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Making the best of two worlds: rural and peri-urban livelihood options sustained by non-timber forest products from the Bolivian Amazon

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SUMMARY

Strategies to foster development based on the gathering, processing and marketing of non-timber forest products (NTFPs) implicitly target rural producers as principal beneficiaries. In the Bolivian Amazon, however, where NTFP-related activities feature prominently among livelihood options, the population has been predominantly urban since the late 1980s. Rural-urban migration, fuelled by the collapse of the rubber industry in the late 1980s, reshuffled extractor populations to the peri-urban neighbourhoods of the regional urban centres. These ex-forest dwellers face limited opportunities on the urban labour market given their low formal education. While women and children find employment in the urban-based Brazil nut industry, many males continue to engage in extractive activities during some months of the year. Benefits generated through household participation in NTFP-related activities constitute the *sine qua non* for their economic survival in town. These urban ramifications of NTFP-based livelihood strategies have largely been neglected by research and development projects. Given that NTFP-related activities can sustain thousands of peri-urban livelihoods, an exclusively rural focus of NTFP-based development becomes flawed. Future research and development agendas need to allow for the rural-urban continuum of NTFP use and trade in order not to neglect the urban dimension of NTFP-based livelihood strategies.

Key Words: rural and peri-urban livelihood strategies, non-timber forest products, rural-urban migration, Brazil nut, palm heart, Bolivia, Amazon.

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INTRODUCTION

Extraction, processing, consumption and sale of non-timber forest products (NTFPs) are crucial elements of livelihood strategies across a variety of settings. An estimated 300 million people living close to tropical forests earn part or all their livelihood through timber and non-timber forest use (Pimental *et al.* 1997). The importance of NTFPs for rural households – especially in times when alternative income, food or animal fodder are scarce[2] – is well documented (e.g., Panayotou and Ashton 1992, de Beer and McDermott 1996, Ruiz Pérez and Arnold 1996). However, the implicitly rural focus of NTFP research has shed little light on NTFPs as current or potential sources of employment and income for urban and peri-urban populations.

To date, NTFP-based research and development have focussed on rural communities (e.g., Butler 1992), sustainable harvesting techniques (e.g., Peters 1994, 1996), markets (e.g., Clay 1992a, b; Iqbal 1993, 1995; Dewees and Scherr 1996), commercialisation and marketing (e.g., Padoch 1992, Richards 1993, Lintu 1995), and biodiversity conservation (e.g., Freese 1997). Textbooks on NTFPs (e.g., Counsell and Rice 1992, Nepstad and Schwartzman 1992; Plotkin and Famolare 1992, de Beer and McDermott 1996; Ruiz Pérez and Arnold 1996) centre around the main issues of conservation and development with a virtually exclusive focus on rural areas and populations. Even an explicitly "holistic approach" to the commercialisation of NTFPs (Taylor *et al.* 1996) fails to account for the urban dimension of NTFP use and trade. With rurally focused research and village case studies abounding, we increasingly understand the importance of NTFPs at the level of rural households, communities and regional economies, but fail to discern the interaction of peri-urban livelihoods with forest resources.

Forest-based income, in both relative and absolute terms, is a crucial parameter in the analysis of NTFP-based livelihoods. Yet it is considered an important indicator of well-being of forest dwellers (Wollenberg and Nawir 1998) rather than that of urban low-income groups. In an in-depth analysis of forest income, Wollenberg and Nawir (1998) draw on ten case studies all of which focus exclusively on rural income, as does a comprehensive study on NTFP-based income by FAO (1995a). Complementary, an extensive literature review on the role forest products play in the livelihoods of the urban and peri-urban poor (Wiggins and Holt 2000a) does not yield substantial data on forest-based income that would permit a comparison between peri-urban and rural livelihood strategies involving NTFPs. One of the few studies addressing this issue owes to Schwartzman (1992). Comparing incomes among rural dwellers and rural-urban migrants in the peri-urban areas of Acre, Brazil,[3] he concludes that despite greater opportunities for wage work in town, a more diversified labour market, and greater integration into the market economy, it is not necessarily the case that migrants' incomes increase; even when they do, they may not offset losses of subsistence production. This explains the persistence of close ties with the

[2] The importance of forest foods and incomes often lies in its timing, rather than in its magnitude as a share of total household inputs (Arnold and Ruiz Pérez 1998).

[3] Schwartzman conducted a survey of 30 rubber tapper households on Seringal Cachoeira in Xapuri, Acre, and 20 rural-to-urban migrant households in two peripheral neighbourhoods in Rio Branco, the capital of Acre.

rural areas which continue to contribute to the subsistence of poor urban migrant households (ibid.).

Research in peri-urban areas of developing countries reveals the former's importance as critical environments in alleviating food insecurity of poor inhabitants (Drescher and Iaquinta 1999). The emerging field of urban forestry underscores the urban poors' dependence on forest and tree products (Carter 1994; FAO 1995b, 1999). These sources, though, refer to forest and tree resources in urban and peri-urban environments rather than those in the forest hinterland. While it is acknowledged that increasing urbanisation results in expanding markets for forest products (Wiggins and Holt 2000a), it remains unclear how this may translate into livelihood options for the urban and peri-urban poor. Neglect of the urban dimension of NTFP use and trade leads to an underestimation of the products' actual importance in the livelihood strategies of peri-urban households. We poorly understand their incentives to continued participation in NTFP gathering and processing, the contribution of NTFP-based income to livelihood security, occupational careers and other consolidation processes. It has therefore been suggested to study the characteristics of peri-urban livelihoods dependent on forest and tree resources and their responses to change (Wiggins and Holt 2000b).

In this paper, I will argue that the traditional focus of NTFP research on the rural sector fails to acknowledge the potential of NTFP-related activities to poverty alleviation in urban and peri-urban environments. It departs from the hypotheses that gathering, processing and sale of NTFPs play an essential role in the livelihood strategies of peri-urban dwellers in the Bolivian Amazon; and that migration in response to shifts in extractive economies is a key element of such strategies. My argumentation is based on a case study from northern Bolivia where the majority of peri-urban dwellers is involved in the supply chains of Brazil nut (*Bertholletia excelsa* H.B.K.) and palm heart (*Euterpe precatoria* Mart.). The paper commences with a brief description of the historical and spatial dimension of NTFP use in the Bolivian Amazon. It is followed by the methodology and methods applied during a household survey in the peri-urban neighbourhoods of Riberalta, the principal town of the region. The ensuing results highlight the role of NTFP-based income within the general household portfolio. In the discussion, household income and migration patterns are related to livelihood security. Finally, conclusions are drawn on the necessity to broaden NTFP research foci by accounting for the rural-urban continuum underlying the supply chains of NTFPs.

HISTORICAL AND SPATIAL DIMENSION OF NTFP USE IN THE BOLIVIAN AMAZON

The northern Bolivian Amazon, comprising the department of Pando, the province of Vaca Diez (Beni Department) and the northern part of the province of Iturralde (La Paz Department), is a prominent example for a pronounced interdependency between the development of the regional economy and livelihood systems based on the extraction of NTFPs (Map 1). The region came within reach of the world economy in the mid-19th century through the extraction of Peruvian bark (*Cinchona* spp.) and, more vigorously, the upcoming rubber boom at the threshold of the 20th century.

Rubber extraction was organised on so-called *barracas*[4], that is rubber estates controlled by a patron (*patrón*). The production system implied pronounced dependency relations rooted in a debt-peonage system that *inter alia* was based on the prohibition of subsistence agriculture. Rubber tappers were compelled to purchase the basic necessities from the patrons at highly inflated prices in return for the rubber tapped. It was only in the wake of the first rubber crisis following World War I that independent rubber tapper communities came into existence. As restrictions on agriculture on the *barracas* relaxed, agricultural activities were combined with the extraction of rubber (*Hevea brasiliensis* (Willd. ex A.Juss) Muell.-Arg.) and Brazil nut. This mode of making a living prevailed on both the *barracas* and in independent communities until the mid-1980s when Bolivian rubber production entered its phase of final decline (Stoian 2000a).

The rubber collapse rendered it difficult to secure a livelihood in the forest. As a result, many forest dwellers migrated to one of the region's three urban centres, viz. Riberalta, Cobija, and Guayaramerín. Rural-urban migratory flows were partly triggered by the emergence of the urban-based Brazil nut industry, absorbing several thousand low-skill labourers. The majority of ex-forest dwellers has settled at the fringes of town, in particular in Riberalta. Life in the peripheral neighbourhoods is characterised by limited access to basic infrastructure, such as electricity, potable water, and inexpensive public transport. Most of the residents need to buy foodstuffs as they lack access to arable land. In addition, they are subject to a temporal labour regime, as only a few dispose of the education needed to enter the formal labour market. Consequently, many peri-urban households maintain their links with the rural areas: a few by working agricultural plots in the proximity of town and others, far more importantly, by participating in extractive activities. They join temporary work crews extracting palm hearts or timber and/or participate in the Brazil nut harvest, lasting from December to March. Otherwise deprived of adequate income sources, some 6,000 urban-based Brazil nut gatherers join each year a comparable number of rural gatherers.

METHODOLOGY AND METHODS

Recent arrivals from the forest hinterland constitute an important share of the population in the peripheral neighbourhoods of Riberalta.[5] A peri-urban household survey[6] was conducted between May and September 1998 to determine the interdependence of these ex-forest dwellers with the rural area, particularly their reliance on the gathering, processing, and marketing of NTFPs relative to long-established Riberalta dwellers (*Riberalteños*) and extra-regional migrants. The distinction between these three groups of origin, as suggested by Verheule (1998), proved valuable for the analysis of income patterns and migration histories among peri-urban dwellers.

Adopting a livelihoods perspective, the survey aimed at the identification of consolidation processes. To this end, four out of a total of sixteen peripheral neighbourhoods were purposefully selected according to their respective year of

[4] The term '*barraca*' refers to both the territorial extension of a rubber estate and its functional center sited around the river-based hut of the owner or patron. Extensions of *barracas* in Bolivia vary from anything between 150 and 100,000 hectares.

foundation, number of residents, and local infrastructure. Among the neighbourhoods (*barrios*) selected, *Los Almendros* was the oldest (founded in 1982), followed by *Villa Don Carlos* (1990), *1° de Diciembre* (1993), and *San Juan* (1996). Generally, the younger a given *barrio* the farther it is located from Riberalta's center (Map 2).

In each of the four *barrios* 30 households were selected at random following a mapping and screening process.[7] Semi-structured interviews with household heads and/or other knowledgeable household members centred around demographic and social aspects, migration histories, and annual cash income generated through extractive and agricultural activities, urban wage labour, salaries, rent, and remittances. Between April and July 1999, all 120 households were revisited to inquire about their participation in the Brazil nut season 1998/99.[8] This proved especially interesting, as the sudden drop of prices paid to Brazil nut gatherers – the first after fairly steady price hikes during most of the 1990s – promised to shed more light on the incentives for participation in the Brazil nut harvest as the single most important NTFP-related activity among peri-urban households.

RESULTS

NTFP-based income as part of the general household portfolio

Rural income

To elucidate the importance of urban-rural linkages among the households sampled, it is crucial to determine their dependence on income generated in the rural areas. Rural income is chiefly derived from forest product extraction – Brazil nut, palm heart, and timber (in this order) – and, to a limited extent, agriculture (Table 1).

[5] From 1985 to 1998, Riberalta's population increased from 28,000 to 58,000. The annual growth rate of 5.7% implies natural growth of around 2.7% and migration-induced growth of 3.0%.
[6] The survey was part of a Ph.D. dissertation (Stoian 2000b) carried out within the framework of the BMZ-funded project "Contributions of Non-timber Forest Products to Socioeconomic Development", jointly carried out between the Center for International Forestry Research (CIFOR) and the University of Freiburg, Germany, and in collaboration with the Programa Manejo de Bosques de la Amazonía Boliviana (PROMAB).
[7] In order to elucidate year-round income patterns, only those households were taken into consideration that had been residing in a given place for no less than a year.
[8] This posed difficulties in some cases, as one household head had died by the time of the second survey and others had relocated themselves, either individually or involving the entire household.

Table 1. Duration of rural stay (gender-wise) and mean cash income generated in rural areas among peri-urban households in Riberalta, Bolivia, by group of origin

	Mean duration of rural stay (months per year)		Rural income (Bs)	Rural income (in percent)
	♂	♀		
Ex-forest dwellers (n=44)	3.3 (±3.4)	1.2 (±1.5)	4066 (±4148)	32.2 (±33.2)
Extra-regional migrants (n=14)	3.5 (±3.1)	0.6 (±1.2)	6938 (±21,530)	10.8 (±29.1)
Riberalteños (n=62)	2.7 (±3.2)	1.1 (±2.0)	3190 (±6529)	20.1 (±31.5)
Total (n=120)	**3.0 (±3.3)**	**1.1 (±1.7)**	**3948 (±8947)**	**23.5 (±32.4)**

Source: Peri-Urban Household Survey 1998.
Note:
Share of rural income in percent of total household income. One *boliviano* (Bs) was about US$0.19 at the time of the survey; standard deviation in parentheses.

In the sample population, about one-fourth of total household income is generated in the rural areas (Table 1); it is principally derived from forest product extraction, complemented by agriculture or agricultural wage labour. Little less than half the households (45%) dispose of rural income, 18% rely for more than half of their total earnings on it, and as much as 9% live entirely from rural income. This last group comprises households of virtually all income ranks, ranging from patron households, who rely for all their income on their *barracas* or farms (n=2), to those of pure extractivists, who generate all their income through the exploitation of Brazil nut, palm heart, and timber (n=6); among the latter, all but one are ex-forest dwellers.

The relative weight of rural income is highest among ex-forest dwellers, making up for one-third of total income. Even *Riberalteños* derive one-fifth of their total income from the rural areas. As for extra-regional migrants, rural income is generally of low importance; the high average computed for this group is due to two middlemen who generate significant income through the brokerage of palm heart or Brazil nut. Extra-regional migrants spend roughly as much time in the rural areas as ex-forest dwellers and *Riberalteños*, albeit for largely different reasons: the former work in the rural areas as military men, construction workers, or contractors, while the latter engage in the extraction of Brazil nut, palm heart, or timber, if not working as contractors too.

Temporary population shifts in search for rural income stand primarily for male migration as documented by the relatively short periods women spend in the rural areas. Female stays in the countryside are largely confined to the Brazil nut harvest, a period in which less than half accompany their husbands to the rural areas. The general picture is that the majority of male household heads (61%) seasonally migrates to the rural areas whilst most of their spouses (65%) remain with the children in Riberalta in order not to compromise their children's education and urban-based economic activities.

In contrast to what the literature suggests (e.g., Stier 1983), the length of the seasonal stay in the rural areas is not a general indicator of wealth as expressed in income. Actually these two variables are independent save for the *Riberalteños* for whom a certain correlation exists. But contrary to prediction, the length of the rural stay is inversely proportional to total income and per-capita income ranks. Seasonal

migration to the rural areas for dearth of urban income sources is a viable option for the low-income labour force temporarily released from the Brazil nut processing plants (see below). In general, though, seasonal migration needs to be understood as part of an overall household livelihood strategy involving both economic and non-economic factors. In particular ex-forest dwellers have strong, often emotional bonds with the forest and maintain strong links with forest-based members of the extended family. The latter commonly demand for urban-based relatives when household labour is insufficient to secure the harvest of Brazil nuts or agricultural crops. The majority of the sample population thus pursues livelihood strategies that entail a rural stay, although the shares of rural income vary widely across groups of origin and income ranks (Table 2).

Table 2. Rural income as share of total income among peri-urban households (n=120) in Riberalta, Bolivia, by group of origin and income quintile

Income quintile	1 "rich"		2		3		4		5 "poor"	
Group of origin	**TI**	**PCI**	**TI**	**PCI**	**TI**	**PCI**	**TI**	**PCI**	**TI**	**PCI**
Ex-forest dwellers	28.5	0	40.6	47.0	43.4	24.5	29.6	33.8	28.3	33.4
Extra-regional migrants	25.2	21.6	0	0	0	0	0	0	–	–
Riberalteños	31.2	32.3	12.9	12.5	17.8	18.1	15.5	8.9	24.7	23.9
Total	**29.0**	**27.8**	**20.0**	**27.3**	**25.2**	**19.5**	**19.5**	**17.1**	**26.7**	**28.7**

Source: Peri-Urban Household Survey 1998.
Note:
1 represents the upper (high-income) quintile and 5 the lower (low-income) quintile of total income (TI) and per capita income (PCI), respectively.

Table 3 Mean gross income (GI), expenses (EXP), and net income (NI) of participants in the Brazil nut harvests 1996/97-1998/99 among peri-urban households (n=120) in Riberalta, northern Bolivia, by type of participant (in Bs)

Type of participant	*Zafra* 1996/97			*Zafra* 1997/98			*Zafra* 1998/99		
	GI	**EXP**	**NI**	**GI**	**EXP**	**NI**	**GI**	**EXP**	**NI**
Zafrero (n=22-34)	3472	2109	1363	3798	2371	1427	2408	1426	982
Granjero (n=3)	5800	1967	3833	9367	2067	7300	3883	1850	2033
Contractor (n=5-6)	2538	1127	1411	4059	1549	2510	4185	1300	2885
Patron (n=2-3)	8194	1570	6624	13,950	2117	11,833	5150	1972	3178

Source: Peri-Urban Household Survey 1998/99.
Note:
Granjero here refers to a person who gathers nuts on his own parcel and sells them at the rate of the free market. One *boliviano* (Bs) was about US$0.19 at the time of the survey; n varies according to the *zafra*.

Low-income households do not rely to a greater extent on rural income than better-off households (Table 2). Rural income percent is very loosely correlated with the quintiles of total income (r^2=-0.02) or per capita income (r^2=-0.04). Trends exist, however, with respect to the group of origin. Ex-forest dwellers exhibit relatively high shares of rural income across the quintiles, whereas extra-regional migrants are only represented at the top end by two middlemen buying Brazil nut and palm heart in the rural areas. *Riberalteños* reveal a relatively high rural income percent at both the top

(*barraca* owners) and the bottom end (Brazil nut and palm heart gatherers), reflecting the importance of extractive activities as generator of rural income.

Extractive income

Participation in the Brazil nut harvest (*zafra*) is not a mere matter of economically surviving three months of the year or working off debts from the *zafra* before. Rather, it is a fairly remunerative activity for most of the gatherers (Table 3). In the *zafras* 1996/97, 1997/98, and 1998/99, their vast majority had a positive balance upon return from the forest, with those facing a negative balance amounting to a mere 5.3%, 4.3%, and 3.0%, respectively. These shares are below the 14.0% reported from the *zafra* 1995/96 (Verheule 1998) and in stark contrast to the widely held belief that pervasive indebtedness prevails among the contracted Brazil nut gatherers or *zafreros*. Losses occur, however, when Brazil nut production in a given locality is insufficient.[9] In order to maximise raw material output, contractors and patrons tend to recruit more gatherers than actually needed, thus compromising the *zafreros*' earnings (Table 3).

Benefits from the Brazil nut harvest chiefly accrue to the patrons and, to a lesser extent, to contractors, and independent or contracted gatherers (Table 3). The majority of the latter (62%) derived a net income of Bs500-1500 in the low-price *zafra* 1998/99, rising to Bs(700)800-2000 in the moderate and high-price *zafras* in 1996/97 and 1997/98, respectively; still, those returning with a net income of less than Bs1000, made up 67%, 54% and 38%, respectively. Though at a first glimpse this seems to be a fairly modest return of a strenuous and somewhat dangerous activity, it compares favourably to the earnings on the casual labour market on which the vast majority of peri-urban dwellers relies. Gross income of an average Brazil nut gatherer varied from 1.6 times the daily wage in the low-price *zafra* 1998/99 to 3.1 times the daily wage in the high price *zafra* 1997/98. Although foodstuffs and other basic necessities are more costly on the *barracas*, participating in the *zafra* is an economically rational decision.

With emphasis on the Brazilian Amazon, Homma (1992, 1994) holds that NTFPs are the last resort of the poorest among the poor. This is not necessarily the case among the peri-urban dwellers in the Bolivian Amazon, where the sample population participating in NTFP-related activities represents the medium quintile, both in terms of total and per-capita income. Among the households engaging in the Brazil nut harvest, gathering and processing of NTFPs make up 62% of total income. Evidently, this high dependency also reflects lacking income alternatives. But the fact remains that NTFP-related activities offer a livelihood basis beyond Homma's (1994) "cult to poverty", as we shall further see when examining the income opportunities provided by the regional palm heart industry.[10]

Extraction of palm hearts from wild stands of *Euterpe precatoria* involved 15.8% of the households sampled in 1998, with 12.5% temporarily working as extractors (*palmiteros*), 2.5% as contractors/patrons, and one person (0.8%) combining both

[9] Insufficient Brazil nut production is reported as by far the most important reason for losses (68.2%), followed by illness of the gatherer and/or accompanying household members (11.4%), lack of transportation (11.4%), being satisfied with a settled balance (2.3%), lack of foodstuffs (2.3%), death of a family member (2.3%), and child care (2.3%).

[10] Income data largely refer to the years 1997/98, i.e. the boom years of the regional palm heart industry which has suffered a considerable decline since.

functions. Again, it is not the lowest-income group constituting the bulk of NTFP extractors, as households participating in palm heart extraction pertain to the medium total and per-capita income quintiles. Almost two-thirds (63.1%) of them had participated in the previous Brazil nut harvest. Income from palm heart extraction can assume significant portions which, in individual cases, clearly exceeds that from Brazil nut gathering. In terms of gross income, average *palmiteros* earn 1.2 to 2.7 times the daily wage.[11]

Being fairly remunerative activities, it may be asked why not more people engage in Brazil nut and palm heart extraction, especially since barriers of entry virtually do no exist. Reasons are manifold and chiefly involve what is perceived as lacking incentives, risk and low prestige.[12] Opportunity costs are carefully considered, as reflected in the share of households participating in the Brazil nut harvest varying from 24.2% in the low-price zafra 1998/99 to 27.5% in the medium-price zafra 1996/97 and 35.0% in the high-price zafra 1997/98. While NTFP extraction is a constant element of livelihood strategies of some households, it constitutes a flexible option for others. While *Riberalteños* and extra-regional migrants may endure a week-long stay in the forest chiefly because of income incentives, ex-forest dwellers tend to appreciate additional factors such as tranquillity (see Henkemans 2001).

Extractive income is also derived from hunting and fishing. Both are an important supplement for a small number of peri-urban households. Sale of bushmeat was a source of income for three ex-forest dwellers, annually yielding Bs300, Bs1750 and Bs2000, respectively. Fishing is also important to supplement the dietary variety, with about one tenth of the households involved. Only in exceptional cases the catch is sold to neighbours or on the central market in Riberalta. Fish-based income was generated by three ex-forest dwellers and one *Riberalteño*, varying from Bs60 to as much as Bs8100 a year. These figures illustrate the strong bonds peri-urban households maintain with the surrounding forests and its intrinsic waterways, also because many more than those mentioned rely on personally secured bushmeat or fish for household consumption. Another NTFP-related activity is fuelwood extraction. Though generally collected for domestic use, fuelwood generated in individual cases between US$100 and US$2000 a year.[13] Overall extractive income is summarised in Table 4.

[11] Gross income is distributed as follows: patrons and contractors earned Bs0.3-0.8 (mean 0.5) per palm heart, contracted *palmiteros* received Bs0.5-1.5 (mean 1.2), and independent *palmiteros* fetched Bs1.3-2 (mean 1.6).

[12] The following motives were reported for not participating in the (low-price) Brazil nut harvest 1998/99: low Brazil nut price (32.8%), dislike of that kind of work (25.4%), high risk involved (11.5%), secure job in Riberalta (9.8%), sickness of a household member (9.0%), problems with settling a positive balance (5.7%), taking care of small children (1.6%) or of the house (1.6%), low advance payment (1.6%), and recent death of the household head (0.8%).

[13] One household, for example, earned an annual extractive income of around US$3000, with fuelwood, Brazil nut and palm heart contributing some US$2000, 600 and 400, respectively.

Table 4. Mean annual extractive income (in Bs) among peri-urban households (n=120) in Riberalta, northern Bolivia, by group of origin and per-capita income

Income quintile / Group of origin	1 "rich"	2	3	4	5 "poor"
Ex-forest dwellers	0	5428 (±5484)	3901 (±4081)	4308 (±4089)	2485 (±3309)
Extra-regional migrants	13,876 (±29,860)	0	0	0	–
Riberalteños	5912 (±8869)	2117 (±3728)	2288 (±2779)	975 (±1899)	1090 (±1834)
Total	**7988 (±17,327)**	**3458 (±4782)**	**2836 (±3462)**	**2103 (±3269)**	**1787 (±2712)**

Source: Peri-Urban Household Survey 1998.
Note:
"1" represents the upper (high-income) and "5" the lower (low-income) quintile. One *boliviano* (Bs) was about US$0.19 at the time of the survey. Standard deviation in parentheses.

While ex-forest dwellers and *Riberalteños* generate extractive income in substantial portions across most income ranks, extractive activities involve only a tiny fraction of extra-regional migrants (Table 4). This small group comprised two rural brokers engaged in Brazil nut or palm heart trade.[14] *Riberalteños* pertaining to the highest quintile entailed nine households without any extractive income; the remaining seven households generated annual extractive income of Bs3300-8160 in case of the *zafreros* (n=4), or Bs7500-22,400 in case of the patrons (n=3). In general, extractive income is most important to ex-forest dwellers: 61% of them derive income from extractive activities, as compared to *Riberalteños* (35%) and extra-regional migrants (14%). This is also reflected in the importance of extractive income relative to total household income: among ex-forest dwellers it averages 31% of the total household income including the households without extractive income; shares of extra-regional migrants (24%)[15] and *Riberalteños* (19%) are considerably lower. In absolute terms, when considering the quintiles 2-5 average ex-forest dwellers earn roughly double the extractive income of average *Riberalteños*.

Processing of non-timber forest products

In 1996, the Brazil nut industry provided permanent employment to 2814 persons (74% female and 26% male); if also accounting for non-permanent staff, 5499 persons found employment in the processing plants, or *beneficiadoras* (Coesmans and Medina 1997). This includes in particular the *quebradoras*[16], i.e. a mostly female work force

[14] Their examples disclose the considerable gains intermediaries may have: a rural broker specialized in palm hearts had a gross margin of Bs78,000 (156,000 palm hearts at Bs0.5 each). Another broker realized a gross margin of Bs17,100 by buying 900 boxes of Brazil nut in the *zafra* 1997/98 at Bs35 each and selling them to a processing plant at Bs54 each.
[15] This percentage is inflated by the extraordinarily high income of the palm heart broker. If excluding this person, the share of extractive income relative to total household income among extra-regional migrants drops to a mere 5%.
[16] Typically, a *quebradora* is regarded as responsible for an account to which a number of assistants contributes. These are in particular older children, but also male spouses and, to a lesser extent, persons that are subcontracted from outside the family.

removing the seed coat by means of a hand-operated machine. The Brazil nut industry constitutes the single most important employer for peri-urban households. In the 1998 sample, 30% of the households had at least one person working in the shelling industry, with 18% represented by the female household head or the spouse, 7% by both male household head and the spouse, and 5% by the male household head. Over the past years, male labourers have increasingly found their way to the *beneficiadoras* where 11.7% of the male household heads secure regular employment. Employment in a *beneficiadora* and participation in the Brazil nut harvest are complementary activities. The temporary release of the work force at the turn of the year implies the need for alternate employment readily available in the *zafra*: 79% of the male work force in the *beneficiadoras* participated in at least one of the *zafras* between 1997 and 1999. Those males who work in a *beneficiadora* but generally do not participate in the Brazil nut harvest are exclusively *Riberalteños*. In contrast, all male ex-forest dwellers working in a *beneficiadora* leave for gathering Brazil nuts, reflecting their high contingence on NTFP-related activities.

Female employment in Riberalta stands chiefly for work in a *beneficiadora* where 27% of the female household heads and spouses secure regular employment. If only accounting for the economically active among the spouses, as much as 48% are employed in a *beneficiadora.* Among the female household heads – all economically active – this share rises to 58%. The close association between harvesting and processing Brazil nuts is reflected in the high rate (63%) of households of female *beneficiadora* employees participating in one or more of the *zafras* between 1997 and 1999. Similar to the males, there is an education differential between those who work in a *beneficiadora* and principally partake in the *zafra* (5.7 years of studies on average) and those who engage in neither activity (7.9 years).

The most important occupation in the *beneficiadoras* is that of the *quebradoras*. Unlike the graders (*clasificadoras*), they do not receive a monthly wage[17] but are paid on a piece-work basis. This explains why they involve other household members, in particular children above the age of eight or ten who assist their mothers upon their return from school. The working day is as monotonous as strenuous: average *quebradoras* work 12.9 hours a day, assisted by up to four helpers (mean value 1.1) whose working hours combined average 7.2 hours. The daily labour input averages 20 hours per household. Virtually all *quebradoras* have to look after their household upon return to their home, in addition to child-rearing. They typically earn between Bs30 and Bs36 a day, or 1.5 to 1.8 times the daily wage. Employees of a *beneficiadora* receive a Christmas bonus and an additional bonus (Bs 300-400) at the end of the year, basic medical service and, most importantly, credit (Coesmans and Medina 1997).

Income synthesis

NTFP-related activities are important elements of peri-urban livelihood strategies in Riberalta. Among the households sampled, 58% derive income from the gathering, processing, and/or trading of NTFPs and 37% depend for more than half their total

[17] In fact, *clasificadoras* receive a monthly wage but have to grade a minimum of 10 boxes (20 kg each) a day. This amount can rather easily be accomplished, and those who wish to earn an 'extra' are paid per piece for each additional box (Coesmans and Medina 1997).

income on NTFPs (Table 5). This dependency is highest among ex-forest dwellers (50%), followed by *Riberalteños* and extra-regional migrants (29% each). NTFP-based income is generated by both females and males, involving a highly gender-specific division of labour. NTFP extraction is clearly dominated by males, while NTFP processing on a piece-rate basis is chiefly a female domain. Salaried employment in the NTFP industry is of lesser importance for the sample as a whole, nor is it gender-specific.

According to an earlier survey (van Beijnum 1996), average household incomes in the peripheral neighbourhoods vary between US$960 and US$1150 a year. This, however, is a gross underestimation of the true magnitude of earnings (Table 5).

Table 5. Ranges of total and per-capita annual income and share of NTFP-based income among peri-urban households (n=120) in Riberalta, northern Bolivia, by per-capita income quintile

Per-capita income quintile	Total income (US$)	Per capita income (US$)	NTFP-based income as share of total income
1 "rich"	4000-15,240	812-3566	28.3 %
2	2575-4000	556-796	35.7%
3	2060-2570	449-556	39.3%
4	1650-2050	323-448	40.5%
5 "poor"	950-1630	122-320	50.0%

Source: Peri-Urban Household Survey 1998.
Note:
"1" represents the upper (high-income) quintile and "5" the lower (low-income) quintile. The lowest quintile disregards an exceptional two-person household whose annual income did not exceed US$583.

Table 6. Mean annual household income (total, NTFP and non-NTFP income in Bs) among peri-urban households (n=120) in Riberalta, northern Bolivia, by per-capita income quintiles

Per-capita income quintile	Total income		NTFP income		Non-NTFP income	
	avg.	StDev	avg.	StDev	avg.	StDev
1	28,882	(±19,179)	7930	(±17,030)	20,952	(±18,578)
2	15,509	(±6054)	4993	(±5649)	10,516	(±7606)
3	13,749	(±5291)	5900	(±6226)	7849	(±4929)
4	11,573	(±3657)	5455	(±6364)	6118	(±4520)
5	7981	(±2924)	3730	(±3248)	4251	(±4224)

Source: Peri-Urban Household Survey 1998.
Note:
NTFP income comprises chiefly the earnings from gathering, processing, and trading Brazil nut and palm heart. "1" represents the upper (high-income) and "5" the lower (low-income) quintile. One *boliviano* (Bs) was about US$0.19 at the time of the survey; standard deviation (StDev) in parentheses; slight divergences are due to rounding.

The impression that households in Riberalta's periphery share in poverty is misleading. Both total and per-capita annual incomes vary considerably, as does dependency on NTFP-based income (Table 5). The difference between the average (US$3150) and median total income (US$2300) implies that the poorer half of

households disposes of 73% or less of the average household's income; this group earns little more than one-quarter of the total income, while almost one-third accrues to the richest 10 percent.[18]

Relative importance of NTFP-based income is closely correlated with income quintile (r^2=0.97). The latter's mean contribution to total income increases from about one fourth in the case of the "richest" households to about one half among the "poorest". Yet income distribution among peri-urban households varies primarily because of diverging income other than that derived from NTFPs (Table 6). NTFP income is more evenly distributed than non-NTFP income, reflected in Gini Coefficients of 0.26 and 0.34, respectively. Total income is slightly less concentrated than non-NTFP income, with a Gini Coefficient of 0.32. In sum, 80 percent of the sampled households pocket around two-thirds of NTFP income and little less than half the non-NTFP income.

Income differentiation among peri-urban households owes to the variability of non-NTFP income rather than divergent levels of income generated through gathering, processing, or trading NTFPs (Table 6). NTFP-based income figures prominently in the top end income quintile, where in particular *barraca* owners and contractors account for a high average, but also in the medium quintile which comprises a good number of *zafrero* and *quebradora* households. If disregarding the top end quintile, we can broadly summarise that NTFP-based income of roughly the same magnitude is generated across the continuum from better-off to worse-off households. In contrast, non-NTFP income is directly proportional to the per-capita income rank, whereby the group of origin proves an important differential (Table 7).

Table 7. Mean annual household income (total, NTFP and non-NTFP income in Bs) among peri-urban households (n=120) in Riberalta, northern Bolivia, by group of origin

Group of origin	Total income		NTFP income		Non-NTFP income	
	avg.	StDev	avg.	StDev	avg.	StDev
Ex-forest dwellers	12,750	(±6213)	6679	(±6114)	6071	(±6044)
Extra-regional migrants	28,862	(±23,513)	9399	(±21,370)	19,462	(±20,920)
Riberalteños	14,510	(±8879)	3980	(±5335)	10,530	(±9623)

Source: Peri-Urban Household Survey 1998.

Note:
'NTFP income' comprises chiefly the earnings from gathering, processing, and trading Brazil nut and palm heart. One *boliviano* (Bs) was about US$0.19 at the time of the survey; standard deviation (StDev) in parentheses; slight divergences are due to rounding.

Extra-regional migrants dispose of higher average incomes as compared with ex-forest dwellers and *Riberalteños* (Table 7), largely because of income generated outside the NTFP sector. It should be recalled that only two out of a total of fourteen extra-regional migrant households rely on NTFPs: if discounting their earnings, NTFP income of this group drops to nil. Ex-forest dwellers are generally contingent on NTFP income which slightly outweighs their earnings outside the NTFP sector.

[18] These better-off, disposing of an annual income exceeding Bs25,000 (US$4780), encompass seven households of *Riberalteños*, four of extra-regional migrants, and only one of an ex-forest dweller. Interestingly, two households of low-skilled laborers also pertain to the richest 10 percent.

Riberalteños typically rely to only about one-fourth of their total earnings on NTFP-based income. In terms of total income, ex-forest dwellers are only slightly worse-off than *Riberalteños*. Rather than a poverty trap, NTFP-related activities constitute a *sine qua non* for the economic survival of rural-urban migrants in town. They also provide a livelihood basis for younger households and low-income groups among the *Riberalteños*. This becomes further evident when comparing the income distribution across the neighbourhoods investigated (Table 8).

Table 8. Mean annual household income (total, NTFP and non-NTFP income in Bs) among peri-urban households (n=120) in Riberalta, northern Bolivia, by neighbourhood

Group of origin	Total income		NTFP income		Non-NTFP income	
	avg.	StDev	avg.	StDev	avg.	StDev
Los Almendros	18,866	(±14,903)	5605	(±6827)	13,262	(±16,544)
Villa Don Carlos	19,757	(±15,115)	6349	(±15,510)	13,407	(±10,804)
1° de Diciembre	10,825	(±5426)	5978	(±5425)	4847	(±4397)
San Juan	12,707	(±5433)	4475	(±3967)	8232	(±6992)

Source: Peri-Urban Household Survey 1998.

Note: 'NTFP income' comprises chiefly the earnings from gathering, processing, and trading Brazil nut and palm heart. One *boliviano* (Bs) was about US$0.19 at the time of the survey; standard deviation (StDev) in parentheses; slight divergences are due to rounding.

Incomes in the more consolidated neighbourhoods *Los Almendros* and *Villa Don Carlos* are almost double those of the more recently founded *1° de Diciembre* and *San Juan* (Table 8). NTFP-based income is rather evenly distributed across the *barrios*, whereas non-NTFP income typically increases with consolidation. While slightly diverting from the general trend, the inhabitants of *1° de Diciembre* have even less access to income from sources other than NTFPs as compared to the residents of *San Juan*. The latter accommodates a good number of younger *Riberalteño* households that typically exhibit higher educational levels than the ex-forest dwellers prevalent in *1° de Diciembre.* This gives credit to fact that formal education is a key determinant of income formation in the households surveyed (Table 9).

In Riberalta's periphery, household income is strongly correlated with the level of formal education of household heads (Table 9). NTFP income is inversely proportional and non-NTFP income is directly proportional to the educational level accomplished: the lower the formal education of household heads, the higher their absolute and relative NTFP income. Reversely, non-NTFP income increases in relative and absolute terms with increasing levels of formal education.

Table 9. Mean annual household income (total, NTFP and non-NTFP income in Bs) among peri-urban households (n=120) in Riberalta, northern Bolivia, by level of formal education of household heads

Level of formal education	n	Total income		NTFP income		Non-NTFP income	
		avg.	StDev	avg.	StDev	avg.	StDev
Tertiary education (*profesional*)	2	39,250	(±21,567)	0	–	39,250	(±21,567)
Secondary education completed (*bachiller*)	12	18,500	(±19,384)	467	(±1617)	18,033	(±19,763)
Higher secondary education (*medio*)	33	14,198	(±7352)	3193	(±4287)	11,005	(±8764)
Lower secondary education (*intermedio*)	25	14,267	(±9105)	4940	(±5999)	9326	(±10,158)
Primary education (*básico*)	44	15,598	(±12,477)	9022	(±12,731)	6576	(±6531)
None (*ninguno*)	4	13,160	(±7771)	10,190	(±4685)	2970	(±5319)

Source: Peri-Urban Household Survey 1998.

Note:

'NTFP income' comprises chiefly the earnings from gathering, processing, and trading Brazil nut and palm heart. One *boliviano* (Bs) was about US$0.19 at the time of the survey; standard deviation (StDev) in parentheses; slight divergences are due to rounding.

The low educational background of ex-forest dwellers is the key factor for their high reliance on NTFP income. The NTFP industry provides them with employment opportunities that require little formal skills. The continued involvement of ex-forest dwellers in extractive activities should not only be viewed as a response to lacking employment alternatives: it also signals their affiliation to the rural areas and related economic activities. In fact, their residential changes have not been as disruptive as the literature suggests, given that rural-urban ties are maintained, if not intensified. Extra-regional migrants, on the other hand, can play their educational token, gaining access to a diverse set of commercial and service-oriented activities through their higher formal skills. *Riberalteños* linger somewhere in-between: though more accustomed to the conditions of the urban labour market than ex-forest dwellers, their employment and career opportunities likewise depend on their educational accomplishment. Lower educated *Riberalteños* rely to a similar extent on NTFP-based income as ex-forest dwellers.

SECURITY OF PERI-URBAN LIVELIHOOD STRATEGIES BASED ON NTFPS

We departed from the hypothesis that different forms of migration are a key element of the livelihood strategies pursued by the peri-urban households investigated. Their broad participation in the Brazil nut harvest and other extractive activities, involving seasonal migration to the rural areas, lends support to this hypothesis. More

permanent forms of migration, as reflected in the relocation of ex-forest dwellers and extra-regional migrants to town, are also based on deliberate household decisions in response to crisis or opportunity. Migration motives are manifold and typically represent a varied mix of "pull" factors, such as better access to urban infrastructure, services and employment, and "push" factors like the crisis in the rubber industry (see Stoian and Henkemans 2000).

The shift in focus from "sustainable" to "secure" livelihoods (see Carney *et al.* 1999) prompts to inquire about the extent to which the peri-urban livelihood strategies can be considered secure. Evidently, livelihood security is segregated by the educational background of the household heads and their spouses. Those with relatively high educational qualifications can pursue an exclusively urban-based livelihood strategy based on career work. In contrast, the majority who is lacking these skills typically faces difficulties to secure sufficient earnings from urban casual work and needs to obtain security through rural income. As much as 38% of the sample population generate more than one-fourth of their total income in rural areas, and still 21% even more than the half. This confirms findings from the survey of migrant households in Rio Branco, Acre, where 25% of the households derived more than half their income from the rural zone (Schwartzman 1992).[19] Given the scarcity of available farmland in the urban surroundings, involvement in agriculture is an opportunity for only a few. As most lack the means of transport, maintenance of a plot or a parcel in far-off places hardly provides an alternative. It therefore does not come as a surprise that a substantial number of households continues to rely on the extraction of Brazil nut as the principal source of rural income.

Opportunities offered through participation in the Brazil nut harvest should not be seen in isolation. Though the extraction of palm heart and timber are dry-season activities which do not collide with the *zafra*, decent income derived from the former may prevent a would-be *zafrero* from gathering Brazil nuts. We have found ample evidence that it is the lowly educated but not necessarily the "poorest" who participate in the Brazil nut harvest. Rather than viewing the *zafra* as a last resort of the urban poor, we should adopt the notion that peri-urban households thoughtfully balance the pros and cons of whether or not to partake in a given year. This autonomous decision constitutes an integral component of the livelihood strategies of many ex-forest dwellers and *Riberalteños*. Given each season's fairly stable demand for *zafreros* and the modest but rather secure prospects for net gains, participation in the *zafra* has evolved as a livelihood option for a set of different actors. The actual gain from gathering or processing Brazil nuts, though, is only one consideration among others. The allure of participating in the *zafra* or working in a *beneficiadora* also roots in the in-built availability of credit. Similar to their rural counterparts, urban low-income groups notoriously lack access to bank loans. The advance payments provided to both *zafreros* and *quebradoras* are thus of paramount importance for the security of peri-urban livelihoods.

Next to security considerations, the crucial importance of education in shaping the livelihood options of peri-urban dwellers merits further attention. Ansell (2000) holds that 'secondary schools play a variety of roles impinging on urban-rural interdependence, with significant implications for sustainable development. ...

[19] If only accounting for the migrant households in the 1998 sample, 23% relied for more than half their total income on rural earnings.

Secondary education plays a critical role in shaping life-style aspirations and expectations, providing young people with skills, knowledge and values relating to ways of life which differ from those of previous generations.' Precisely because ex-forest dwellers have been largely deprived of secondary education, they are the most dispossessed in urban society as compared to extra-regional migrants or *Riberalteños*. The question remains whether the children of rural-urban migrants will face the same restrictions on the labour market as their parents; or whether they catch up with the offspring of the other two groups of origin given their improved access to education in town. The former's elevated drop out rates from primary or secondary education may cast a doubt on this prospect. Nonetheless it is likely that the enormous pool of young (peri-)urban students wants to seek out opportunities other than those available to their formally less educated parents. Unmistakably, participation in secondary education is the key determinant of urban life chances in general and earning opportunities of rural-urban migrants in particular.

Livelihood security and livelihood options need also to be viewed in light of the ongoing process of neighbourhood consolidation in the periphery. At a first glimpse, the peri-urban neighbourhoods may be little appealing to outsiders because of their prevalence of precarious housing and mud roads. But a closer look reveals unmistakable signs of consolidation, manifested in locally improved housing, enhanced infrastructure, and increased access to services such as health care and adequate schooling. Concomitantly, the consolidation process brings about new employment opportunities that have a bearing on the future appeal of the NTFP sector. For the time being, the Brazil nut industry remains the undisputed number one employer for peri-urban dwellers, but importance varies according to *barrio*. As consolidation advances, male and female involvement in the processing of Brazil nuts and palm heart decreases.[20] It is chiefly the groups deprived of employment opportunities involving higher formal skills which continue to rely on the NTFP sector due to its high demand for unskilled labor.[21]

Yet another process of consolidation through remodelling takes place at the household level. Probably more than in any other respect, the urban move of ex-forest dwellers has had an impact on the role of gender within the household. When living in the rural area, women chiefly looked after the agricultural plots – in addition to child-rearing and engaging in other household tasks – but rarely contributed directly to the household's cash income. This has dramatically changed in the urban area where they contribute significantly to the monetary household budget. In terms of career prospects, though, the female workforce is the most disenfranchised group (Verheule 1998). Male household heads, on the other hand, have converted from rural small producers working essentially to meet subsistence needs to an urban proletariat depending principally on the casual labour market. To what extent higher esteem accrues to women who contribute significantly to the household's cash income remains open, as does the question what bearing this has on household decision-making. Gender-related shifts of power within the household need to account for the

[20] Male participation is lowest in *Los Almendros* and *Villa Don Carlos* (7% each), somewhat higher in *1° de Diciembre* (15%), and highest in *San Juan* (21%). Similarly, female participation in NTFP processing is far lower in *Los Almendros* (20%), *Villa Don Carlos* (17%), and *1° de Diciembre* (20%), as compared to *San Juan* (50%).

[21] Males working in a *beneficiadora* and principally participating in the *zafra* have studied for 5.5 years on average, whereas those who are neither employed in such a plant nor harvest Brazil nut did so for 8.3 years.

higher burden women in peripheral neighbourhoods have as compared with the more tranquil life of women in the rural areas (see Coesmans and Medina 1997). It could well be the case that the most obvious developmental return from rural-urban migration accrues to the migrants' children. This new generation is likely to benefit from enhanced formal education, provided that children backed by their parents make wise use of the higher education available in town.

CONCLUSIONS

The case of the extractive economy in the northern Bolivian Amazon shows that NTFP-based employment and income can be critical for thousands of poor and marginalized households in urban and peri-urban environments. When analysing the livelihood strategies prevalent in Riberalta's periphery, the rural-urban dichotomy becomes blurred. Rather than a rural-urban divide, it is the rural-urban nexus underlying these strategies that makes up their flexibility, adaptability and, after all, viability.

Contributions of NTFPs to socio-economic development can only be fully acknowledged when the entire local supply chain and its stakeholders are taken into account. By their very definition, NTFPs originate from the forest hinterland but their extraction, transport, processing, and sale involve a variety of market participants along the rural-urban continuum. Urban-based households can be engaged in several of these activities, defying an exclusively rural focus on NTFP beneficiaries. In given settings, the benefits of NTFPs extend to poorer households in urban and peri-urban areas, in particular the migrant households among them.

Extraction and processing of NTFPs provide livelihood options for peri-urban dwellers not only in terms of a 'last resort' but also beyond. Some households, especially those of poorly educated migrants from the forest hinterland, rely on NTFP-related activities as they are deprived from access to the formal labour market. Their periodic engagement in NTFP gathering, along with employment in urban-based processing plant for NTFPs, prove the *sine qua non* for their economic survival in town. But their is also a good number of other households in the periphery, spanning across income ranks, who engage in NTFP extraction despite the alternatives they have. Their reasons are manifold, including socio-cultural bonds with the forest, inertia, search for adventure and, at least for some, quick profit.

Among the peri-urban population, migrant households play a special role. Rather than options for career development, NTFP-based livelihood strategies imply security for these households; barriers of entry do not exist and readily available employment in the NTFP sector increases household resilience. In the absence of alternative large-scale employment for rural-urban migrants, this stabilising effect of the NTFP industry is a merit of its own. "Net benefits" of migration may still appear marginal when focussing on the parent generation alone. Though career development for this generation is highly constrained, it is their children who can benefit from access to secondary and tertiary education in town. NTFP-based income generated by migrant

households in peri-urban areas thus converts into the seed from which the second generation can harvest.

It is crucial for NTFP research to take into account these "secondary" benefits of income derived from extraction, processing, and trading NTFPs. Livelihoods approaches along with the analysis of NTFP supply chains[22] are appropriate frameworks for elucidating such benefits. Further stimulus is provided by research on peri-urban areas in developing countries and the rural-urban linkages connecting them with the rural areas and *vice versa*. The implicitly rural focus of NTFP research to date should be broadened by accounting for the rural-urban continuum underlying NTFP use and trade.

[22] See for example the production-to-consumption system approach suggested by Belcher (1998).

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