market activities (Lanjouw and Feder 2001).

At the other end of the spectrum, the “specialized” cases seem to confer the kinds of benefits sought by some NTFP advocates. The forest products in these cases provide substantial incomes to producer households. They have stable markets and good returns to investment. The people involved in these cases tend to earn good incomes from their forest products.

However, they also have characteristics that might be considered anti-poor. Specialisation is associated with more intensive management in one form or another, consistent with Homma’s (1992) economic model. High demand gives a strong incentive for increased production. This can be achieved through more extensive harvesting (harvesting from a larger area) or from intensified management. In all but the most remote areas, the first option is closed; the land/resource base is limiting and the competition among harvesters too high. In most situations intensification is required to increase the quantity of production. Moreover, intensified management can also give better quality products and more control over timing. So, as demand/prices increase so do the rewards for intensified management.

One of the interesting findings is that in more than half of the specialized cases, production is from managed sources, but not from true plantations. Still, as discussed above, cases using cultivation tend to have higher incomes.

Wealthier people are generally better placed to take advantage of new market opportunities, having land and/or capital, as well as better skills and connections. For example, research on the bamboo case in China showed that as opportunities in the bamboo sector increased and farmers intensified their management, better-off households gained the largest share of the increased earnings, and poorer households gained the least (Ruiz-Perez et al 1999).

Other factors also contribute to this anti-poor bias. Intensified management, whether in a plantation system or in a managed forest system, requires security of tenure over the land/resource, some confidence that there will be a market for the product when it

is harvested, and enough economic security that the grower can afford to wait for slow-maturing products. The poor, by definition, do not have these assets.

It is simplistic, and often wrong, to assume that because an NTFP is important to the poor, efforts to develop it will help the poor. In practice there may be severe constraints that make it difficult to move beyond the stage of wild gathering. Where the resources are treated 'de facto' as open access resources, over-exploitation and dissipation of rents prevail. Moreover, the "external conditions" such as transportation infrastructure, market access, property rights, education, and health care, and limits in terms of available capital, skills and connections, make it difficult for the poor to move beyond the current situation. Some of these products might be classified as "poverty traps", where even decreasing prices result in the need to increase harvesting to maintain a minimum income level. Others, under the prevailing institutional conditions, do not offer sufficient economic advantage. It is necessary to examine each case carefully to see where the real constraints operate and to identify solutions.

NTFP INTENSIFICATION AND BIODIVERSITY

NTFP production has often been considered to be more compatible with biodiversity conservation than timber extraction or agriculture. In fact, this depends very much on the production system employed. Low intensity extraction of NTFP from a natural forest can have a low impact on the local ecology and on biodiversity at the landscape scale and even at the species scale. But as harvesting intensity and management intensity increase the negative impact is higher. Some of the intensively managed systems represented in our study have completely displaced the natural vegetation within the management unit. At the extreme, the bamboo in Anji county, China, is produced in a monoculture. Cardamom is produced in the Western Ghats of India under a range of production systems. Small quantities are still harvested from wild sources. Many small producers integrate cardamom production in secondary forests, retaining some of the original forest biodiversity. However, some of the larger producers use artificial shade and irrigation to maintain an appropriate micro-climate for intensive cardamom production, with very little biodiversity at the plot level.

The impacts at the landscape- or plot-level are less clear for some of the less intensively managed cases. In most cases ecological and biodiversity impacts have not been measured or even estimated. For that reason, we have not included this aspect in the analysis. Moreover, assessing impacts of this kind needs a clear understanding of the baseline situation. Should the current management system be compared with a natural undisturbed forest? Or should it be compared with a degraded forest or even an agricultural field?

At the species level, almost all non-cultivated products were reported to show declining resource bases. Over-exploitation is common.

Here we confront an apparent contradiction. One objective of many NTFP projects is to encourage biodiversity conservation, but successful NTFP development is likely to have the opposite effect. Better markets, improved infrastructure, higher product demand/prices leads to increased harvesting, intensified management and erosion of biodiversity. As intensified production increases, it can be expected that wild

resources will be harvested to economic extinction, while the market is increasingly supplied with cultivated material. This situation was modeled by Homma (1992) and several cases in our study illustrate the situation well. Cases where cultivated resource production has taken over as the main source of supply include Woodcarving Bali, rattan-Indonesia, rattan – vietnam, mulberry-Laos and mushroom-Korea.

Opportunities do exist though for extensive management under some conditions. For example, in conservation areas or in buffer zones around protected areas, some NTFP can be managed to provide income for local people, with relatively low impact. The cardamom-Vietnam case provides a good example. Currently a large proportion of the harvest comes from a National Park. This harvesting is illegal, and there is active enforcement, making it more difficult for collectors and traders, increasing risk and pushing down prices paid to harvesters. However, harvesting has a relatively small impact on the cardamom plants and on the surrounding biodiversity. It seems that a solution could be found to allow people to continue their harvesting activities, with appropriate rules to maintain the resource and limit inadvertent damage by harvesters to other resources.

The Mushroom-China case offers a positive example. This product is also harvested from a national park. Harvesters have the right to harvest mushrooms (but only mushrooms). This allows local people some benefits from the park. Because they are such high value products it amounts to a substantial amount of income collectively. However, gatherers remain unorganized and there is competition for resources. Harvesters frequently take immature mushrooms that would be ten times more valuable a day or two later. Luckily, the harvesting pressure does not seem to have seriously damaged the resource, though there is evidence that litter removal during harvesting has a negative impact on production. Many other organisms are much more susceptible than fungi to damage from over-harvesting.

There is increasing interest in the idea of managing forests for multiple resources. NTFP production could be compatible with timber production, recreation, or other objectives. It is an area that needs more research.

CONCLUSIONS

Classifying NTFPs according to their role in household economic strategies provides a useful tool to help understand the role and potential of these products to contribute to livelihood and conservation objectives. Different roles imply quite different potentials and indicate the need for different kinds of interventions.

Overall, commercial NTFP production is an important source of employment and income in a wide range of situations. However, in most cases NTFP production is not the main source of income. People use NTFPs as part of systems, and it is important to consider whole systems in development efforts.

Our case groupings, and the related literature, show the importance of the case context in determining how people use their forest and other resources. Some of the key context variables identified in our study are property rights, size and accessibility of markets for NTFP, and the availability of alternatives - the “opportunity cost” of labour and of land in the area.

In poor remote areas, with open access resources, there is a tendency for resource overexploitation of marketed NTFPS, and dissipation of rents. This trend is exacerbated where more households are getting involved in harvesting and trade in response to new opportunity (e.g. new market, increasing price) or need (e.g. contracting economies, drought, or other factors limiting alternatives). Many households make some part of their living from these NTFPs, but the producers are at a disadvantage, with unstable markets, poor infrastructure and market access, and low bargaining power. In these situations, forestry (including NTFP harvesting) is often the default option. The area is underdeveloped and there are few alternatives.

Where the market is sufficiently attractive, the product sufficiently valuable and land/resource tenure secure, people invest in managing NTFP. Two basic strategies were examined – cultivation and intensified management of wild resources. Cultivated cases tended to have higher incomes relative to the local situation, and higher returns per unit of land compared to non-cultivated NTFP production. In areas that have more agricultural development, typically with a high proportion of the land under private ownership, NTFP production fits in with other land uses, making productive use of land that is marginal for agriculture (e.g. sloping lands, fence rows, water courses) and also using available labour at low periods in the agricultural cycle.

Ultimately, if NTFPs are to be useful in efforts to reduce poverty – that is, to lift people of poverty – it will have to be through increased and/or more efficient commercial production and trade. Interventions to this end should consider:

- Commercial NTFP production is commonly integrated with other economic activities.
- There are some inherent paradoxes in that the conditions that favour effective commercialization are not met in many poor areas. The process of commercialization may have an anti-poor bias.
- Other important constraints exist outside the NTFP sector. Poor people are poor because they have poor access to markets, insufficient human capital, insufficient productive capital, weak institutions, and generally weak bargaining power. (Some) NTFP may offer the potential to create employment and income generating opportunities, but realizing this potential will require investments in other areas as well.
- NTFP investments may be a good place to start to help to improve capacity and to win better access to resources. But, it may be that if the external constraints were released, people would prefer other activities over NTFP production. As Arnold et al (1994) found, it may be better to help people to move into alternative activities.

The potential for NTFP commercialization to be effective as a tool for biodiversity conservation is limited. The main responses to increased market demand for NTFP are inimical to biodiversity conservation in many situations, but there are some promising management options:

- Increased harvesting of wild NTFPs often leads to over-exploitation at the species level.
- Intensified management to increase production is likely to have negative biodiversity consequences at the plot level.

- Intermediate intensity systems can have relatively high biodiversity compared to monoculture plantations and many intensive agriculture. Such systems may meet the economic needs of local people (income diversification, risk spreading, efficient labour and land use) with relatively good biodiversity impacts.
- We have not explored the the potential for reducing pressure on surrounding areas (landscape level effects) through increased income and employment from NTFP.

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APPENDIX 1

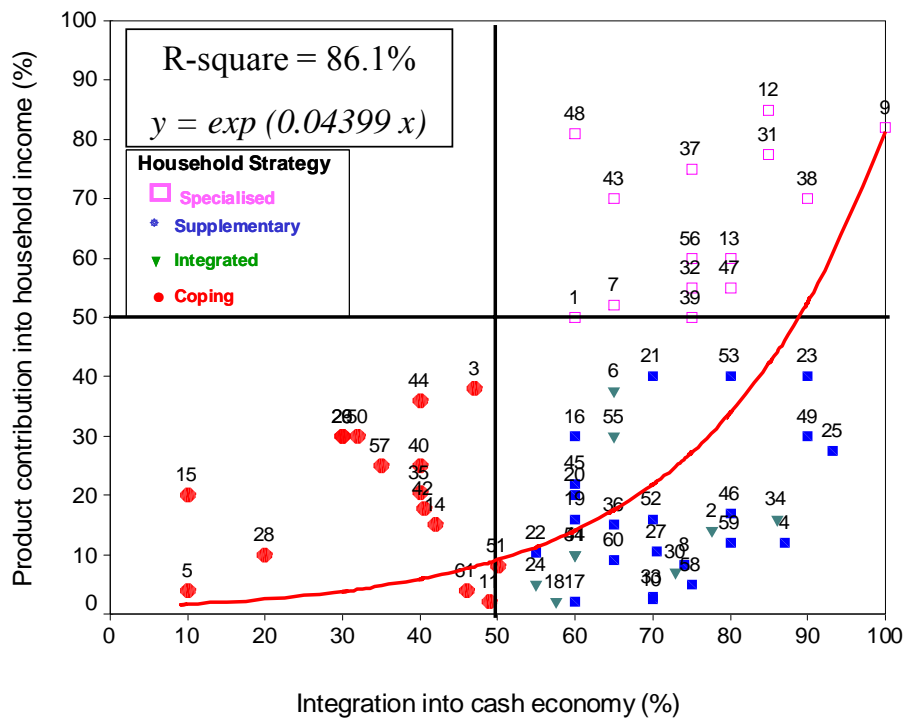
List of Cases

No	Product	Species	Use of the product	Locality of raw material	Country
1	Ant eggs	<i>Oecophyla smaragdina</i>	Animal food	Malingping, Banten	Indonesia
2	Bamboo	<i>Phyllostachys heterocyclus</i>	Fibre (for weaving; Bamboo mats)	Anji County, Zhejiang	China
3	Bamboo	<i>Neohouzeaua dullooa</i> (Gamble) A. Cams	Fibre (for weaving; Bamboo handicraft)	Cho Don, Bac Kan Prov	Vietnam
4	Bark	<i>Cassipourea flanaganii</i> (Schinz) Alston	Medicinal	Pirie Mission & Cwence	South Africa
5	Bark	<i>Boehmeria malabarica</i>	Resin/dyes	Ban Tat Mouan	Lao PDR
6	Benzoin	<i>Styrax paralleloneurum</i> Perk.	Ornamental (Smoking agent)	Northen Tapanuli, North Sumatra	Indonesia
7	Brazil Nut	<i>Bertholletia excelsa</i> H.B.K.	Human food	North Bolivia Amazon	Bolivia
8	Bush meat	<i>Tayassu tajacu</i> and <i>Tayassu pecari</i>	Human food	Cuence del rio Nanay	Peru
9	Cardamom	<i>Elettaria cardamomum</i> Maton	Human food	Kerala	India
10	Cardamom	<i>Amomum</i> spp.	Medicinal	Bolovens Plateau	Lao PDR
11	Cardamom	<i>Amomum villosum</i>	Medicinal	Babe, Bac Kan Prov.	Vietnam
12	Chewsticks	<i>Garcinia kola</i> and <i>Garcinia epunctata</i>	Medicinal	Nkwansa, Bansa, Betin.	Ghana
13	Damar resin	<i>Shorea javanica</i> K&V	Resin/dyes	Krui, Lampung	Indonesia
14	Elephant hunting	<i>Loxodonta africana</i>	Sport Hunting	Gurube District	Zimbabwe
15	Fruit	<i>Choerospondias axillaris</i>	Human food	Central mid-hills	Nepal
16	Fruit	<i>Orbignya phalerata</i> Martius	Medicinal	Bacabal, Maranhao	Brazil
17	Fruit	<i>Platonia Insignis</i> Mart.	Human food	Boa Vista, Para	Brazil
18	Fruit	<i>Bactris gasipaes</i> Kunth	Human food	Manacapurus, Amazona	Brazil
19	Fruit	<i>Endopleoura uchi</i>	Human food	Acara, Para	Brazil
20	Fruit	<i>Pouteria sapota</i> (Jacquin) H.E. Moore & Stearn	Human food	San Andres, Veracruz	Mexico
21	Fruit	<i>Myrciaria dubia</i> -Mirtaceae	Human food	Maynas Province	Peru
22	Fruit	<i>Uncaria tomentosa</i>	Medicinal	Puerto Inca	Peru
23	Fruit	<i>Garcinia Kola</i> (Heckel)	Human food	Omo Forest	Nigeria
24	Fruit	<i>Dacryodes edulis</i> (G. Don) H. J. Lam	Human food	Sakpoba	Nigeria
25	Fruit (alspice)	<i>Pimenta dioica</i> (L.) Merrill (MYRTACEAE)	Human food	Puebla	Mexico
26	Fuelwood	<i>Acacia seyal</i>	Fuel wood	Far North Province	Cameroon
27	Garcinia fruit	<i>Garcinia gummi-gatta</i>	Medicinal	Sirsi, Karnataka	India
28	Leafs for fibre	<i>Sabal yapa</i> Wright ex Becc.	Fibre (for weaving, paper, thatch, etc)	Xmaben	Mexico
29	Medicinal Bark	<i>Prunus africana</i> (Hook.f) Kalkman	Medicinal	Buea Subdivision, Fako Division	Cameroon
30	Mulberry Bark	<i>Broussonetia papyfera</i>	Fibre (for weaving, paper, thatch, etc)	Kenthao & Paklay	Lao PDR
31	Mushroom	<i>Tricholoma matsutake</i>	Human food	Yunnan Province	China
32	Mushroom	<i>Lentinula edodes</i>	Human food	Kong Ju, Chungnam	Korea Republic

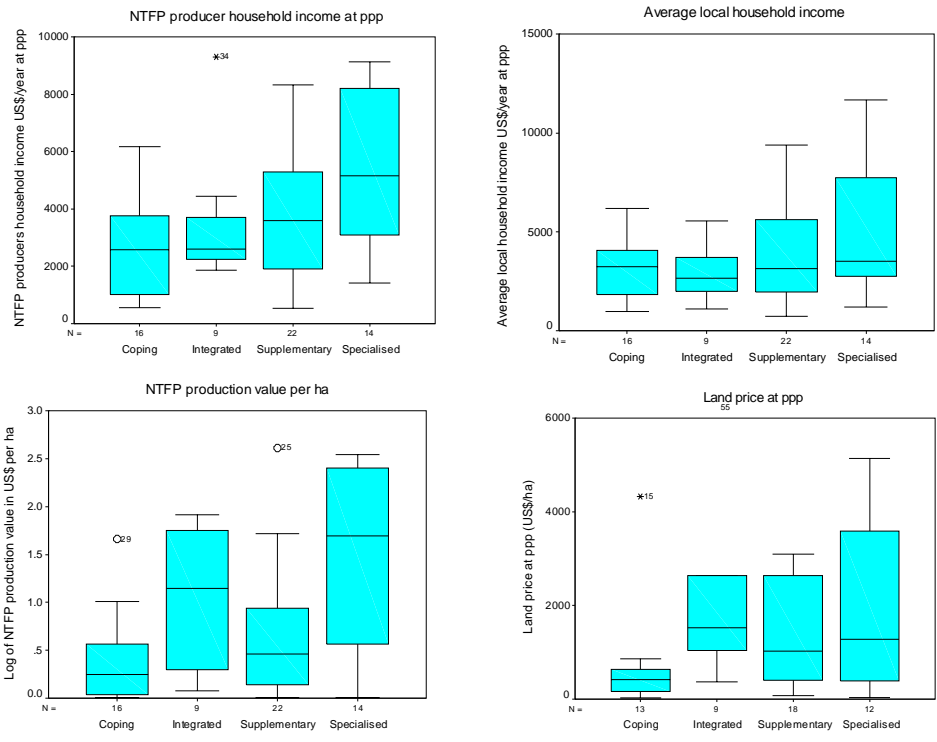
33	Nuts	<i>Vitellaria paradoxa</i> C.F.Gaertner subsp. <i>paradoxa</i>	Human food (Butter)	Bassila	Benin
34	Palm Fibre	<i>Carludovica palmata</i>	Fibre (for weaving, paper, thatch, etc)	Manabi Province	Ecuador
35	Palm Fibre	<i>Hyphaene petersiana</i>	Fibre (for weaving, paper, thatch, etc)	Xini ward, Sengwe	Zimbabwe
36	Palm Heart	<i>Euterpe precatoria</i> Mart.	Human food	North Bolivia Amazon	Bolivia
37	Palm Heart	<i>Euterpe edulis</i> Mart.	Human food	Eldorado-SP	Brazil
38	Pine resin	<i>Pinus caribaea</i>	Resin/dyes	San Andres	Cuba
39	Rattan	<i>Calamus</i> spp.	Fibre (for weaving; Rattan handicraft)	Besiq, Damai, East Kalimantan	Indonesia
40	Rattan	<i>Calamus</i> spp.	Fibre (for weaving; Rattan handicraft)	Puerto Princesa	Philippines
41	Rattan	<i>Calamus tetradactylus</i>	Fibre (for weaving; Rattan handicraft)	Cam Xuyen	Vietnam
42	Rattan	<i>Laccosperma secundiflorum</i>	Construction (Rattan furniture)	Yaonde	Cameroon
43	Rattan	<i>Laccosperma secundiflorum</i>	Fibre (for weaving; Rattan handicraft)	Rio Muni	Equatorial Guinea
44	Rattan	<i>Eremospatha macrocarpa</i>	Fibre (for weaving; Rattan handicraft)	South Western	Ghana
45	Root	<i>Baccharis trimera</i> (Lers)	Medicinal	Banhado Grande, Para	Brazil
46	Root	<i>Maytenus ilicifolia</i> Mart. ex Reiss - Cel	Medicinal	Campo Largo, Parana	Brazil
47	Root	<i>Pfaffia glomerata</i> Spreng. Pedersen	Medicinal	Porto Rico, Parana	Brazil
48	Root	<i>Psychotria ipecacuanha</i>	Medicinal	Huerta Norte, Alajuea	Costa Rica
49	Root	<i>Harpagophytum procumbens</i>	Medicinal	Omaheke Region	Namibia
50	Rubber	<i>Hevea brasiliensis</i>	Ornamental	Upper Jurua, Acre	Brazil
51	Sandalwood	<i>Santalum album</i> LINN.	Medicinal/ essential oils	West Timor	Indonesia
52	Tendu leaves	<i>Diospyros melanoxylon</i>	Fuel	Harda, Madya Pradesh	India
53	Tree bark	<i>Trema micrantha</i>	Fibre (for weaving, paper, thatch, etc)	Sierra Norte, Puebla	Mexico
54	Wood	<i>Paraserianthes falcataria</i>	Ornamental (Woodcarving)	Bali	Indonesia
55	Wood	<i>Agathis alba</i>	Ornamental (Woodcarving)	Sukabumi, West Java	Indonesia
56	Wood	<i>Bursera glabrifolia</i>	Ornamental (Woodcarving)	Oaxaca	Mexico
57	Wood	<i>Bursera aloexylon</i> (Schiede) Engl.	Ornamental (Woodcarving)	Olinala, Guerrero	Mexico
58	Wood	<i>Brachylaena huillensis</i>	Ornamental (Woodcarving)	Kilifi district	Kenya
59	Wood	<i>Pterocarpus angolensis</i>	Ornamental (Woodcarving)	Bushbuckridge district	South Africa
60	Wood	<i>Polyscias fulva</i>	Ornamental (Woodcarving)	Mpigi District	Uganda
61	Wood	<i>Aflezia quanzensis</i> Welw.	Ornamental (Woodcarving)	Chivi District	Zimbabwe

APPENDIX 2

Figures 1. Cases grouped by Household strategy

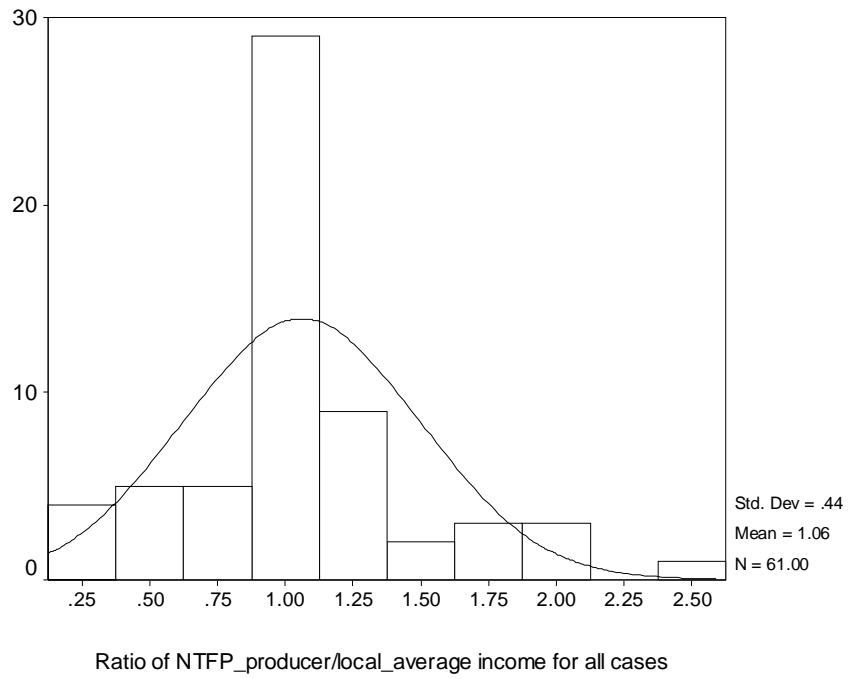


Figures 2.



Figures 3.

Distribution of ratio NTFP_producer/local_average income for all cases



Figures 4.

