



Rain forest livelihoods: income generation, household wealth and forest use

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Exploring the relationship of wealth and income generation for tropical rain forest dwellers.

Concern over the fate of the tropical rain forests and the people who depend on their forest resources has prompted much discussion on the promise of rain forest extraction by traditional communities for rural economic development and forest conservation. Recent studies from Amazonia and elsewhere point to the significant contribution of rain forest products to household, local, regional and even national economies (Fearnside, 1989; Peters, Gentry and Mendelsohn, 1989; FAO, 1993). Encouraged by these findings, numerous non-governmental organizations (NGOs) and other groups are working to help traditional forest peoples secure their rights to the forest and develop management regimes for the sustainable and mutually profitable harvesting of local non-wood resources. In doing so, such groups hope to preserve the forest, conserve its resources and enhance rural welfare by raising the incomes of forest peoples. Increasingly, however, practitioners and researchers are recognizing the need for a deeper understanding of the factors that influence income generation among forest peoples, beyond the market value of the wood and non-wood forest products (NWFPs) (see Godoy and Bawa, 1993; Coomes and Barham, 1997 and articles in this issue). This understanding is crucial to appropriate programme design and policy formation.

It is argued here that a key factor conditioning how forest people use their local resources - and thus generate their incomes - is the level and type of wealth (i.e. land and non-land assets) held by forest peasant households. Ostensibly small differences in wealth, among families and through the life cycle, are often overlooked; however, they can make a difference in the opportunities available to households and give rise to considerable diversity and specialization in economic livelihood among forest people. Indeed, wealth may be the key to unlocking the logic of the diversity seen in forest product extraction among forest people. This argument is illustrated by the findings from an ongoing study of rain forest use in the Pacaya-Samiria National Reserve area of the Peruvian Amazon, one of the largest and most biodiverse forest reserves in Latin America. The authors conclude that initiatives aimed at promoting sustainable resource use and poverty alleviation among rain forest peoples could improve their efficacy by giving greater attention to the role of wealth in income generation and by seeking ways to improve the prospects and paths for wealth accumulation of forest peasant

households.

PEASANT LIVELIHOODS IN RAIN FOREST ENVIRONMENTS

Estimating incomes generated from the harvest of NWFPs in rain forest environments is a challenging undertaking under the best of conditions. In most study regions, forest peoples pursue numerous activities to generate subsistence and commercial income, some of which are feasible only in certain seasons or under particular conditions. In addition, economic returns to extractive activities can vary widely, even in neighbouring locations, because of differences in resource access and/or the richness of natural resource stocks. As a result, accurate measurement of the returns and costs of forest product extraction can be a demanding, data-intensive undertaking. To make matters worse, seasonal, interannual and unpredictable changes in the environment and in market conditions can dramatically alter incomes from extractive activities over time. Given the lack of written records and the high costs of data-gathering efforts in these areas, researchers face a considerable challenge when they attempt to assess the level and composition of incomes generated by rain forest peoples.

[A welcome sign at the border of the Pacaya-Samiria National Reserve In northeastern Peru](#)

Despite these difficulties, researchers and practitioners have endeavoured in recent years to estimate the value of individual products and of total household income through careful survey work with forest dwellers. Through repeated visits to respondent households, efforts to enhance their recall and painstaking elaboration of production levels in each activity, researchers have been able to construct income profiles of forest peoples. From these efforts, in the Amazon and elsewhere, it has been observed that the income-generation patterns of forest peoples can be quite heterogeneous both among neighbouring communities and among households within communities (Anderson and Ioris, 1992; Gunatilake, Senaratne and Abeygunawardena, 1993; Coomes, 1996). Furthermore, although on casual observation forest peoples may appear to be "generalists" pursuing a broad mix of economic activities, including agriculture, fishing, hunting, gathering, and other forest product extraction, forest households actually tend to specialize, in some cases quite highly, in one sector (and sometimes in a single product). The "speciality" can differ among households within the same community as well as across communities.

Livelihood heterogeneity and specialization: an example from the Peruvian Amazon

The Pacaya-Samiria National Reserve, located between the Marañón and Ucayali rivers in northeastern Peru, is one of the largest protected areas in the Amazon (Rodríguez Achung, Rodríguez Achung and Vásquez Ruesta, 1995) (Figure 1). Its residents, known locally as *riberaños*, are primarily of mestizo origin (mixed Spanish-Amerindian descent). They rely on floodplain agriculture, fishing, hunting and forest product gathering for their livelihood, with major seasonal variations driven by the annual flood cycle. In 1992 there were 173 communities in or around the Pacaya-Samiria National Reserve, comprising some 80 000 people. A study was initiated to clarify the economic logic underlying the resource use behaviour of the *riberaños* and thereby to help guide conservation and development efforts in the region and elsewhere. Socio-economic data were gathered from 300 households in eight communities over 16 months (June 1996 to September 1997). Both villages and households were selected to represent the region's diversity of economic activity and environments. In each village, households were ranked according to wealth on the basis of an initial rapid rural appraisal (see Takasaki, Barham and Coomes, 1999b) and then stratified for sampling. Because wealthy households made up a small proportion of the total, the wealthier households were oversampled to ensure that the number of observations was sufficient for analysis of differences in resource use and livelihoods across the wealth spectrum. In the

household surveys, the evolution of household wealth was detailed and annual income was estimated for several recent years using production data and average prices of each product in the village.

FIGURE 1 - Location of the Pacaya-Samiria National Reserve, Peru

Across the eight communities, peasant households relied on agriculture, fishing, aquatic extraction (i.e. aquarium fish, shrimp, turtle eggs, turtles), hunting and forest product gathering for almost all subsistence and cash income. Of these activities, fishing and agriculture were the most important, each accounting for 39 percent of total household income. NWFPs accounted for 19 percent, whereas wood products and wage income contributed less than 1 percent and 2 percent of income, respectively. Within NWFP activities, more than half of the income came from aquatic extraction, about one-quarter from gathering and one-sixth from hunting. At first glance, NWFP extraction has a complementary role to agriculture and fishing.

Figure 2 illustrates the heterogeneity in economic livelihood among three floodplain villages along the Marañón River. Households in Village 1 were on average highly specialized in fishing, earning 88 percent of income from this activity and barely 3 percent of income from NWFP extraction. In contrast, households in Village 3 derived 70 percent of income from agriculture and a little more than 10 percent from NWFPs. Economic activity in Village 2 was more mixed, with about half of household income coming from agriculture and 32 percent from NWFPs. Such contrasts among villages were apparent across all eight communities in the study.

The village-level data, however, obscure significant intravillage differences among households (Table 1). Data on household participation in NWFP extraction and reliance on NWFPs indicate that certain households dedicate themselves to extractive activities even though the majority of households in the community may focus principally on agriculture or fishing. In Village 1, for example, only 26 percent of households generated any income from this activity, yet two of the 23 households were considered reliant on NWFPs, i.e. earned at least 30 percent of their income from extraction. In Village 2, 84 percent of households participated in forest extraction and almost one-half were reliant on NWFPs. In Village 3, where households tend to rely heavily on agriculture, 61 percent of households participated in NWFP extraction and five of the 28 households earned more than 30 percent of their income from NWFPs. Such heterogeneity raises the question of what factors influence livelihood choices across households and villages.

Distribution and types of wealth in forest peasant households

The role of wealth in income generation of forest households like those in the Pacaya-Samiria National Reserve has not been carefully examined by many researchers. The dearth of such studies is surprising, given that with the limited access of forest peoples to capital, land markets and formal insurance arrangements, peasant livelihood choices could be expected to depend strongly on household wealth. Indeed, recent studies of agrarian and pastoral households in developing countries show that wealth also has an integral role in predicting the choices households make regarding their range of activities and their income levels (Reardon and Vosti, 1995; Barham, Carter and Sigelko, 1995; Zimmerman and Carter, 1996; Dercon, 1998). Moreover, studying peasant wealth, even over time, is likely to be a more straightforward undertaking than estimating household incomes derived from multiple sources.

An intriguing point is that the wealth of forest peoples, unlike that of agrarian or pastoral households, is not necessarily highly concentrated in either land or livestock. Instead, the wealth of forest peasant households can be rather diverse, including land of various types, fishing capital (e.g. boats, motors, a range of net types), extractive capital (e.g. shotguns, chainsaws), livestock, durable consumer goods (which may sometimes be sold and

remobilized) and houses in other locations. Savings in cash and related forms are minimal. Product - and environment - specific knowledge and skills relating to certain types of NWFP extraction. however, can be important assets, as intangible wealth.

The differences in level and composition of wealth among forest households are sometimes overlooked because there is little evidence of social stratification in these communities. People dress similarly, live in similar thatch-roofed houses, share a common peasant ethic and all appear to be engaged in agriculture, fishing and NWFP extraction. However, closer examination of the levels and forms of wealth held by forest peoples is revealing. Table 2 compares statistics on three types of assets - land, productive capital (i.e. fishing and extractive resources) and non-productive assets (i.e. consumer durables, livestock, shops and houses) - for the three study villages.

FIGURE 2 - Mean income share by activity for three lowland villages along the Marañón River, Pacaya-Samiria National Reserve, Peru

The average wealth holdings in these villages were distinct in type and value. Households in Village 1, on average, held far less land (50 percent or less) yet three times more productive assets than households in the other villages; much of this capital was in the form of fishing boats, motors and nets. In contrast, households in Village 2 held more wealth in nonproductive assets than productive assets, and their landholdings were more than twice those in Village 1. In Village 3, land had an even larger place in households' wealth than in the other villages, and holdings of non-productive assets were lower.

TABLE 1. Household participation in and reliance on NWFP extraction

Village	Participation in NWFP extraction (% of households)	Number of reliant households¹	Number of households observed
Village 1	26	2	23
Village 2	84	12	25
Village 3	61	5	28

1 Households considered reliant earned at least 30 percent of their income from extraction.

Striking differences in wealth were also apparent within these villages (Table 2). In all three villages, some households held no capital or non-productive assets while others had holdings worth five to eight times the average holding in the community. In Village 1, for example, the households that were wealthiest in terms of non-land assets possessed productive capital and non-productive assets worth 8.5 times and 4.6 times the holdings of the average household, respectively.

Moreover, one household in Village 1 possessed no land. In Villages 2 and 3, all households possessed at least some land, but land-rich households held 10 to 20 times as much land as land-poor households. Thus wealth holdings within these communities were distinct and unequally distributed across households. This finding is shared by other recent studies among forest communities elsewhere in the Upper Amazon (see Hammond, Dolman and Watkinson, 1995; Coomes, Barham and Craig, 1996; Coomes and Burt, 1997).

WEALTH AND LIVELIHOOD CHOICE IN THE RAIN FOREST

How does household wealth affect economic choices related to making a living in the rain forest? As for all peasants, whether they be farmers, pastoralists, fishers or forest extractors, wealth holdings provide households with:

- the material basis for producing subsistence goods and cash income (e.g. the purchase of a large fishing net to increase returns to a fishing family);
- a buffer against bad times, either as a form of insurance to smooth consumption or to enable income diversification (e.g. livestock or a sewing machine that could be sold in times of illness, flood, etc.);
- the basis for higher permanent consumption (e.g. the purchase of a generator to provide electric lighting).

Wealth also conditions the economic choices of forest households in less direct ways. In the absence of credit markets, households with greater assets are more able to self-finance investment in forest extraction or other activities. Where and when credit is available, wealth can serve as collateral for loans that enable households to expand activities (e.g. more fishing trips) or to diversify in alternative economic opportunities (e.g. lowland rice). Finally, wealth gives a household self-insurance in the risky floodplain environment, and thereby enables it to engage in potentially more profitable but riskier economic activities (e.g. lowland rice or game harvesting). Thus there are good reasons to expect that wealth affects the economic choices of forest peasant households, particularly with respect to activity specialization.

The relation between wealth and livelihood is clearly evident in data from households in the Pacaya-Samiria National Reserve study. The sample was divided (at the median) into rich and poor households in terms of land and non-land assets, and the households' share of income from agriculture, fishing and NWFPs was compared (Figure 3). Households that were land rich focused most heavily on agriculture, earning more than half of their income on average from agricultural products. Within the land-rich group, those households that held fewer assets tended to rely more on agriculture than those that were rich in assets. In contrast to land-rich households, the land poor tend to focus most heavily on fishing, especially if they are asset rich; indeed, the most specialized households were fishers who were land poor but asset rich. The households with the most "balanced" range of activities were those with a relatively "balanced" composition of wealth, i.e. those households that were poor in both land and non-land assets, and to a somewhat lesser degree households that were rich in both.

TABLE 2. Mean household wealth by lowland village, Pacaya-Samiria National Reserve, Peru¹

Village	Land (ha)	Productive capital (NS) ²	Non-productive assets (NS)
1	1.4 (2.1) [0-9.5]	1 840 (3 446) [0-15 600]	819 (973) [0-3 795]
2	3.5 (3.4) [0.5-10.9]	632 (1 245) [0-4 620]	939 (2 041) [0-6 684]
3	5.6 (3.2) [1.2-14.1]	699 (854) [0-3 340]	576 (844) [0-3 961]

¹ (): standard deviation; []: range (minimum-maximum).

² US\$1 = 2.6 new soles (NS).

Interestingly, these two groups correspond to those that relied most on NWFP extraction: land poor/asset poor households obtained 25 percent of their income and land rich/asset rich households 19 percent of their income from NWFPs. Moreover, these two groups earned greater incomes from NWFPs than households in the other two wealth categories. Thus in these three floodplain villages, where palm fruit gathering was the principal extractive activity, the greatest pressure and reliance on NWFPs was found among the poorest and the richest households. In other communities, where more skill-based extractive activities were dominant, the highest reliance on extraction was found to be among the young, poor and most skilled households (Coomes, Barham and Takasaki, 1999).

DISCUSSION AND CONCLUSION

Although by most standards traditional forest peoples are economically poor, within and among forest communities significant differences are seen in holdings of land and other assets, and such differences are of considerable importance to the use of NWFPs and other forest resources. Differences in household wealth - although they may appear to be small - can be instrumental in differentiating resource use and ultimately income generation. Thus the nature and distribution of wealth held by forest peoples merits closer attention by researchers and practitioners working on issues of tropical forest conservation and development.

Of particular importance for further study is the process by which forest peasant households accumulate (or disperse) wealth. At least three key questions need to be addressed. First, how do forest peoples come to hold different types and levels of wealth? Clearly a broad suite of factors can influence wealth accumulation, including the initial endowment in land or capital, access to labour, forest knowledge and extractive skill. The Pacaya-Samiria National Reserve project suggests that the initial endowment of wealth and geographical factors are particularly influential in shaping distinct paths of wealth accumulation, which in turn influence households' livelihood choices (see Takasaki, Barham and Coomes, 1999a, 1999c).

[FIGURE 3 - Income reliance by wealth position for households in three lowland villages, Pacaya-Samiria National Reserve, Peru](#)

Second, what are the roles of NWFPs in the process of wealth accumulation? Central to this issue is the problem of how forest peoples invest proceeds from forest product extraction. Some forest peasant households, for example, rely on such products primarily for consumption, whereas others may invest a part or all of their earnings. How they invest is also important: some households may use their earnings to purchase productive capital (and thus position themselves to deepen their involvement in extraction); others may invest in land (and perhaps shift their focus more to agriculture) or in consumer durables; still others may invest in human capital by sending their children to the city for an education. Each investment path gives rise to new opportunities and suggests distinct roles of forest products in wealth formation and accumulation. Indeed, forest reserves such as the Pacaya-Samiria National Reserve may not just be sinks for the rural poor, but may serve for some as springboards to better lives elsewhere.

[A typical ribereño dwelling](#)

[Housing construction materials harvested from the forests and ready for sale](#)

Third, how do diminishing stocks of NWFPs and other forest resources influence prospects for forest people to accumulate wealth? Whereas some NWFPs are sustainably harvested, others are depleted by forest peoples, and as a result the economic opportunities and the possibilities for amassing wealth available to different segments of the forest population shift through time. In the Pacaya-Samiria National Reserve project it has been observed that much extraction of the NWFPs viewed as central to conservation efforts (i.e. game and premium fish species) is

done by households led by young males, especially those who are skilled in hunting and certain types of fishing (Coomes, Barham and Takasaki, 1999). Where skill and capital requirements are low - as in the case of palm fruit gathering - it appears that both very poor and well-off households participate. It would be important to identify households that rely the most on ecologically vulnerable NWFPs and to understand better how households come to specialize in such products as the availability of other resources declines, and to discern whether alternate livelihoods can be promoted for these households.

Stripping of palm fruit (*Mauritia flexuosa*) from the stems after harvesting

In the practice of forest conservation and promotion of NWFPs, NGOs and other groups may benefit from closer attention to how differences in wealth affect local options for forest peasant households. Understanding of the linkage among wealth, resource use and income is crucial in devising approaches for working with forest communities to develop more effective and inclusive schemes for local management of forest resources. Attention to intracommunity differences in wealth is facilitated by rapid rural appraisal techniques devised for assessing holdings of land and other assets in peasant communities (Mukherjee, 1993; Chambers, 1994; Takasaki, Barham and Coomes, 1999b). In rain forest environments where the range of marketable products is very broad, the assessment of wealth often proves to be more feasible than estimating household income. Moreover, practitioners may find that a focus on improving the wealth levels of forest peasant households can be more effective than trying to enhance incomes, since wealth is an important determinant of resource use as well as income and has several other important roles in terms of household economics and welfare (e.g. insurance, credit base). By focusing on wealth, conservation and development groups may work more effectively to promote the sustainable use of forest resources while improving the lot of the rural poor in the world's tropical rain forests.

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