

INTERIM REPORT

COMPLEXITY OF FOREST-BASED LIVELIHOOD STRATEGIES AND FACTORS INFLUENCING

LOCAL RESOURCE USE ACROSS REGIONS AND SCALES: IMPLICATIONS FOR POLICY

1. Introduction

Environmental resources in general and forests in particular provide a wide array of benefits to poor people living in rural areas, including foods, medicinal products, a host of different uses for wood, non-timber forest products (NTFPs), agricultural implements, as well as a range of on-site ecological services .

For addressing the question of whether and under what conditions forest conservation can be compatible with livelihood development, it is essential to understand the relationships between the rural household economy and the environment. How important are forests to the welfare of the rural poor? Different socio-economic groups utilize forest and environmental benefits in different ways and to different degrees (Vedeld et al. 2007). According to Vedeld et. al (2004), understanding the role that environmental income plays in poor people's livelihoods is important because the size and nature of environmental income has implications for issues of conservation and sustainable resource use. Moreover, it has been extensively reported that forest dependence is positively associated with conservation behavior, because of either local people's economic incentive to manage it sustainably and/or of a culture linked to forest maintenance (Ostrom 1990, Wade 1998; Gibson 2000; Wily and Mbaya 2001; Dahal et al. 2010).

In this report, focusing on forest peoples from different social origins across a gradient of political and Amazonian socioeconomic contexts, I present some of the preliminary results concerning cash and subsistence income shares, the rates at which forest activities and income are integrated into broader rural livelihood strategies, and how diversified are patterns of forest use.

2. Data available

The Poverty and Environment Network (PEN) is a CIFOR (Center for International Forestry research) led cross-continental survey which gathered an unprecedented set of uniform socio-economic and environmental information at the household and village levels from forest communities of 58 sites spread over 24 developing countries. I draw on a section of this global database to focus on the Amazonian region and study forest-based livelihoods across a gradient of socioeconomic contexts: (1) riverine communities in eastern Amazonia (Pará, Brazil); (2) settlers in central Amazonia (Amazonas, Brazil); (3) rubber tappers and settlers in central-western Amazonia (Acre, Brazil); (4) indigenous peoples and smallholder agriculturalists in western Amazonia (Pando, Bolivia); and (5) indigenous peoples in western Amazonia (Sumaco, Ecuador). The PEN research format encompasses three types of quantitative surveys covering a 12-month period: **Village Surveys** gathered information on demographics, infrastructure, forest and land use, and forest institutions; **Annual Household Surveys** covers household composition, land tenure, assets, forest resource-base, crisis, forest services, forest clearing, welfare and social

capital; **Quarterly Household Surveys** include all income information and high quality data on forest use, agricultural production, market dynamics, among others.

Table 1: PEN research format: Three types of quantitative surveys covering a 12-month period.

Type of survey	General characteristics		Main information gathered
Village surveys (V1, V2)	Data that are common to all or show little variation among households.	V1 - beginning of the fieldwork; background information	Demographics, infrastructure, forest and land cover/use; forest resource base; forest institutions; forest user groups (FUGs)
		V2 - end of the fieldwork period; information of the 12 months period covered by the surveys	Risk, shocks, wage and prices, forest services
Annual household surveys (A1, A2)	All household information	A1 - beginning of the fieldwork; basic household information	Household composition, land tenure; assets and savings; forest resource base; FUGs
		A2 - end of the fieldwork period; information of the 12 months period covered by the surveys	Crisis and unexpected expenditures, forest services, forest clearing, welfare, social capital
Quarterly household surveys (Q1, Q2, Q3, Q4)	All income information; high quality data on forest use	Data collected every 3 months over a 12-month period	Direct/indirect forest income, fishing, non-forest environmental income, wage income, agriculture income, livestock income, other income sources

3. Some results of analyses

Sampling specifications

Villages comprised within the data sets were categorized by ethnicity (or ‘social origin’), a variable previously not existent at the PEN spreadsheets format. The Amazonas site was missing from the global database as it had many standardization problems (thus I am not using this section of the data yet, but I plan to fix some of these problems). In the Table 2, I present the number of villages sampled by site, and the number of villages and households sampled by ethnicity.

Table 2: The study so far encompasses 510 households spread over 48 communities, 4 field sites, and 6 ethnicities:

Site	Villages sampled (n)	Households sampled (n)	Ethnicities	Households sampled by ethnicity	Villages sampled by ethnicity
Abaetetuba	4	140	Riverine Extractivists (Caboclos)	107	3
			Quilombola	33	1
Acre	4	55	Rubber Tappers	55	4
Pando	8	122	Non-Indigenous Forest Extractivists	122	8

Sumaco	32	193	Kichwa (Indigenous)	127	21
			Settlers	40	7
			Mixed (Kichwa & Settlers)	26	4
TOTAL	48	510	6 Ethnicities	510	48

Total income

Figures 1 and 2 show the overall average income per capita by region and by ethnicity respectively, along with its cash and subsistence shares. I will investigate whether the higher total income and higher subsistence share observed in Acre is related to history of social movements and pro-forest state policies. Ecuador (Sumaco) presented the lowest average income per capita and the lowest subsistence income share.

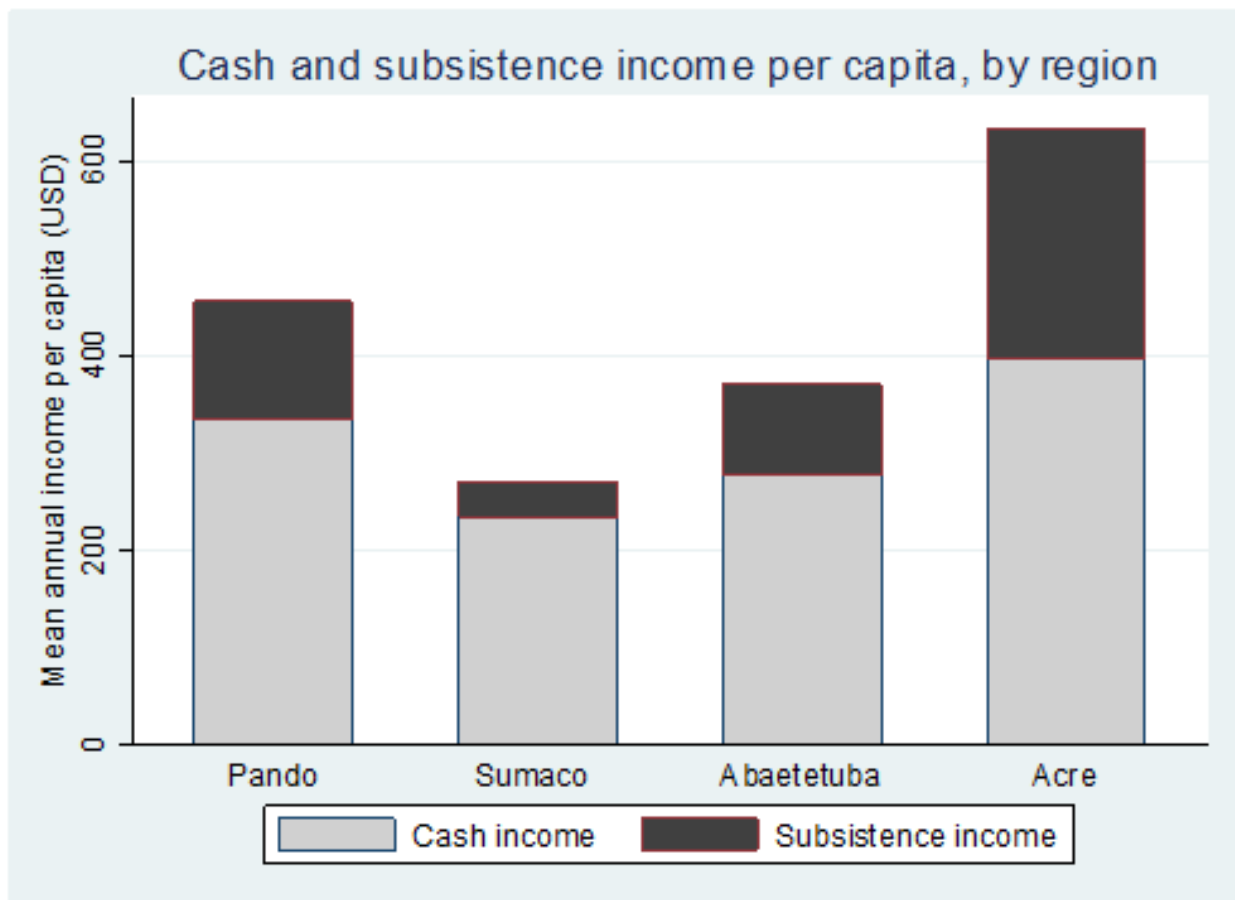


Figure 1: Cash and subsistence mean annual income per capita (USD), by region.

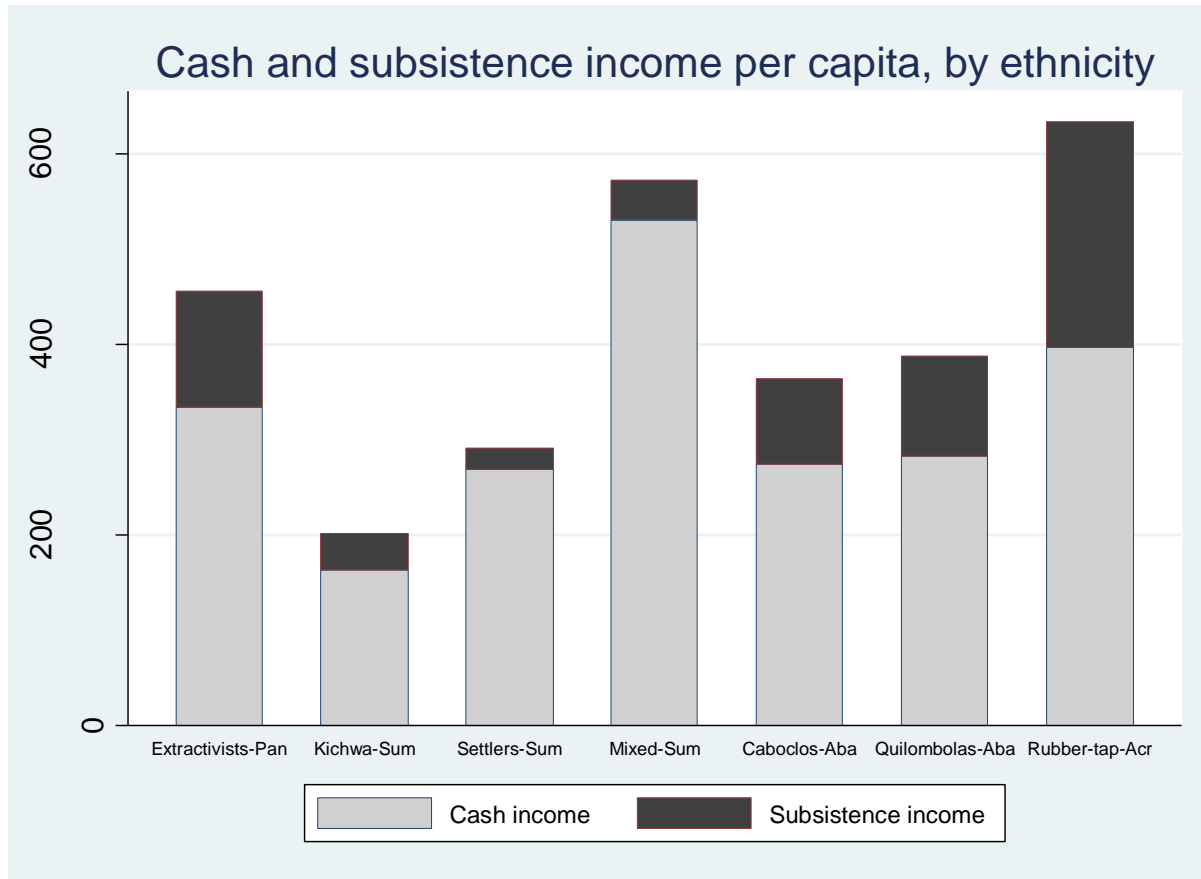


Figure 2: Cash and subsistence mean annual income per capita (USD), by ethnicity.

Mapping livelihood strategies: the distribution of income shares

The distribution of income shares by site and ethnicity is presented at Figure 3, where we can see the differences in forest shares (or forest dependence in terms of income) across forest users within divergent socioeconomic contexts and deriving from divergent social origins (ethnicities). For instance, extractivists in Pando (Bolivia) presented the highest forest income share (61.9%), followed by riverine (40.8%) and quilombola (36.5%) villages in Abaetetuba (Brazil), and rubber-tappers in Acre (35.5%). The lowest rates of forest income shares were observed in Sumaco (Ecuador): 28% for Kichwa communities (indigenous), 23% for mixed communities (indigenous and settlers) and 11% for Settler communities.

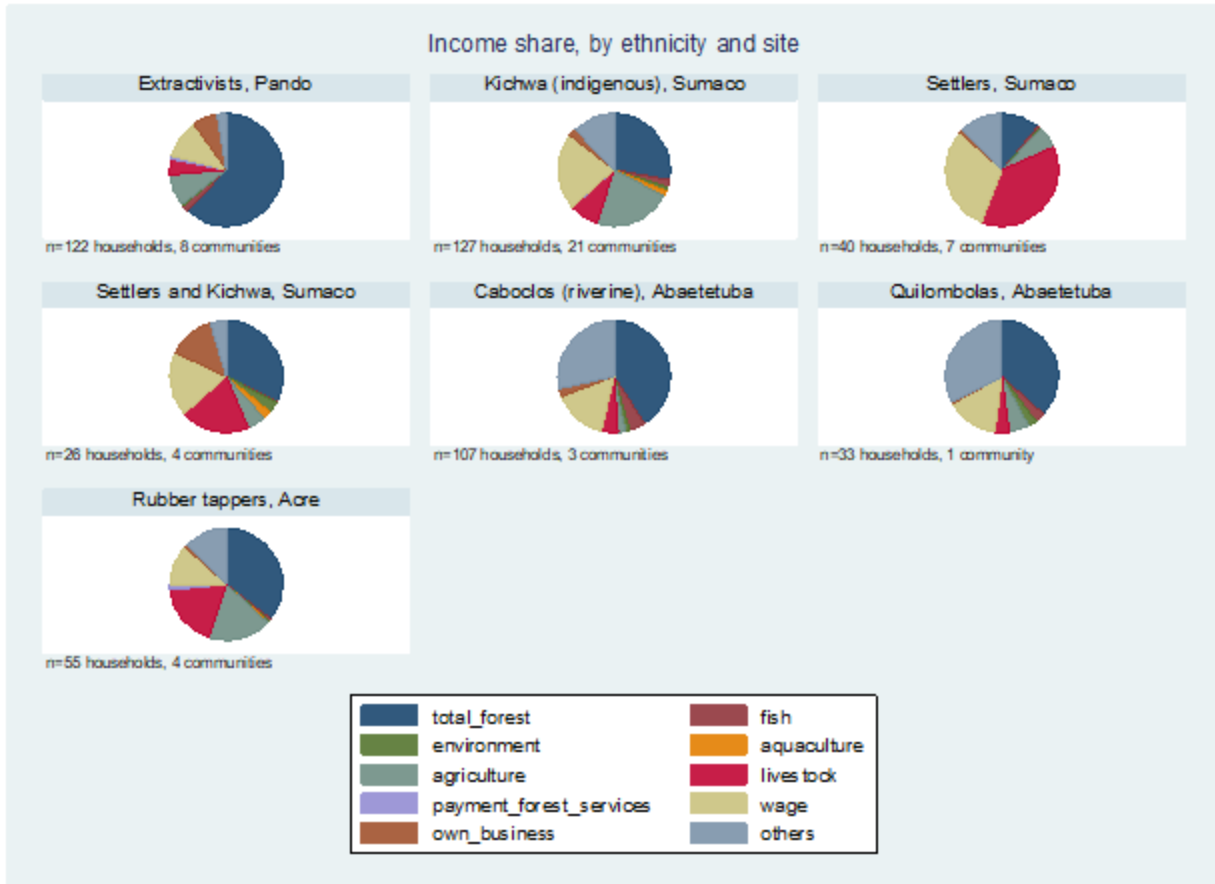


Figure 3: The distribution of income shares by source of activity (forest, agriculture, livestock, wage, etc.), by site and ethnicity.

Income shares vs. Total income

In the tables below, are presented the income shares across quintiles. From these, we can see how forest income decreases or increases as total income increases. The results did not show a consistent pattern across ethnicities and contexts: in Pando (extractivists, Bolivia), and Abaetetuba (riverines, Brazil), forest shares remain constant as total income increases (perhaps indicating that forest activities do not lose importance as they become richer); in indigenous and mixed communities in Sumaco (Ecuador) forest shares increased as total income increases; and at settler communities in Sumaco (Ecuador) and the quilombola community in Abaetetuba (Brazil), forest shares decreases as income share increases.

Table 3: Income shares across quantiles (income groups): Pando, Bolivia/ Ethnicity: extractivists, N=122 Households

Income source (net)	Quantile 1		Quantile 2		Quantile 3		Quantile 4		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Forest (total)	386	68	574	59	983	63	2073	62	1034	62
Unprocessed forest products	336	59	515	53	882	57	1748	52	898	54
Firewood	14	2	16	2	17	1	14	0	16	1
Processed forest products	37	7	43	4	84	5	310	9	120	7
Fish	20	4	25	3	34	2	39	1	31	2
Environment	1	0	6	1	13	1	10	0	8	0
Aquaculture	0	0	0	0	0	0	0	0	0	0
Agriculture	34	6	102	10	162	10	287	9	155	9
Livestock	28	5	38	4	77	5	143	4	74	4
Payment for forest services	2	0	16	2	20	1	18	1	16	1
Wage	55	10	8	15	170	11	340	10	187	11
Own business	11	2	27	3	62	4	367	11	118	7
Others	31	5	39	4	28	2	87	3	46	3
Total income	567	100	971	100	1549	100	3363	100	1669	100

Table 4: Income shares across quantiles (income groups): Sumaco, Ecuador / Ethnicity: Kichwa (indigenous), N=127 households

Income source (net)	Quantile 1		Quantile 2		Quantile 3		Quantile 4		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Forest (total)	53	13	216	23	579	39	1287	50	204	28
Unprocessed forest products	49	12	214	23	556	37	1280	49	198	27
Firewood	4	1	2	0	20	1	4	0	5	1
Processed forest products	0	0	1	0	2	0	3	0	1	0
Fish	14	3	19	2	11	1	29	1	15	2
Environment	3	1	25	3	4	0	11	0	8	1
Aquaculture	11	3	24	3	4	0	6	0	12	2
Agriculture	119	30	178	19	312	21	315	12	162	22
Livestock	29	7	81	9	186	12	117	5	61	8
Payment for forest services	1	0	0	0	0	0	0	0	1	0
Wage	91	23	268	28	200	14	557	21	160	22
Own business	5	1	17	2	54	4	56	2	16	2
Others	66	17	114	12	142	10	216	8	91	12
Total income	392	100	943	100	1493	100	2594	100	730	100

Table 5: Income shares across quantiles (income groups): Sumaco, Ecuador / Ethnicity: Settlers, N=40 households

Income source (net)	Quantile 1		Quantile 2		Quantile 3		Quantile 4		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Forest (total)	124	25	267	27	10	1	120	5	134	11
Unprocessed forest products	117	24	249	26	10	1	120	5	127	10
Firewood	7	1	10	1	0	0	0	0	5	0
Processed forest products	0	0	7	1	0	0	0	02	0	
Fish	4	1	10	1	8	1	10	0	8	1
Environment	1	0	8	1	4	0	5	0	4	0
Aquaculture	0	0	0	0	3	0	0	0	1	0
Agriculture	100	20	93	10	60	4	30	1	76	6
Livestock	105	21	208	21	620	42	1210	50	455	38
Payment for forest services	0	0	0	0	0	0	0	0	0	0
Wage	92	19	289	30	481	33	814	33	370	31
Own business	14	3	1	0	15	1	10	0	10	1
Others	56	11	99	10	273	19	243	10	155	13
Total income	460	100	973	100	1473	100	2442	100	1212	100

Table 6: Income shares across quantiles (income groups): Sumaco, Ecuador / Ethnicity: Mixed (settlers & Kichwa), N=26 households

Income source (net)	Quantile 1		Quantile 2		Quantile 3		Quantile 4		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Forest (total)	11	2	211	23	272	18	1639	38	743	32
Unprocessed forest products	11	2	206	22	272	18	1639	38	742	32
Firewood	0	0	5	1	0	0	0	0	1	0
Processed forest products	0	0	0	0	0	0	0	0	0	0
Fish	0	0	2	0	2	0	5	0	3	0
Environment	0	0	0	0	0	0	197	5	76	3
Aquaculture	12	2	34	4	63	4	88	2	58	3
Agriculture	77	16	58	6	71	5	203	5	120	5
Livestock	162	33	140	15	672	45	648	15	462	20
Payment for forest services	0	0	0	0	0	0	0	0	0	0
Wage	117	24	432	46	311	21	614	14	426	18
Own business	5	1	0	0	22	1	789	18	309	13
Others	109	22	59	6	88	6	144	3	106	5
Total income	493	100	936	100	1502	100	4327	100	2303	100

Table 7: Income shares across quantiles (income groups): Abaetetuba, Brazil / Ethnicity: Caboclos (riverine), N=107 households

Income source (net)	Quantile 1		Quantile 2		Quantile 3		Quantile 4		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Forest (total)	239	40	315	32	548	36	1256	46	676	41
Unprocessed forest products	199	33	266	27	357	23	726	27	430	26
Firewood	9	2	14	1	11	1	13	0	12	1
Processed forest products	31	5	36	4	180	12	518	19	233	14
Fish	47	8	55	6	82	5	106	4	80	5
Environment	11	2	14	1	26	2	21	1	20	1
Aquaculture	0	0	2	0	0	0	0	0	1	0
Agriculture	17	3	22	2	47	3	33	1	34	2
Livestock	26	4	72	7	69	5	125	5	82	5
Payment for forest services	0	0	0	0	0	0	0	0	0	0
Wage	123	21	241	25	258	17	308	11	255	15
Own business	0	0	28	3	7	0	102	4	39	2
Others	132	22	220	23	491	32	750	28	471	28
Total income	594	100	969	100	1525	100	2701	100	1656	100

Table 8: Income shares across quantiles (income groups): Abaetetuba, Brazil / Ethnicity: Quilombolas (slave descendent), N=33 households

Income source (net)	Quantile 1		Quantile 2		Quantile 3		Quantile 4		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Forest (total)	304	43	423	41	474	31	945	36	600	37
Unprocessed forest products	290	41	363	36	427	28	779	30	511	31
Firewood	6	0	11	1	4	0	68	3	28	2
Processed forest products	7	1	49	5	43	3	97	4	61	4
Fish	21	3	58	6	47	3	43	2	49	3
Environment	1	0	13	1	76	5	57	2	40	2
Aquaculture	0	0	0	0	0	0	1	0	0	0
Agriculture	11	2	34	3	157	10	159	6	100	6
Livestock	12	2	20	2	83	5	119	5	66	4
Payment for forest services	0	0	0	0	0	0	0	0	0	0
Wage	168	24	122	12	230	19	376	14	247	15
Own business	0	0	0	0	34	2	4	0	9	1
Others	183	26	352	34	375	24	913	35	534	32
Total income	700	100	1021	100	1547	100	2616	100	1645	100

Table 9: Income shares across quantiles (income groups): Acre, Brazil / Ethnicity: Rubber-tappers, N=55 households

Income source (net)	Quantile 1		Quantile 2		Quantile 3		Quantile 4		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Forest (total)			541	53	554	39	960	33	788	35
Unprocessed forest products			436	43	490	34	569	20	527	24
Firewood			37	4	28	2	32	1	32	1
Processed forest products			68	7	36	3	359	12	229	10
Fish			12	1	9	1	17	1	13	1
Environment			6	1	11	1	9	0	9	0
Aquaculture			0	0	2	0	12	0	7	0
Agriculture			114	11	251	18	557	19	407	18
Livestock			122	12	250	17	556	19	407	18
Payment for forest services			0	0	3	0	56	2	33	2
Wage			82	8	126	9	372	1	262	12
Own business			0	0	0	0	32	1	19	1
Others			142	14	226	16	335	12	276	12
Total income			1019	100	1432	100	2904	100	2221	100

Forest Income Shares: how diversified are forest uses and how do these vary across regions and contexts?

Figure 4 presents the composition of unprocessed forest products shares, by category of use, at each of the study sites. Figures 5 to 8 show the income contribution of the top 10 forest products, by study site. In Pando, 72% of the total forest income is composed by Brazil nuts; in Sumaco, 36% of forest income derives from sawn wood and seven of the top 10 forest products are composed by timber products; in Abaetetuba, 77% of the total forest income is composed by Acai fruits, and in Acre, 35% of total forest income is composed by Brazil nut (52%) followed by rubber (13%). More detailed figures regarding the composition of the most important forest product at each site can be observed in a comparative ranking presented at Table 10.

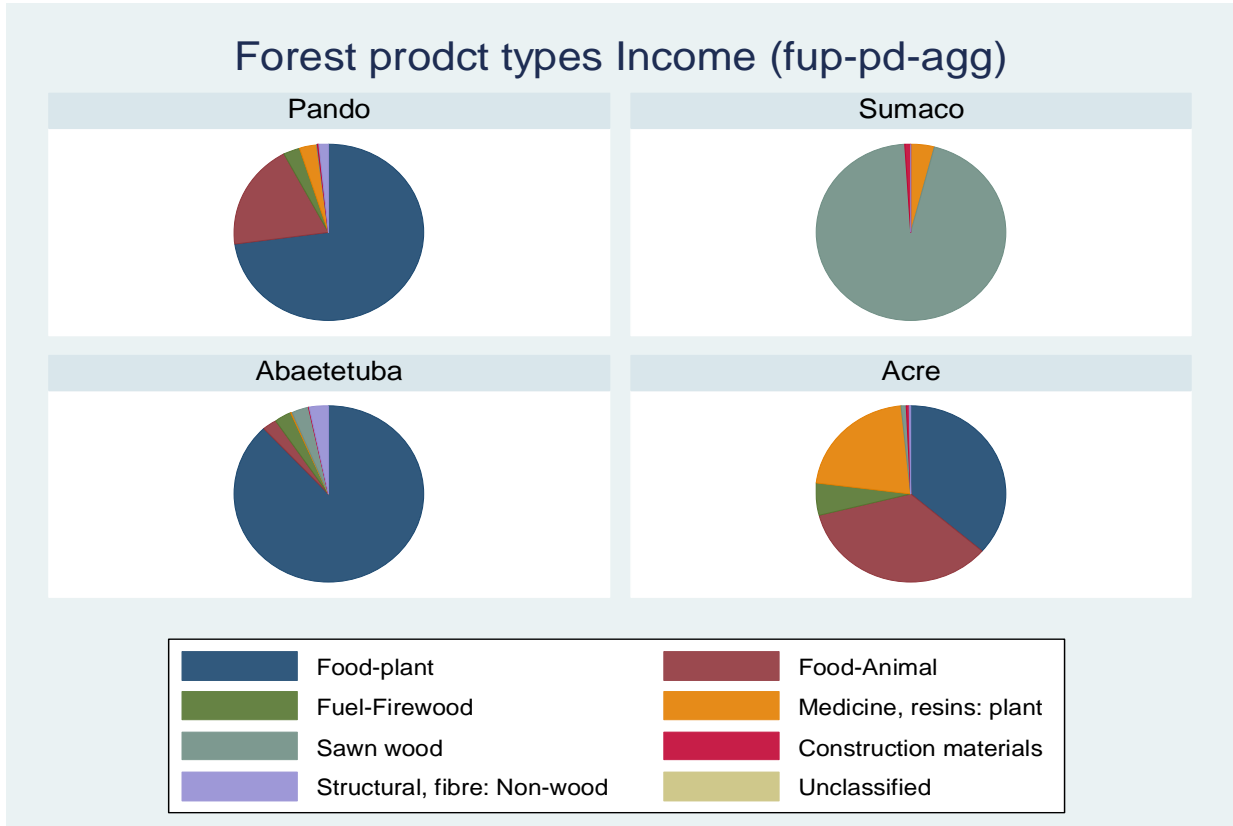


Figure 4: Composition of aggregate unprocessed forest products (by type of use), by site.

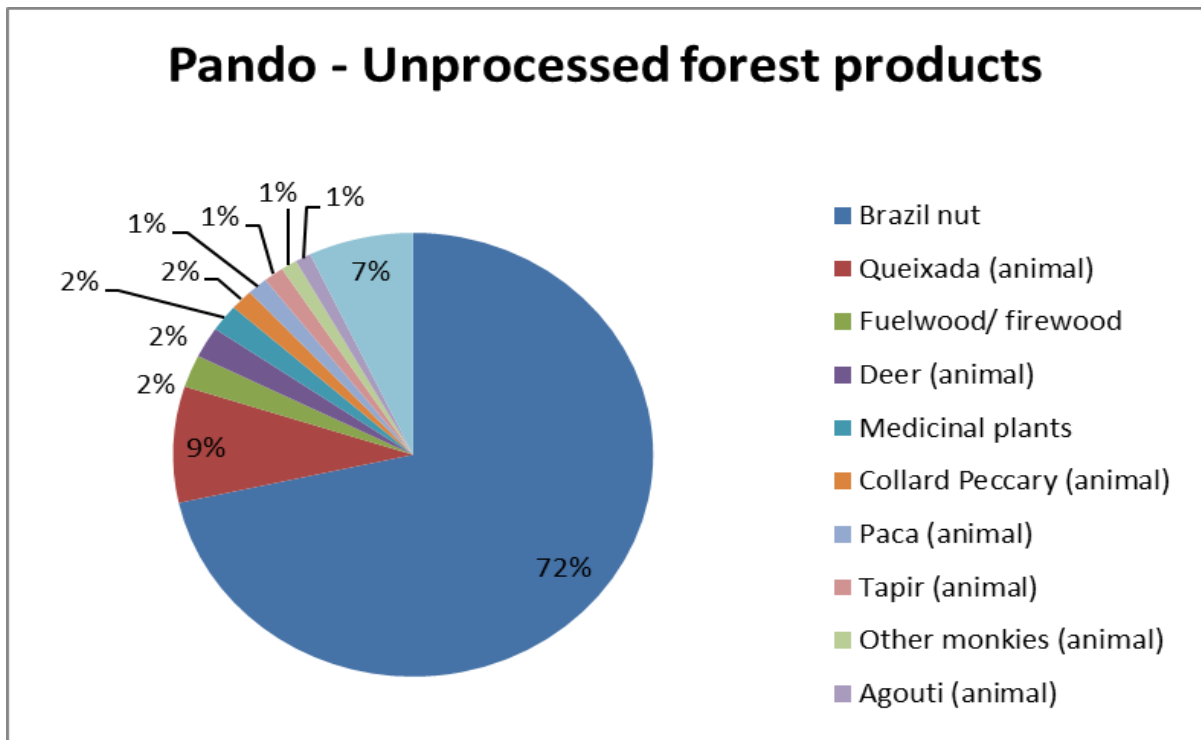


Figure 5: Top ten forest products shares, Pando (Bolivia)

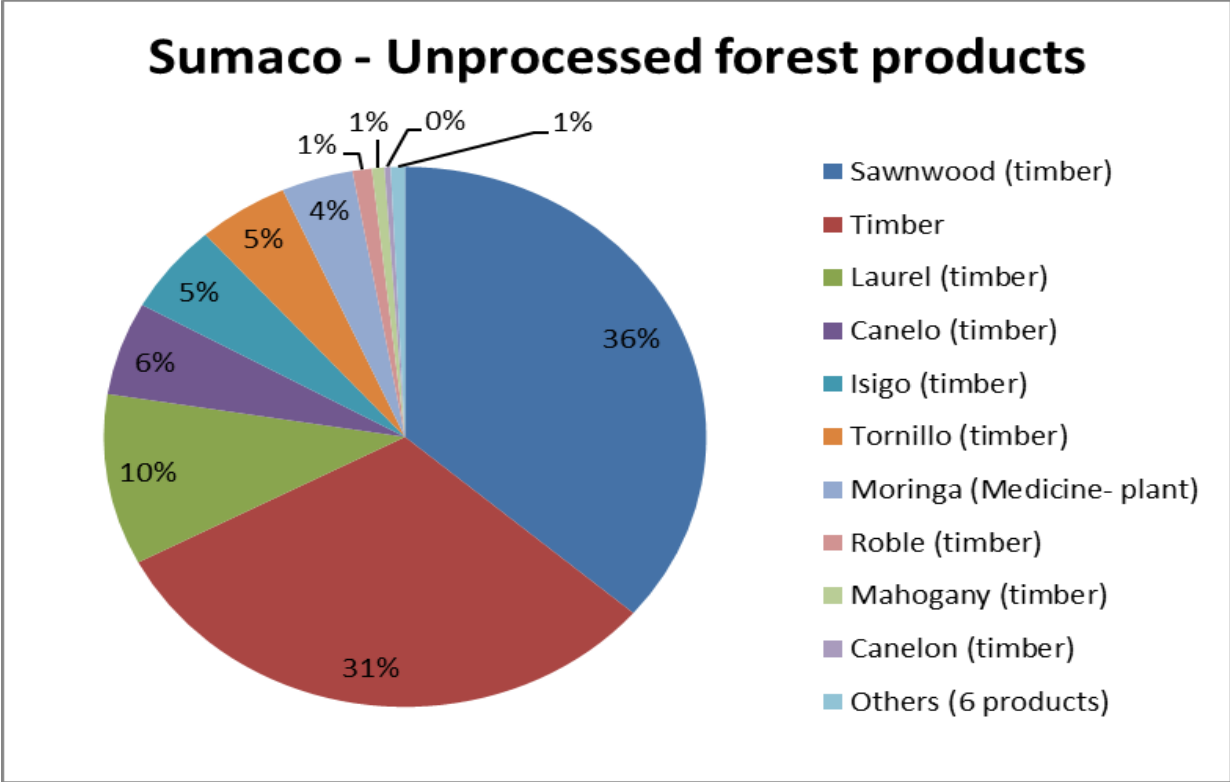


Figure 6: Top ten forest products shares, Sumaco (Ecuador)

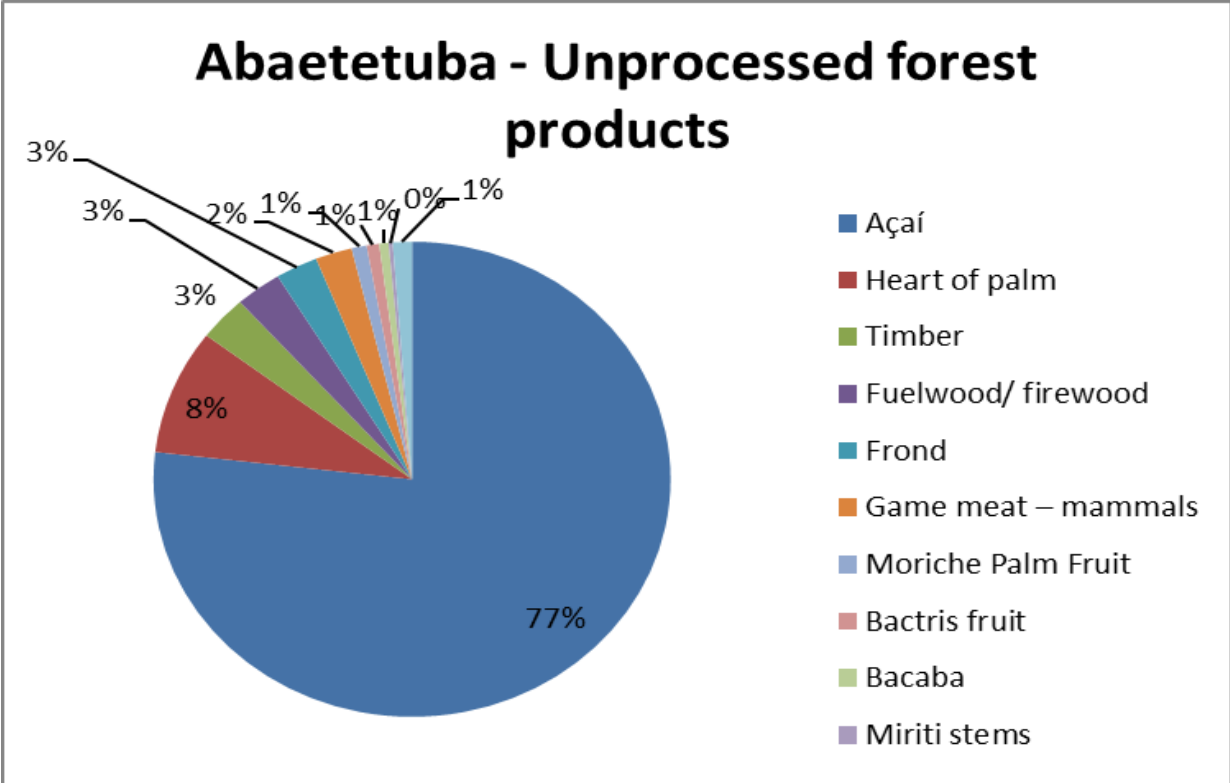


Figure 7: Top ten forest products shares, Abaetetuba (Brazil)

Acre - Unprocessed forest products

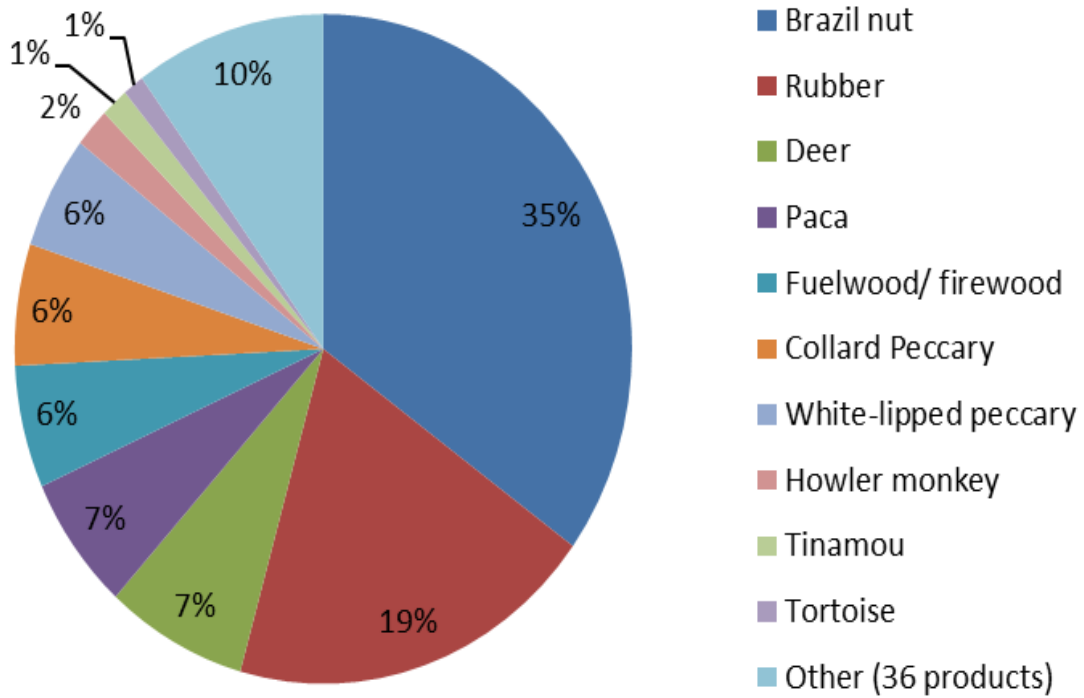


Figure 8: Top ten forest products shares, Acre (Brazil)

Table 10: Comparative ranking: Composition of the top ten most important forest products in each site and their respective contribution to the total forest income.

Forest product ranking	Pando	Mean (\$/hh)	%	Sumaco	Mean (\$/hh)	%	Abaetetuba	Mean (\$/hh)	%	Acre	Mean (\$/hh)	%
1	Brazil nut	725.7	71.5%	Sawnwood (timber)	468.1	36.3%	Açaí	449.3	76.8%	Brazil nut	244.9	35.0%
2	Queixada (animal)	85.9	8.5%	Timber	399.7	31.0%	Heart of palm	49.9	8.5%	Rubber	135.2	19.3%
3	Fuelwood/ firewood	23.9	2.4%	Laurel (timber)	131.9	10.2%	Timber	17.8	3.1%	Deer	51.8	7.4%
4	Deer (animal)	22.9	2.3%	Canelo (timber)	72.0	5.6%	Fuelwood/ firewood	16.9	2.9%	Paca	45.6	6.5%
5	Medicinal plants	20.0	2.0%	Isigo (timber)	68.9	5.3%	Fron - d structural	15.5	2.6%	Fuelwood/ firewood	41.4	5.9%
6	Collard Peccary (animal)	15.4	1.5%	Tornillo (timber)	62.9	4.9%	Game meat-mammals	13.4	2.3%	Collard Peccary	41.1	5.9%
7	Paca (animal)	13.9	1.4%	Moringa (Medicine- plant)	49.7	3.9%	Moriche Palm Fruit	5.5	0.9%	White-lipped peccary	38.3	5.5%
8	Tapir (animal)	13.7	1.4%	Roble (timber)	13.3	1.0%	Bactris fruit	4.6	0.8%	Howler monkey	13.2	1.9%
9	Other monkies (animal)	11.0	1.1%	Mahogany (timber)	8.7	0.7%	Bacaba	3.4	0.6%	Tinamou	10.1	1.4%
10	Agouti (animal)	10.8	1.1%	Canelon (timber)	4.3	0.3%	Miriti stems	1.5	0.3%	Tortoise	7.8	1.1%
	Others (64 products)	71.6	7.1%	Others (6 products)	9.8	0.8%	Others (24 products)	7.0	1.2%	Other (36 products)	70.0	10.0%
	TOTAL	1014.7	100.0%	TOTAL	1289.2	100.0%	TOTAL	584.9	100.0%	TOTAL	699.3	100.0%

There are clear different forest use patterns across regions and contexts, for example, in Pando (Bolivia), forest use is largely focused on Non-Timber Forest Products (NTFPs), while in Sumaco (Ecuador), forests are used primarily for timber. Would be market demands the principle factor driving these patterns? Or would that be other political and structural reasons that explain such scenarios? I will investigate what are the main drivers that explain the varied livelihood strategies at each of the study sites, and explore jointly with local actors, what are the institutional blockages to improving forest-based livelihoods and conservation.

4. Pathways for results interpretations: the ‘Livelihood Approach’

Forest-based livelihoods encompass many dimensions and multiple causalities; they take different forms for different people across different environments. As such, the empirical reality which livelihood approaches seek to encompass is not trivial. Attempts to reduce measurements to a single scale are said to undermine the understanding of the complexity and diversity of livelihoods, as well as their relationship with the physical environment, and with each other. (Chambers and Conway 1992).

The concept of livelihood strategies address the interconnections between asset portfolios, diversified strategies of groups and individuals, and outcomes for the welfare of the rural poor (Barret and Swallow 2005). The livelihood approach (LA) was designed to be people-centered, and to allow a holistic view of how people make a living in an evolving social, institutional, political, economic and environmental context (Carney 1998; Bebbington 1999). Ellis and Freeman (2005) suggest that the LA can be effective in addressing:

- The multiple and diverse character of livelihoods;
- The prevalence of institutional blockages to improving livelihoods;
- The social and economic character of livelihood strategies;
- The principle factors implicated in rising or diminishing vulnerability;
- The micro-macro (or vice versa) links that connect livelihoods to policies.

In addition, the framework must be able to reach across scales to enable the comprehension of the relationships between intra-household, household, regional, and macro economies; as well as the relationships between households, institutions and organizations that operate at wider scales. The different aspects of rural livelihoods can be altered for different reasons, resulting in different outcomes. Tracking the effects of these changes might also improve the understanding of the opportunities that enable the poor to build their own pathways out of poverty (Ellis and Freeman 2005). Thus, the Livelihoods Approach is said to potentially strengthen people’s own incentive solutions, rather than substitute for, block or undermine them (Ellis and Freeman 2005). The approach understands the different dimensions shaping livelihoods not only as things that allow survival, adaptation and poverty alleviation but it may be also the basis of “agents’ power to act and to reproduce, challenge or change the rules that govern the control, use and transformation of the resources” (Bebbington 1999).

5. Field trip (CNS congress)

As part of the policy section of the project, in November 2012, I have attended the Third National Congress of Extractive Populations in Macapá, Brazil. The event was organized by the “Conselho Nacional de Seringueiros - CNS” (Brazilian Forest Peoples’ council), which is an Amazon wide grassroots’ movement, nowadays composed by forest users such as rubber-tappers, riverines, slave descendants, fishers, and other traditional populations. The majority of participants were traditional forest users, however, there was an impressive board of regional and national political authorities participating in the event, such as: the Brazilian Minister of the Environment, the Brazilian Minister of the Agrarian Development, the Governor of Amapá State, as well as Deputies and Senators, among others. The main issues debated during the congress were (1) agrarian reform and creation of new collective use areas, (2) policies related to extension, sustainable management, and market access, (3) differentiated health policies directed to forest peoples, (4) educational improvements and reforms in the context of forest-based livelihoods. I recorded the entire event, took notes of key information that will be used in my analyses and made some informal interviews with grassroots movements’ leaders, political authorities and fellow activists.



Following the aforementioned event, I travelled to the *São João do Jaburu* community within the sustainable Development Reserve Itatupã-Baquiá, Gurupá/PA, where I have dedicated several years of participatory research (that was possible since this community is geographically close from Macapá - the place where the event was held). I spent one week in this field site, and discussed with them about livelihood strategies, forest management, environmental policies and other issues related to this project; I conducted two meetings with the community and open interviews with managers and community leaders.

6. Looking ahead

Over the next two months, I will advance data analyses and build models that may provide insights on how factors such land tenure regimes, market connections, levels of social organization, and others, might influence livelihood strategies and patterns of forest use across the different socioeconomic contexts studied. I will also advance on my PhD dissertation chapters before visiting the project’s research sites. Preparing for fieldwork will include the elaboration of questions that aim to elucidate (1) whether levels of forest and subsistence income

shares and wellbeing are tied to pro-forest state policies, (2) what are the institutional blockages to improving forest-based livelihoods and conservation and how these vary across regions and contexts, (3) what are the locally-based solutions that allow for sustainable livelihoods establishment with autonomy devolved to forest users, and (4) what policy alternatives can potentially support bottom-up approaches to conservation and sustainable development in the long term.

7. Literature cited

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