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**“IN THE FOREST IS OUR MONEY”:
THE CHANGING ROLE OF COMMERCIAL EXTRACTION
IN TAWAHKA LIVELIHOODS, EASTERN HONDURAS**

by

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Abstract

“In the Forest is Our Money”: the Changing Role of Commercial Forest Extraction in Tawahka Livelihoods, Eastern Honduras

Kendra McSweeney
McGill University, Montreal, 2000

Supervisor: Oliver T. Coomes

The uneven success of tropical forest product marketing initiatives over the past decade has illuminated our poor understanding of forest peasant livelihood systems. This dissertation explores *how*, *when* and *why* peoples living within biodiverse tropical forests turn to the sale of forest products to meet their needs over time, through a detailed examination of commercial forest extraction by the Tawahka Sumu (pop. 1,000) of the Mosquitia region, eastern Honduras. The study uses a multi-method, multi-scalar approach that incorporates conceptual insights from cultural ecology, agricultural economics, and peasant studies.

A detailed household census (n=116, or 88% of Tawahka households in 1998) was used to establish patterns of reliance on commercial extraction. As a group, the Tawahka were found to manage a diverse market income portfolio in which commercial extraction contributed some 18% in 1997-98 (US\$23/capita). At the household level, however, reliance on the extractive sector varied from 0-93%. Analysis of multi-year income data suggests that households move easily into, and out of, the sector. Statistical analysis indicates that the most important determinants of this sporadic engagement are unanticipated household-level calamities (illness, crop shortfall).

This *ex post* insurance function of commercial extraction was also demonstrated over longer time scales by a detailed historical analysis of the Mosquitia's dugout canoe trade, which revealed that the sale of dugout canoes has provided local peoples with an important fall-back during periods of economic recession. Discussion highlights the dynamism of peasant livelihoods, in which forest product sale is seen as only one response

to householders' changing needs over both the lifecycle of the household and larger economic cycles in the region.

The modern dynamics of the canoe trade appear to have changed little over two centuries, emphasizing the little-recognized continuity within native exchange systems despite market penetration and monetization. During the 1990s, the Tawahka sold half of the approximately 500 canoes they made, mainly to Miskito buyers. The future of canoe commerce is threatened by pressures on the forests of the newly-created Tawahka Asangni Biosphere Reserve, including high internal growth rates, *ladino* colonization, and agricultural reorganization in the wake of Hurricane Mitch. The implications of the study's findings to conservation and development initiatives in the neotropics are discussed.

Résumé

“Dans la forêt est notre argent”: le rôle de l’extraction forestière commerciale chez les Tawakhas de l’est du Honduras

Kendra McSweeney
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Au cours des dix dernières années, les différentes initiatives pour commercialiser les produits forestiers en vue d’augmenter le revenu des communautés rurales et conserver la diversité biologique n’ont pas toujours remporté les succès escomptés. Cette situation reflète une compréhension insuffisante des modes de vie des communautés forestières, plus particulièrement en ce qui concerne comment, quand et pourquoi celles-ci se tournent vers la vente de produits forestiers pour répondre à leurs besoins. Cette étude adresse ces questions dans un examen détaillé de l’extraction commerciale des produits forestiers des Tawahka Sumu (pop. 1,000) de la région Mosquitia à l’est du Honduras. Cette étude utilise différentes méthodes et différentes échelles ainsi que des concepts provenant de l’écologie culturelle, de l’économie du secteur agricole et des études sur les productions rurales.

Un recensement précis des foyers (n=116 soit 88% des foyers Tawakha en 1998) a été mené pour établir les modèles de dépendance au commerce d’extraction. Il a été observé que les Tawakhas gèrent un portefeuille de revenus variés dont 18% (23\$ Américain/capita) en 1997-98, étaient attribuables au commerce d’extraction. Toutefois, à l’échelle des foyers, la dépendance au secteur d’extraction varie de 0% à 92%. Une analyse des revenus sur plusieurs années suggère que les foyers ne se fient pas exclusivement aux produits forestiers. Des analyses statistiques ont été effectuées pour isoler les facteurs les plus déterminants de ses engagements sporadiques. Les résultats indiquent que des désastres (maladies, récoltes perdues ou insuffisantes) sont des facteurs décisifs lorsque les Tawakhas choisissent de vendre des produits de la forêt. La fonction d’assurance *ex-post* des ventes de produits forestiers a été

également démontrée à long terme à travers une analyse historique détaillée du commerce de canoës (pirogues) dans la Mosquitia. Des analyses de contenu et des récits de vie révèlent que les ventes de canoës offrent un substitut non négligeable pendant les périodes de récession économique.

Les dynamiques actuelles du commerce de canoës se sont très peu modifiées depuis 200 ans, démontrant que, malgré les insertions dans le marché et la monétarisation, les systèmes d'échanges interethniques perdurent. Dans les années 1990, les Tawakhas ont vendu approximativement la moitié des 500 canoës qu'ils ont fabriqués dont la plupart aux acheteurs Miskito du bas de la rivière. Le futur du commerce de canoë est menacé par des pressions sur la Réserve Biosphère Tawahka Asangni telles que des taux internes de croissance démographique élevés, par l'incursion des colons *ladinos*, et par une réorganisation agricole qui fait suite à l'ouragan Mitch. Les implications des résultats en ce qui concerne les initiatives de conservation et de développement dans les neo-tropiques sont discutées.

Resumen

“En el bosque esta nuestro dinero”: El Papel Cambiante del Extractivismo Forestal Comercial en la Subsistencia de los Tawahka, al Este de Honduras.

Kendra McSweeney
McGill University, Montreal, 2000.

Supervisor: Oliver T. Coomes

Durante la década pasada, las iniciativas de mercado de productos forestales dirigidas hacia el mejoramiento de los ingresos rurales y la conservación de la biodiversidad, han experimentado un éxito desproporcionado. Los resultados reflejan nuestro pobre entendimiento de los sistemas de subsistencia de los campesinos que viven en y del bosque, especialmente en lo concerniente en el *como*, *cuando* y el *porque* esta gente cambia hacia la venta de productos forestales para cubrir sus necesidades. Este estudio se dirige hacia contestar estas preguntas a través de una examinación detallada del extractivismo forestal comercial realizado por los Tawahka Sumu (población 1,000 hab.) de la región de Mosquitia, en el Este de Honduras. El estudio utiliza un método múltiple y un enfoque multiescalar que incorpora elementos conceptuales de ecología cultural, agricultura económica y estudios campesinos.

Un detallado censo familiar (n=116, o 88% de las familias Tawahka en 1998) fue utilizado para establecer patrones de expectación del extractivismo comercial. Como grupo, se encontró que los Tawahka manejan un portafolio de productos e ingresos diversos, donde el extractivismo comercial contribuyó con un 18% en 1997-98 (US \$23/per capita). Sin embargo, a nivel familiar, la expectación en el sector extractivo varió de 0 a 93%. El análisis de los datos de ingreso multianual, sugiere que las familias se mueven fácilmente hacia adentro y hacia afuera del sector. Fueron realizados diversos análisis estadísticos para determinar el elemento más sobresaliente de estas esporádicas ganancias. Lo encontrado indica que las calamidades inesperadas (como enfermedades y cosechas malogradas o insuficientes) son particularmente importantes en la estimulación de la generación de dinero en efectivo a través de la venta de productos forestales. La función del seguro *ex post* del extractivismo comercial fué también demostrada sobre

grandes escalas temporales mediante un análisis histórico detallado del comercio de las canoas labradas a partir de árboles de la Mosquitia. La interpretación de las historias orales así como de las diversas fuentes históricas, revelaron que la venta de las canoas labradas brindó una importante alternativa durante los periodos de recesión económica.

La dinámica moderna del comercio de las canoas (*pipantes* y *cayucos*) parece haber cambiado poco durante dos siglos, tendiendo a la continuidad de los sistemas de intercambio nativos sin importar la penetración de los mercados y de la monetización. Durante la década de los noventas, los Tawahka vendieron la mitad de aproximadamente 500 canoas que ellos elaboraron, principalmente a los Miskito. El futuro del comercio de las canoas está amenazado por las presiones en los bosques de la recién creada Reserva de la Biósfera Tawahka Asangni, incluyendo las altas tasas de crecimiento poblacional internas, la colonización ladina y la reorganización agrícola debida a la recién presencia del huracán Mitch. Las implicaciones de los resultados obtenidos en el presente estudio para las iniciativas de conservación y desarrollo en los neotrópicos son discutidas.

Preface

This dissertation is based largely on fieldwork I conducted in 1998 in Tawahka Sumu communities of the mid-Patuca River, northeastern Honduras. Five months after I left the field, the most intense Atlantic hurricane ever recorded zigzagged over Honduras. Much of the rain that Hurricane Mitch dumped over the country flowed out through the Patuca basin, washing away Tawahka homes and livestock. Along some stretches, the river I had easily swum across in April spread over 1.5 km wide, scouring the land and depositing in its wake a metre-thick layer of infertile sand. Productive orchard gardens—the heart of Tawahka subsistence and economy—were entirely destroyed. Virtually overnight, the Tawahka's physical and cultural landscape was radically altered; livelihoods that I had known and recorded—and depict over the next 200+ pages—are now a distant memory.

Or are they? Shortly after the hurricane, the Tawahka's first requests for help included predictable needs (food, medicines) but also urgent appeals for bullets: hunters were eager to supplement dwindling food reserves with game. Today, two years after Mitch, Tawahka farmers are coping with the loss of lowland fields by clearing forested uplands. Others are cutting mahogany for sale to compensate for the loss of cash cropping. Although just some of the ways the Tawahka are coping with Mitch, these activities reflect the importance of forest resources in the ongoing process of survival. Indeed, how and when forest peoples turn to forest resources—albeit under less historic conditions—is the question that drives this dissertation. I show, for example, that before Hurricane Mitch, many Tawahka also sold forest products to cope with household-level emergencies. The fundamental continuity of the Tawahka's economic behaviour *since* Mitch, then, ensures that the Patuca-specific insights of this dissertation are of more than merely historic interest.

This dissertation is the culmination of a process begun in June 1994, when I first came to the Patuca as one of four researchers hired by the Harvard Institute for International Development (HIID) for a long-term, NSF-funded study of forest reliance. The project, spearheaded by Ricardo Godoy, required that my colleagues and I live in a Tawahka community—two of us in Krausirpi, two in Yapuwas— without

electricity, running water, or medical facilities, for more than two years virtually without break. But what originally seemed daunting quickly proved intellectually and personally rewarding. For this I am grateful to the intellectual vision and personal persistence of Dr. Godoy. Although few would have asked so much, few can be credited with providing a truly life-defining experience. The project also introduced me to an array of field research methods and to complex research design, the details of which were hammered out in the Yapuwas schoolhouse. I am grateful to all project members, particularly the Principal Investigators Drs. Godoy, Nick Brokaw, and David Wilkie, as well as to my fellow researchers, for these rewarding bouts of intellectual ferment. For his quiet competence, companionship, and patience with my initially rudimentary Spanish, I am grateful to my co-worker and housemate, Adoni Cubas. I thank my father Kerry for his monthly mailings, which kept me informed of family and world events and provided much-appreciated reading material; imaginative care packages from my sister Lucy helped to vary the culinary routine of Krausirpi.

When I returned from Honduras in April 1996, I decided to pursue some of the questions that my field experience had raised by enrolling in the Ph.D. program in Geography at McGill. For funding my studies, I thank FCAR Quebec (*Fonds pour la formation de chercheurs et l'aide à la recherche*) and the Principal's Dissertation Fellowship (McGill). For my intellectual development at McGill I owe much to my supervisor, Professor Oliver Coomes. Always available for consultation, Professor Coomes offered support in the form of time, interest in my project, and thoughtful advice about my approach and direction. By sharing his own evolving thoughts on forest peasant livelihoods with me, Professor Coomes helped me to define mine; in the process, I was treated as a colleague well before I began to feel like one. For first introducing me to tropical fieldwork, I am grateful to Professor Theo Hills; for guidance throughout the doctoral process, and for helpful comments on earlier drafts of the dissertation, I thank Professor Coomes and the other members of my committee: Professors George Wenzel (Geography) and Catherine Potvin (Biology). Among my fellow graduate students, I am grateful for the unwavering friendship of Aurélie Lebrun, which will likely far outlast the shared doctoral experience that kindled it. I

thank Sarah Dalle, who I first met on the Patuca, for her friendship, for her time in co-managing the Mosquitia Campaign, and for our stimulating discussions about ‘the field.’ Peter Vander Woude enlivened the computer lab and provided generous cartographic assistance; I also thank Christopher Omelon for his map-making prowess, Natalie Lerch for kindly translating several German sources, Aurélie Lebrun for the French version of the abstract, and Leonardo Cabrera García for the Spanish version.

While writing my dissertation in Montreal, the solitary process was made immensely more pleasant by the companionship of Ben Graham, and by the support of friends Desea Trujillo, Vicky Princz, and Tim Dimick. I owe a particular debt to my parents, Susanne and Kerry, for their constant interest in my work, financial support, and love, as to the rest of my family in Montreal and elsewhere—my sister Lucy, brothers Luke and John, and grandfather Angus Westkirk and wife Noella Westkirk—for their support, encouragement and love.

Colleagues beyond McGill, particularly those working in the Mosquitia, have contributed much to the shape and content of this dissertation. Among geographers, I thank William Davidson of LSU, Karl Offen (now of Oklahoma State), William Adams of Eastern Kentucky University, and Elmor Wood; I owe a particular debt to Peter H. Herlihy of the University of Kansas at Lawrence for early encouragement of my field studies, for his generosity with materials and contacts, and for introducing me to the power of truly *community*-based natural resource management. I also thank Laura H. Herlihy for sharing her recordings with me and David J. Dodds for his thoughtful comments on my work; in Honduras, the expertise of botanist Paul House and anthropologist Fernando Cruz Sandoval proved most helpful.

My five-month field season in 1998 would not have been possible without generous support from the Young Canadian Researchers Award program of IDRC (Ottawa), a FCAR *Stage* for Overseas Research, and a grant from the Social Science and Humanities Research Grants Committee at McGill. In Honduras, I thank the helpful staff at AFE-COHDEFOR (Tegucigalpa and La Ceiba), the *Archivo Nacional*, and the *Instituto Geográfico Nacional* for assistance in tracking down archival materials and maps. In the Mosquitia, I received logistical support from MOPAWI

(*Mosquitia Pawisa*), and thank the Tawahka organizations FITH and *Asociación Asang Launa* for their institutional support, administered through the capable hands of Edgardo Benitez Maclin. I thank the students of PEBIT for their hospitality in Tegucigalpa.

Finally, I owe my greatest debt to the Tawahka and other residents of the Patuca River, on whose cooperation the research project rested. During the 27 months that I lived and worked among them, their invariably good humour, interest, and energy made fieldwork a pleasure. Without exception, they endured being followed, questioned, interviewed, photographed, and videotaped with humour, patience, and understanding. Innumerable Tawahka children helped in myriad ways. Jesus Ortiz was a superb field assistant, and I am grateful for the thoughtful cultural insights of Cristóbal Sánchez, Sixto Ortiz, Indalecio Sánchez, and Dorilia Martínez.

But I remain indebted to the Tawahka, particularly those in Krausirpi, in more personal than professional ways: for lodging me, nursing me through illness, and sharing their food—from monkey to *wahbul*. I was privileged by three families to become *lapia* to their children, and I have shared deaths, sickness, clothing, tools, travel adventures, and companionship with Tawahka in Krausirpi as in Parawas, Yapuwas, Kamakasna, and Krautara. Although there are too many to thank by name, the hospitality of the Martínez and Cardona families of Krausirpi stands out. I passed many moonlit evenings chatting with Gumercindo (Chindo) Vásquez and Bernaldo Sánchez; Mirta Cardona shared her home and music collection with me for three months. Four people to whom I owe special debts of gratitude I will sadly not see again. I thank Aurelio Salinas, a great *pipantero*, for his enthusiasm for his craft and generosity of spirit; Berta Rosa, *laipia*, for her friendship and honesty about the troubles of single motherhood; Doña Gumercinda Mena, who in showing me how to cut a *wacal* in my first week in Krausirpi made me feel welcomed; Don Isidro Martínez, Tawahka elder and my neighbour for over a year, for his many gifts, and sheer delight in sharing his culture. This dissertation is dedicated to their memory, and to the memory of my godmother, Kathy McSweeney.

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Abbreviations

BRP	<i>Biosfera Río Plátano</i> (Río Plátano Biosphere Reserve)
COHDEFOR	<i>Corporación Hondureña de Desarrollo Forestal</i> , now AFE (<i>Administración Forestal del Estado</i>)-COHDEFOR (responsible for management of Honduran forests)
dbh	Diameter at breast height: conventional height at which tree measured (or, for rain forest trees, above buttress)
FITH	<i>Federación Indígena Tawahka de Honduras</i>
GPS	Geographic Positioning System
masl	Metres above sea level
NGO	Non-governmental organization
NTFPs	Non-timber forest products
L	Lempira (Honduran currency)
TABR	Tawahka Asangni Biosphere Reserve
<i>transl.</i>	'Translated': indicates passage translated from original language of source cited (including German, Spanish, and Miskitu)
UNHCR	United Nations High Commission for Refugees (Spanish: ACNUR)

CHAPTER ONE

Introduction

1.1 Evolving Interest in Forest Peasant Economies

The main body of this dissertation is divided into five chapters that are linked by one question: *How, when, and why* do peoples living near biodiverse tropical forests turn to commercial extractivism¹ to meet their needs? The question is important because the sale of rain forest products by local peoples has been hailed by scientists, conservationists, and development practitioners as a means for tropical forests to 'pay for themselves' while raising incomes for their economically marginalized inhabitants. Largely on the basis of theoretical attractiveness, commercial extractivism was aggressively promoted and widely implemented during the 1990s, particularly in the Latin American and Southeast Asian tropics where the pace of rain forest conversion has been particularly high.² In theory and in practice, the approach has also been heatedly criticized, largely on the grounds of unsound economic and/or ecological sustainability (e.g., Fearnside 1989; Browder 1992; Pendleton 1992; Godoy 1993c; Boot and Gullison 1995). But both proponents and detractors of the 'use it or lose it' approach to rainforest conservation and development have recently converged in their realization that the success of any 'extractive reserve' or rain forest product marketing initiative requires a much better understanding of "prevailing local ecological,

¹ Defined here as the harvest, or 'extraction' of wild and semi-wild floral and faunal goods by local peoples for purposes of sale. Although forest-based extraction is commonly considered to include only the harvest of non-timber forest products (so-called NTFPs such as bark, latex, or game), this and other studies consider firewood and lumber production by individual households to be inseparable from the harvest of other wild goods.

² Social and natural scientists have picked up different threads of the "rainforest valuation and marketing" tapestry. Valuation studies are many, but include Kramer *et al.* (1989), Godoy (1992), and Godoy *et al.* (2000c). Prance (1989) and Bennett (1992) advocate ethnobotanists' involvement in the marketing of non-wood products. NGO and government policy papers regarding the building of institutions and markets for NTFP marketing include May (1991), Brigham (1995), Vosti and Witcover (1995), and Broekhoven (1996). Anthropologists such as Clay (1992, 1996) have also sought to lay out general principles and strategies for developing NTFP markets. Anthologies on these subjects include those edited by Nepstad and Schwartzman (1992) and Plotkin and Famolare (1992).

socioeconomic, and political conditions” (Salafsky *et al.* 1993:39).

Of these, perhaps the least understood are the *socioeconomic* motives behind forest peoples’ participation in commercial extractivism. Indeed, our understanding of the basic microfoundations of forest peasant behaviour, and subsequent resource outcomes, is in its infancy (Barracough and Ghimire 1995; Dove 1995; Jepma 1995; Coomes 1996a; Coomes and Barham 1997; Southgate 1998; Byron and Arnold 1999). In contrast, researchers have been relatively successful in illustrating how *macro*-level social, political, and economic processes influence peasant-driven deforestation.³ But these large-scale explanatory frameworks have fallen short in helping to explain what researchers increasingly report: the remarkable heterogeneity of land use practices (and ensuing environmental outcomes) *within* communities.

The purpose of this dissertation, then, is to join an emergent literature that seeks to ground future conservation/development initiatives in sound empirical understanding of the target group: the forest peasant household (see Coomes 1996a; Coomes and Barham 1997; Murphy *et al.* 1997; Barham *et al.* 1999; Kant 2000; Takasaki *et al.* 2000a, 2000b). In particular, I argue that the potential for commercial extractivism to raise rural incomes is not a technical problem that can be solved by the ‘proper’ constellation of marketing infrastructure, price incentives, and value-adding technologies (e.g., Clay 1996). Rather, commercial extractivism should be seen as *one* of many activity choices that forest peasants weigh in their ongoing process of making a living, in which the relative attractiveness of any particular income sector is firmly embedded in each household’s prior experience, current and future needs, and endowments at any given time.

³ For example: Larson and Bromley (1990), Hecht (1992), Downing *et al.* (1992), Rudel and Horowitz (1993), Durham (1995), Edelman (1995), Alcorn (1996), Bebbington (1996), Uhl *et al.* (1997); see reviews in Durham (1995) and Dodds (1998c).

1.2 Research Problem and Literature Review

To argue these points, I use a case study of commercial forest use among the Tawahka Sumu⁴ of eastern Honduras. This indigenous group of horticulturalists/foragers lives within the broad-leaved forests of the Mosquitia region. They have traded forest products for centuries, and continue to do so today. But they also engage in a host of other income-earning activities besides, and so provide an attractive field 'laboratory' in which to address the main research thesis. The three themes of primary interest are outlined below, and their relevance and distinct contribution to the literature are discussed.

i. Changes in Forest Reliance over Different Temporal Scales

Studies of forest peasant economies typically lack a longitudinal perspective on household production, and are instead dominated by "snapshots" of peasant livelihoods (Byron and Arnold 1999). But forest peoples turn to different income-earning activities at different times of year, and in different degrees between years. Evolving activity choices over the life cycle of the household compound this dynamism. This means that commercial extractivism can be important in different seasons, in lean years, or more to young households than old. This dissertation identifies some of such 'household moments' during which extraction appears to be a particularly attractive choice to forest dwellers.

The importance of extraction as an income-earning option also fluctuates over longer temporal scales. Studies have documented the rise and fall of forest products over time (e.g., DeFilipps 1992; Homma 1992; Offen 1998), but their relative importance vis-à-vis other activities, particularly in times of economic recession, are poorly known (Coomes and Barham 1997). That is, did forest resources provide economic buffers to forest inhabitants when some products lost international markets, or did all forest-based trade follow 'boom-and-bust' cycles? This dissertation responds to the need to draw

⁴ The name by which the Tawahka of Honduras refer to themselves. Although 'Sumu' is considered to be a name imposed on the Tawahka by other groups, the Tawahka in Honduras do not use 'Mayangna,' the term preferred by their coethnics in Nicaragua (e.g., Stocks 1996; Offen 1999).

attention to the historic precedent for contemporary forest trade, towards the identification of historic circumstances under which forest resources offered—and can offer—significant economic rewards to forest households.

The current work is therefore allied with revisionist interpretations of forest peasant economies, particularly in their response to integration by capitalist systems (e.g., Hugh-Jones 1992; Macdonald 1992; Korovkin 1997; McKinley 1998). Previous studies tended to depict forest peoples as victims of capitalism, suggesting that market integration—particularly that initiated by forest product trade—is a uni-directional, evolutionary process from non-monetized barter systems to fully formalized economies geared to regional, national, and international markets (Johnson and Earle 1987; Godoy *et al.* 1995; Sierra *et al.* 1999). This viewpoint has led to concerns that market-oriented forest extractivism may negatively affect local communities.⁵ Such concerns seem misplaced, however, considering growing evidence of forest peasant adaptability to the ups and downs of international markets.⁶

ii. *Forest Product Marketing as a Diversification Strategy*

The complex amalgam of activities that typically makes peasant economies 'mixed' is considered to be a risk-minimizing response to sporadic and incomplete credit, factor, and product markets, and in particular, to an uncertain biophysical environment (Reardon *et al.* 1992; Zimmerman and Carter 1996). Modeling peasant production choice under these different constraints is an important theme in peasant economics (Pichón 1997). The emphasis to date, however, has been largely on householders' choices within agriculture, or between agriculture and off-farm wage work (e.g., Bartlett 1980, 1982; Ellis 1993; Netting 1993; Toniolo and Uhl 1995). Researchers have only recently focused on peasants in lowland rainforest environments, where risks—and so, levels of diversification—might be expected to be particularly high (e.g.,

⁵ For example, by initiating: a loss of economic independence (see discussion in Posey and Dutfield 1996:50-52), a loss of production diversity in favour of risky market-oriented specialization (e.g., May 1991; Hammond *et al.* 1995), and an erosion of ecological knowledge (see Johannes 1989; Godoy *et al.* 1997a).

⁶ See Padoch and de Jong (1990), Cruz and Benitez (1994), Coomes (1995), Barham and Coomes (1996), Santos *et al.* (1997).

Wilk 1991; Vosti and Witcover 1993; Schelhas 1996a). This supposition appears to be borne out in recent studies of forest peasants, at least at the community level.⁷

The conservation and development initiatives that tackle household-forest interactions are less likely, however, to locate forest extraction as one of a suite of production options in a household's portfolio. Rather, they tend to promote forest extraction in isolation from economic alternatives, as Pichón (1997:350) notes. Thus studies abound documenting the way in which households engage in market-oriented forest extractivism, but much less *why* or *when* they do, especially in relation to other activities (Byron and Arnold 1999). In contrast, the present work responds to calls for a more contextualized analysis of commercial forest use.

iii. The Role of Household Wealth in Commercial Extractivism

For peasant households, the choice to focus on forest extractivism as a productive activity has several outcomes. First, forest extractivism may accrue distinct benefits to extractor households that are not enjoyed by non-extractors. Can the overall welfare—measured by health, education, or wealth—of extractors be distinguished from their non-extracting neighbours, and under what circumstances? Studies of household participation in extractivism have mainly focused on income generation outcomes (e.g., Pinedo-Vasquez *et al.* 1990; Nations 1992; Godoy and Bawa 1993; Clay 1996; Simmons 1997), even when extractivism is compared with other production activities (e.g., Anderson and Ioris 1992), neglecting the myriad other ways households may accrue positive outcomes from their productive choices. But if the consumption/investment side of the microeconomic equation is lacking, we risk presenting a highly skewed picture of forest households, as Barham *et al.* (1999) argue. I therefore seek to complement an examination of the role of forest products in production profiles with a picture of their role in a household's consumption profile.

⁷ Recent studies of forest peasants describe diverse cash income options at the community level, ranging from cash cropping to gold panning: Padoch and de Jong (1990), MacDonald (1992), Bedoya (1995), Hammond *et al.* (1995), Coomes (1996), Schelhas (1996a), Godoy *et al.* (1997a), Simmons (1997).

1.3 Conceptual Approach

The main impetus for this work came from my observation, during the nearly two years that I lived in a Tawahka community, of significant variation in the extra-subsistence strategies of households within an apparently 'homogenous' indigenous group. All households were subject to similar price constraints and enjoyed comparable access to forest resources. Yet some derived significant earnings from the sale of forest products, while others did not enter the forest for months at a time; the commercial activities of some households merged easily with their subsistence pursuits, while other households separated their subsistence and market activities.

These perceptions led me to consider the factors that influence why households engage in market activities, and how they choose between forest and non-forest occupations. Early on in my fieldwork it became clear to me that my 'traditional' neighbours were not, in fact, bound to a prescribed farming/ hunting/ gathering way of life. Rather, they appeared dynamic in their activity choice, depending on their relative wealth and their current and future needs, in a context of changing opportunities and constraints. I then grounded and honed this basic realization using the neoclassical models of peasant decision-making in the peasant economics and agricultural economics literatures (e.g., Ellis 1993,1998; Upton 1996), which provided a framework in which to conceptualize the processes underlying livelihood choices for peasants such as the Tawahka.⁸ But because this literature rarely engages with peasants at the forest edge, I also drew insights from a small but growing literature that has adapted the models of peasant decision-making to incorporate distinct constraints of peasants living near or within biodiverse forests (e.g., Pichón 1996,1997; Pattanayak and Sills 1999). One of the most helpful is that schematized by Schelhas (1996a), and is reproduced in Fig.1.1.

⁸ I use the term 'peasant' following Ellis (1993), as an *economic* rather than political or social term, to refer to peoples whose livelihoods are land-based, but who also participate in the market economy through the sale of crop surpluses, labour, and other goods and services. Helms (1971) uses the term in reference to the Nicaraguan Miskito; 'peasant' does not deny the unique cultural characteristics of a given group. 'Forest peasants,' then, can include indigenous peoples as well as recent colonists in forest zones.

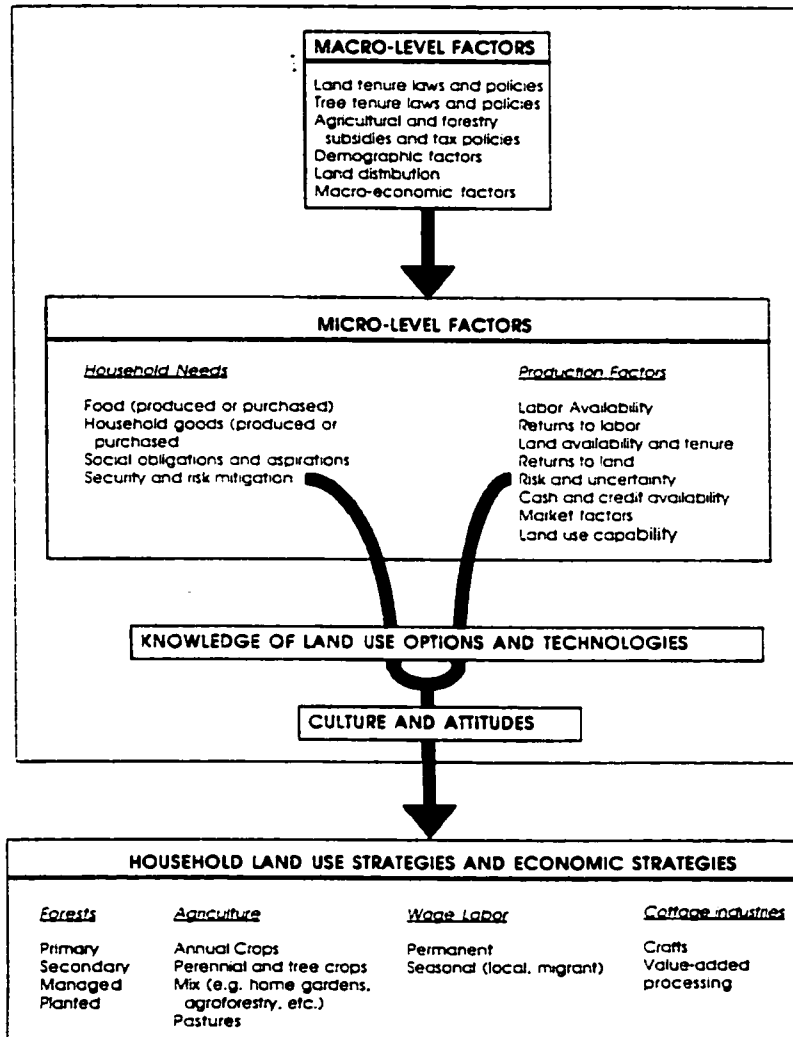


Fig. 1.1 Conceptual model of forest households' land use strategies. Reproduced from Schelhas (1996a:259). "Micro-level" production factors might also include 'Labour organization'; "Economic Strategies" (lowest box) could also include off/non-forest activities such as business, gold-panning, livestock-raising, etc.

My approach responds to an emergent literature and development approach that engages the junction of forest peasant livelihood and resource use; I examine aspects of human-forest interaction over time through the lens of the 'forest peasant economy.' The fundamentally multidisciplinary nature of this topic is reflected in the range of fields—many in themselves cross-cutting—that contribute to the work's methodological direction and analytical insights. These include agricultural economics, economic anthropology, ethnobotany, political ecology, environmental history, and others. I summarize the most influential in Fig.1.2, and depict their specific contributions to the research focus. The research focus itself is seen to lie at the intersection of the three distinct but overlapping 'spheres' in which forest peasant livelihoods are articulated: nature, commerce, and subsistence.

In its focus on human-environment interactions and their mediation by economic factors, this work is most fundamentally aligned with the nature-society outlook of cultural ecology, particularly with regard to the discipline's preoccupation with the adaptability of human resource use under changing conditions (Butzer 1989; Turner 1989,1997).⁹ This dissertation locates itself within the cultural ecology tradition as practiced by human geographers. Points of contact between this work and the so-called 'Berkeley school'¹⁰ of cultural ecology are particularly apparent. For example, research presented here is based on a multi-method approach that incorporates archival work, household surveys, and participant observation. Methodological plurality is a hallmark of cultural ecology within Geography, as is the use of lengthy and detailed field research. Also, the relationship between humans and their environment is considered dynamic; a strong sense of historical context permeates the corpus of the Berkeley School as it does this dissertation. A further, if serendipitous, link is that one of the classic studies in cultural ecology is based on fieldwork in the same cultural region as the current study (Nietschmann 1973).

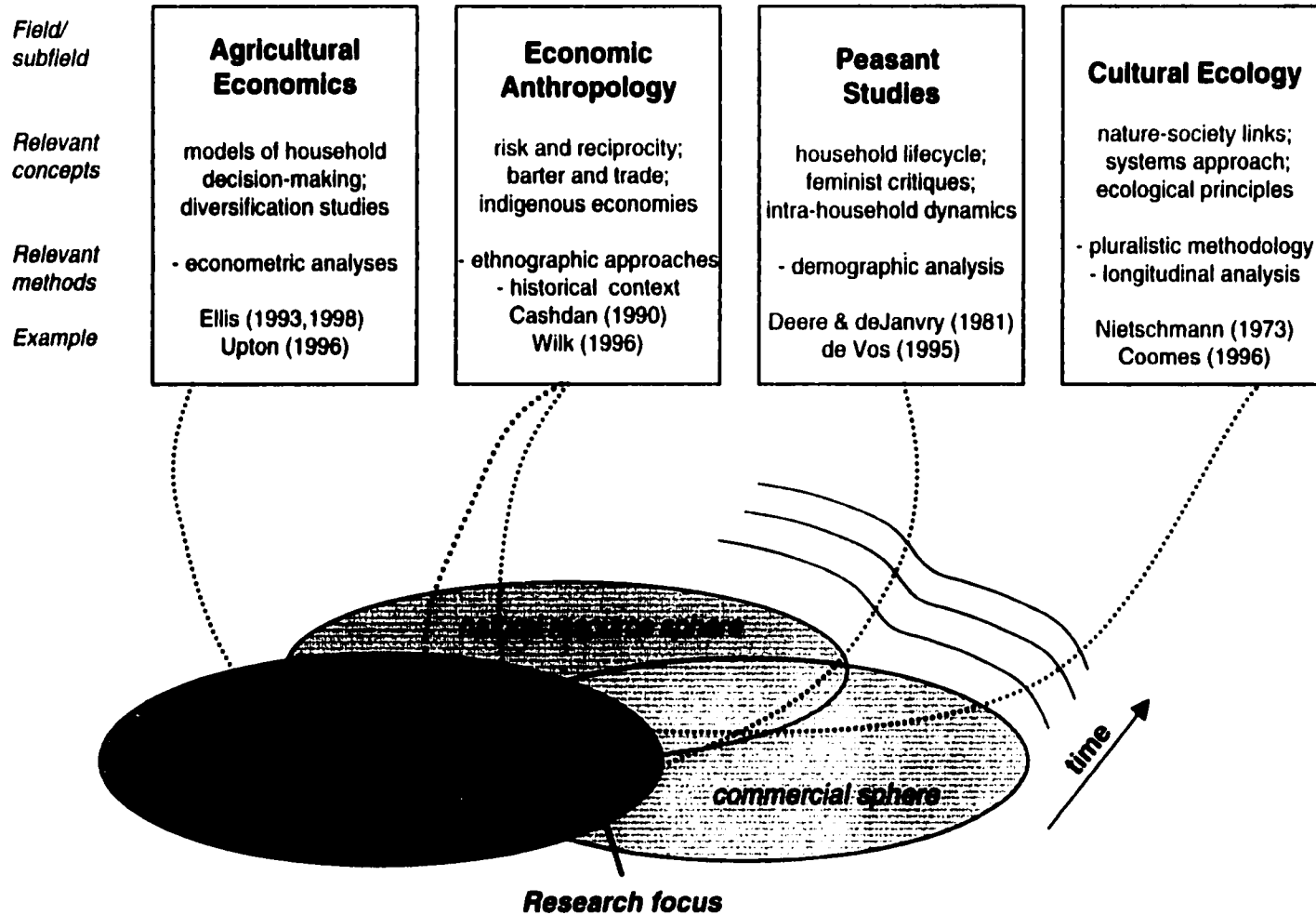
The research presented here is probably best seen as materialist and

⁹ Cultural ecology has been described as "a research perspective [that has] sought understanding primarily through synthetic analysis and empirical examinations of problems and themes that link human activity and the physical environment" (Turner 1989:92).

¹⁰ So named because it arose from the work of Carl Sauer and his colleagues in Geography at the University of California at Berkeley.

Fig. 1.2 Methodological and analytical lineage of research focus.

Literatures contributing to the understanding of forest peasant economies



empirical, in common with most work in cultural ecology (Turner 1989): there is little explicit attention paid to the role of ethnicity or myth and ritual in household decision-making, although some studies acknowledge these relationships (e.g., Parker 1989; Bedoya 1995; Pichón 1996; Schelhas 1996b). Nevertheless, such elements are not ignored. For example, reciprocal labour exchange, communal land holding, kin-level social and economic organization, and the prevalence of investment in social capital are all ways in which indigenous groups may differ in their social and economic organization from other peasants; such ‘cultural’ elements are therefore incorporated into the analysis.

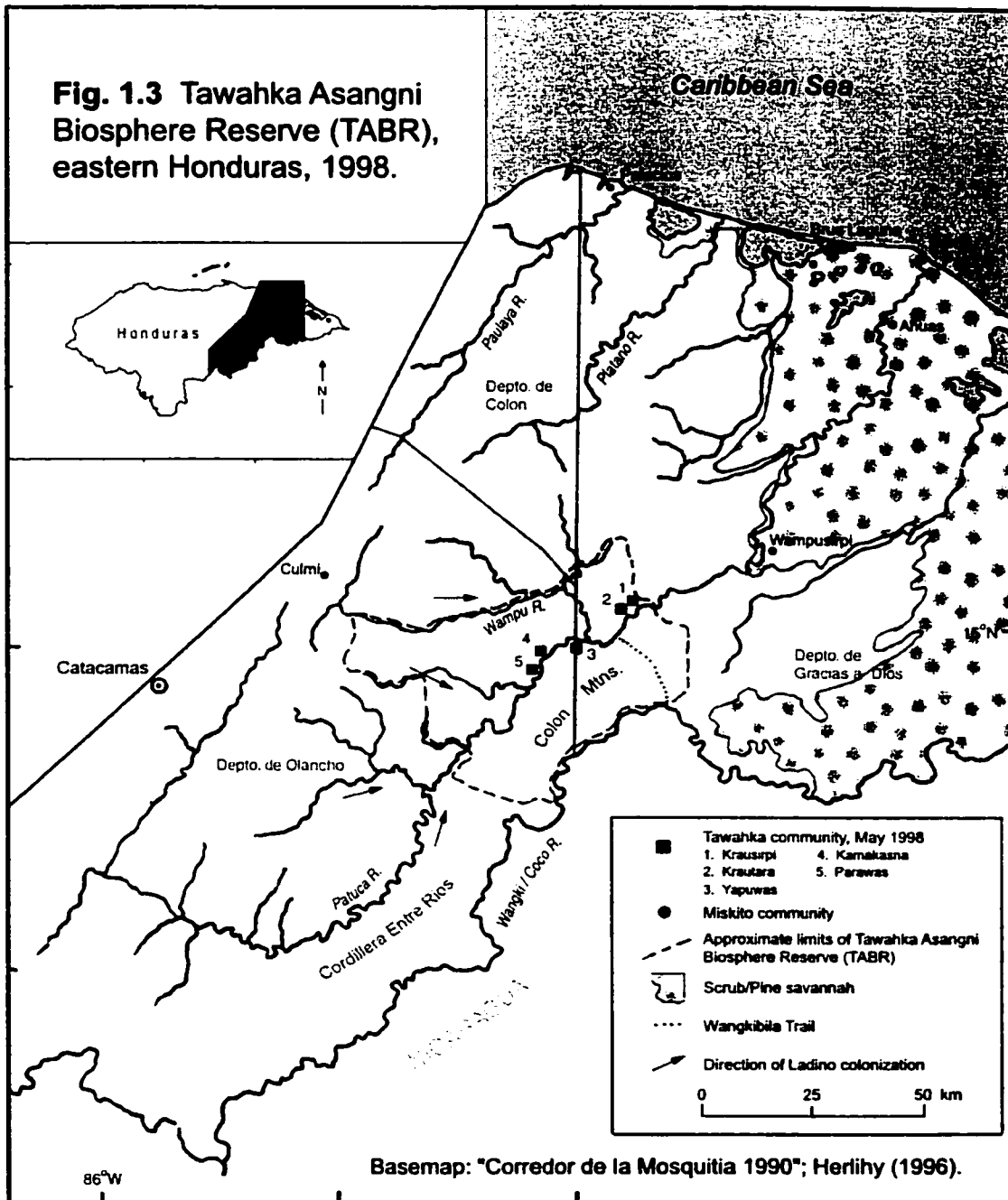
1.4 A Study of the Tawahka Sumu

The dissertation’s aims are met through a case study of Tawahka Sumu livelihood practices in the Mosquitia region of eastern Honduras. About one thousand Honduran Tawahka live in five communities (Krausirpi, Krautara, Yapuwas, Kamakasna, and Parawas) along about 40 km of the mid-Patuca River, within the 2,300 km² Tawahka Asangni Biosphere Reserve (hereafter referred to as the TABR; see Fig. 1.3). The project’s research agenda was honed to answer three specific questions within this setting:

- i. How do households within a shared environmental, economic, and ethnic context vary in their use of, and reliance on, forest resources?
- ii. What household-level factors can explain when and why forest resources are used; particularly, can household wealth portfolios predict patterns of extraction?
- iii. What can an examination of a single commercial forest product—in this case, dugout canoes—reveal of the inner workings of commercial extractivism, its outcomes, and its historical underpinnings?

The TABR offered an attractive site in which to study the dynamic links between forest resource use, reliance, and production trajectories for several reasons. First, the Tawahka are indeed a “forest people” who rely on a variety of

Fig. 1.3 Tawahka Asangni Biosphere Reserve (TABR), eastern Honduras, 1998.



rainforest resources for subsistence and income generation, as they have done historically; but they are also cash-croppers, wage workers, traders, and gold panners. Tawahka households in fact display an analytically attractive variety of production portfolios ideal for probing the dynamics of forest reliance over time. Second, the Tawahka's historical isolation from their Nicaraguan coethnics means their homeland effectively describes a unique culture area, thus providing the unusual opportunity for research to be undertaken at the scale of an entire ethnic group. A third and largely practical reason was that my own prior work experience in the region greatly facilitated research (see later). Fourth, the Tawahka are not 'extraordinary.' In basic subsistence strategies, labour organization, and market involvement their experience is little different from that of most forest peasants, and they face the same territorial constraints, resource impoverishment, demographic dynamism, and increased market involvement of forest dwellers throughout the tropics. Thus findings regarding their livelihood strategies should pique broad academic and policy interest; in particular, the Tawahka's residence within a biodiverse, protected area means this study's findings should resound with nascent conservation/ development initiatives elsewhere in the neotropics.

Finally, the study benefits from the thematically broad and historically deep literature that exists on the Honduran Tawahka, a corpus that appears unusually rich given the group's small size. Much of the literature derives from recent interest in the establishment of the TABR. For example, at least 13 academic papers, five reports, and two Master's theses have been written on some aspect of the Tawahka and/or their homeland since 1990. These works range from socioeconomic reports (e.g., Cruz and Benitez 1994) and ethnobotanical description (e.g., House 1997) to detailed econometric analyses of production patterns (e.g., Godoy *et al.* 1996a). All inform the current study. In addition, numerous studies from the greater Mosquitia region (in both Honduras and Nicaragua) are highly relevant and help to inform and contextualize the study's findings. Most important in this regard are two recent dissertations: first, the study conducted by Dodds (1994) among Honduran Miskito offers much insight into shifting cultivation as practiced in the region, and discusses

the impact of current population growth on future resource use; second, the detailed archival work on which Offen's (1999) dissertation is based provides a rich backdrop for the current study's historical sections.

Fieldwork and Methods

The dissertation relies on primary and secondary data collected in a multi-method approach, reflecting the disciplinary plurality of the literatures from which the research problem arose. 'Multi-method' not only implies that different methodological techniques are employed to address distinct 'projects' within the research corpus, but that a triangulation of methodologies are applied to any given problem (see McKendrick 1999). I applied this approach at different scales (e.g., individual, household, and community; aggregated forest products versus individual forest product), over different time periods (one year, past decade, past century), and in different ways (qualitative and quantitative; see Byron and Arnold 1999).

I collected primary data during two phases of fieldwork in Honduras, between 1994 and 1998. The first phase lasted 22 months and the second, five months. Subsequent to both periods, I compiled and analyzed the resultant data at McGill University in Montreal. In addition, I collected secondary, archival data between 1996 and 1999, largely in North America. Below I outline the two main data collection phases and the particular research methodologies of each.

Phase I

For 22 months between June 1994 and March 1996, I lived and worked in the Tawahka community of Krausirpi as one of five researchers employed by the Harvard Institute for International Development (HIID) for a National Science Foundation-funded project (SBR-9417570). The project was designed to test a variety of hypotheses regarding the changing role of forest products in consumption and production as households become more 'market integrated'—that is, increasingly commercially involved with non-local actors and the national, monetized economy. In the study, location was used to proxy for time: researchers were placed in one of two

villages, one deemed more 'market integrated,' (and therefore representing a later 'stage' of integration) the other less so. In each village, 16 households were tracked closely with regard to members' time allocation, total household production, and cash income. In addition, community-level variables such as environmental conditions and endowments were measured using plant and animal transects, daily meteorological readings, and the keeping of a 'daily events' journal. Results were then compared across communities; some are described in Godoy *et al.* (2000c). In addition, another field effort was nested within the main study: in the summer of 1995, a separate HIID team conducted a one-shot socioeconomic survey of nearly all (88%) of Tawahka households (n=100). Results of this brief study are found in Godoy *et al.* (1996a, 1997a, 2000b).

Because I was not enrolled in a doctoral program prior to 1996, the work I conducted as an employee of HIID did not constitute dissertation fieldwork *per se*. I nevertheless term this period 'Phase I' of data collection because of the multiple ways in which the experience influenced and facilitated my later research. First, I became familiar with the regional geography and with local residents, and became competent in the regional *lingua franca*, Miskitu. I found language acquisition to be particularly important in understanding local peoples' perceptions of their environment and livelihoods. Most importantly, my proven long-term commitment to the region earned local people's respect, trust, and interest in subsequent work.

Second, through involvement in the HIID study I became familiar with a host of data-gathering techniques, which I later honed for dissertation research. These included the use of focus groups, individual interview styles, survey design, lengthy historical interview strategies, unobtrusive participant observation techniques, and forest sampling methods.

Third, all data collected for HIID between June 1994 and March 1996 were made available for my use by the Principal Investigators with few restrictions (see facsimile of agreement in Appendix I), including the results of the Reserve-wide survey of 1995. Among the data most useful to the current study are price data (1994-96), and detailed longitudinal data on cash income, agricultural production, forest

product extraction, and asset holdings. Data culled from this master HIID dataset will hereafter be referred to as "HIID data," and serve largely to inform the current study or to corroborate or cross-check my own findings.

Fifth, during the time that I was employed by HIID, I initiated independent projects that ultimately led to the dissertation research. For example, the detailed village census that I compiled in 1995 with the help of local collaborators and extended in 1996 provided an important benchmark for later demographic analyses. In addition, I began a detailed, Reserve-wide household survey in 1996 that served to update and extend HIID's initial 1995 survey, and laid the groundwork for subsequent household questionnaires.

Finally, the most resonant outcome of the HIID experience was to impress upon me the temporal variability of Tawahka livelihoods. I maintained residence in a Tawahka village for a full 22 months, with few breaks; during one period, I remained in the study village for eight months without leaving. By witnessing two calendar years of Tawahka life, the within-year and between-year fluctuations in wage opportunities, rainfall, harvests, game availability, household composition, and labour bottlenecks were illuminated for me, sometimes dramatically. Also, I witnessed individual household crises from their onset to their resolution, which offered an important window into coping strategies. My resultant longitudinal perspective on village life informs every part of this work.

Phase II

The backbone of the dissertation is formed by data I collected during Phase II, during which I spent nearly five months (late January to early June, 1998) in Tawahka territory and adjacent communities.¹¹ During this period, permission to conduct research and logistical support were provided by the Tawahka's political arm, FITH (*Federación Indígena Tawahka de Honduras*), and their fundraising arm, *Asociación Asang Launa* (Appendix II). This support included the use of a short-wave radio and

¹¹ Funding for fieldwork was provided by an IDRC Young Canadians Research Award, a FCAR *Stage* for Overseas Research, and a research grant from the Social Sciences and Humanities Research Grant Committee, McGill University.

improved access to river transportation. I also maintained contact with a regional NGO, MOPAWI (*Mosquitia Pawisa*), whose representatives provided further transportation assistance. During my fieldwork, I lived at all times in local homes, and conducted all interviews myself; assistants were used sparingly. The multiple data-gathering techniques I used are described in detail below.

Prior to the initiation of data collection, I had considered holding a meeting in each Tawahka community to explain the research program and obtain communal permission to conduct the research (beyond that already granted in writing by FITH). Following consultation with local peoples, however, I decided to instead solicit informants' permission on an individual basis.¹² I expressed my thanks both personally and communally; the latter by hosting a communal meal following termination of research in each Tawahka village.

Household Survey

Prior experience in the region had shown me that I could effectively use questionnaire-based interviews with household heads to solicit detailed information about household production strategies. I therefore developed a questionnaire prior to fieldwork, which I tested and restructured in the field (see Appendix III). I designed the questionnaire to elicit qualitative and quantitative information on productive activities, physical capital and land holdings, family composition, labour organization, and prior production experience. In addition to factual information, I also solicited information on households' wealth accumulation strategies and aspirations by using open-ended questions about hypothetical situations.

The sampling strategy was straightforward: to capture as many households as possible within the five Tawahka communities of the TABR. A household was considered 'Tawahka' if at least one of its heads spoke Tawahka, or had parents that

¹² The rationale for this decision was three-fold. First, communal meetings were deemed to serve only to raise community expectations about the potential economic rewards of the proposed work. Second, few villagers appeared willing to spare the time for a meeting, given a busy agricultural period and the large number of recent workshops and meetings called by a regional NGO. Finally, informants emphasized that my prior conduct in the region 'spoke louder than words,' and had cemented local trust in my purely scientific motives, thus assuring community cooperation.

did. Because the Honduran Tawahka are self-selecting regarding residence (i.e., no non-Tawahka families are allowed to settle in Tawahka communities), no further stratification was required. The sample does not include the 31+ adult Tawahka who have married 'out' of the Reserve over the past 20 years and formed households in Nicaragua and the Honduran department of Olancho.¹³ These households were excluded due to the prohibitive time and cost required to reach them, and because they face economic opportunities and constraints distinct from their TABR-dwelling coethnics, a fact that would have confounded data analysis. Tawahka households temporarily residing in the Honduran capital (Tegucigalpa) were interviewed, however, since they maintain homes within the TABR, and represent the group's "elite."

I conducted household interviews in Tawahka communities and in Tegucigalpa between February and late May, 1998. While traveling within the TABR, I was accompanied by a paid assistant, who also acted as cultural and linguistic interpreter. In total, I reached 116 households, or 88% of the 132 Tawahka households residing within the TABR at the time. Of the 16 that I missed, nine were away (visiting relatives, or in distant agricultural or wage pursuits), two had household heads who were seriously ill, three were unwilling/shy, and in one, the male household head was incarcerated. I nevertheless compiled basic demographic data on these households (family size, members' age and sex) from family or neighbours, meaning such data are complete for all Tawahka households residing, or based, in the TABR (n=132).

Because I personally conducted all interviews, inter-interviewer bias was eliminated. I held interviews in Spanish or Miskitu or both; each visit took about an hour (ranging from 20 minutes to three hours). First, I briefed respondents on the purpose of the questionnaire,¹⁴ and alleviated any concerns regarding anonymity. As a

¹³ These households should not be considered the "up-and-out" sector of the Tawahka population. In other words, they are not Tawahka whose departure from the community either arose from, or precipitated, significantly improved socioeconomic status. Rather, such moves were almost invariably instances of migration through marriage, to Miskito or *ladino* farmers.

¹⁴ Without exception, respondents showed little or no interest in knowing *why* they were being questioned. Indeed, they often dismissed my explanation by stating that we were friends, and friends help each other out, no matter what. Implicit in this generous approach to granting interviews, however, was the notion that at some later date I would be available to be asked for something in return, if a favour had not

rule, I interviewed male household heads first, since most questions concerned agriculture, extractive, and wage work, which are typically—but not exclusively—masculine domains. In most cases (70%), I found that a single interview was sufficient to complete the entire questionnaire. It was not uncommon, however, for men to defer to their spouses for some questions, particularly those regarding family, illness, and livestock. In such cases, I held a second interview at a later date with the female household head; 30% of households required two or more visits. The 13% of households headed by ‘solo’ women (n=15) required only one visit.

I made every effort to interview respondents alone and in a relaxed environment, in order to encourage thoughtful answers and because prior experience suggested that the most considered responses could only be obtained out of earshot of family and neighbours. In practice, however, I held few interviews under these ideal conditions. Women were often distracted by young children. Illness, loiterers, runaway fires, *locos*,¹⁵ sudden communal tasks, store clients, and drunkenness all interrupted interviews and compromised attention. Also, because agricultural demands were particularly heavy during the field season, respondents were occasionally tired and/or rushed while answering questions. I then used return visits to fill in blank responses or to clarify/expand answers. This process significantly lengthened the time required to complete interviews.

Also, not all informants answered all questions, usually due to poor recall of prior events (in such cases, respondents were encouraged to not answer rather than to ‘guess’ a response). Forgetfulness became more noticeable as the four-month interview period wore on. Detailed recall of specific events from the beginning of 1998 (e.g., labour arrangements during January bean planting) eroded noticeably among informants interviewed in May and June. One result is that although I

already preceded the interview. Such reciprocity often took the form of lending tools, medicines, or a gift of foodstuffs, usually coffee and sugar. No cash payments were ever made for an interview during the household survey.

¹⁵ Known in the regional language, Miskitu, as ‘*blah uplika*’, these are people who are considered to suffer from ancestral possession. At random times of day or evening, they may suffer ‘attacks’, manifested by running through the community with eyes closed, wielding and/or throwing axes, machetes, burning firewood, rocks, poles, etc. During such periods, which may last over an hour, villagers retreat into their

interviewed 116 households, subsets of data have different sample sizes, ranging from 99 to 116. Where such discrepancies might effect data interpretation, they are noted.

Oral History Interviews

To piece together an economic history of the Patuca basin from about 1920, I held interviews with older residents of the Mosquitia. The idea was to solicit personal stories, particularly relating to prior extractive eras, towards complementing the established economic history of the region with details specific to the Patuca River basin.

To facilitate the oral history interview process, I had assembled prior to fieldwork a 40+-page album of old photographs, maps, and drawings related to the history of the Mosquitia in general and the Patuca in particular. I had copied about half of the album's images from the primary literature, and half were personal photographs that I had acquired from prior visitors to the Patuca region.¹⁶ The images depict people, villages, prior technology (including propulsion of freight canoes before outboard motors), and past economic activities (including mahogany lumbering and jaguar trapping); sample pages of the album are reproduced in Appendix IV. I used this visual historic record to initiate discussion and jog memories. The technique proved highly successful by orienting discussion to desired themes, reconciling disparate dates and ages, and providing visual points of reference that clearly helped some elderly respondents focus their attention on particular eras. Use of the 'history album' had the added effect of facilitating impromptu intergenerational discussions that proved instructive to all (see Fig. 1.4). The album also helped to balance the one-sided nature of interview-based information acquisition by allowing me to offer informants something in return—in this case, images of their own past.

homes to avoid serious injury. Any physical damages inflicted by a *loco*, however, are not considered the responsibility of the *loco*, who faces no communal reprisals when in remission or cured.

¹⁶ I am particularly grateful to Fernando Cruz Sandoval of Tegucigalpa, and William Adams of Eastern Kentucky University, for sharing with me their personal photographs and slides of the Patuca's people and places, taken in 1977 and 1969-1972, respectively.



Fig. 1.4 Miskito villagers reviewing and discussing the 'history album,' Wampusirpi, Río Patuca, February 1998. Photograph by the author.

In all, I conducted 32½ hours of interviews with 24 informants at various locations in Honduras (see Appendix V). I held the interviews in Spanish, Miskitu, and English, tape-recorded or videotaped them, and transcribed them within a few days. My original aim had been to interview across all social, ethnic, and economic strata, from North American entrepreneurs/ adventurers, to *mestizo*¹⁷ and Miskito¹⁸ traders and Tawahka producers. Not surprisingly, the former proved extremely difficult to locate, having moved or passed away. Thus, this dissertation's historical sections resound largely with Tawahka and Miskito voices, trading a more comprehensive peoples' history for detailed local interpretation of economic episodes.

Structured oral history interviews were not the only source of first-hand historical information. Relevant historical data also emerged during household surveys, from 'economic' interviews, and in the course of everyday discussion. In all cases, I made every effort to transcribe comments *verbatim* in my fieldnotes. Indeed, throughout the dissertation I reference *any* data obtained through formal or informal interaction by the subjects' initials (e.g., FG; HM). I avoid full names in the interests of privacy.

'Focused' Interviews

In order to garner specific information about contemporary pricing, trade, family genealogies, agricultural strategies, and extractive techniques, I conducted a dozen structured interviews with traders, shopkeepers, forest extractors, and village elders. Interviews with these 'key informants' were intended to solicit in-depth information on specific themes. For example, two were conducted in a 'focus group' setting in which three informants were asked to confer about prices. Also, in an effort to better understand the evolution and spatial distribution of Tawahka landholdings, I

¹⁷ *Mestizo* refers to a person of mixed Iberian and indigenous descent. Much of the Honduran population considers itself *mestizo*. In eastern Honduras, the local term for *mestizo* is *ladino*, and typically refers to persons with no indigenous identity.

¹⁸ The Miskito are the indigenous majority in the Honduran Mosquitia, and reside downriver (coastward) of Tawahka settlement. In keeping with Helms (1971, 1995), Nietschmann (1973, 1997), and Herlihy (1993, 1997), I use Miskito, rather than Miskitu (see Offen 1999), although I use the latter in reference to the group's language, which is the *lingua franca* of the region.

interviewed five subsistence farmers on separate days in order to visit and map their agricultural plots. In about half of all such interviews, I paid respondents for their time in order to ensure minimal distraction, and to compensate them for time lost during a busy agricultural period.

Archival & Library Research

In Honduras and in North America, I obtained or reviewed primary materials relevant to the history and economy of the Patuca basin. In Honduras, I consulted national economic indicators and some travelers' accounts at the *Banco Central de Honduras*; topographic maps of the study region were purchased from the *Instituto Geográfico Nacional* in Tegucigalpa; thematic vegetation maps and reports of 1980s-era reforestation projects were obtained at COHDEFOR (the national forestry service) offices in Tegucigalpa and La Ceiba. I obtained ethnographic reports and photographs of the Tawahka region circa 1977 directly from former staff of the *Instituto Hondureño de Antropología e Historia*. Unfortunately, I was unable to profitably consult the holdings of the *Archivo Nacional* in Tegucigalpa in early 1998 because water damage and renovation had resulted in near-total archival disarray.

Before and after fieldwork in Honduras, North American repositories yielded much useful historical data, largely in the form of first-hand travelers' accounts covering almost three centuries (ca. 1680 to 1950). Many of these materials were available through interlibrary loan at McGill University. I consulted others at Harvard University's Bancroft Library, and at the Benson Latin American Collection of the University of Texas at Austin.

Participant Observation

Whenever possible during fieldwork, I accompanied Tawahka and others during extractive, agricultural, and other activities. These activities included a ten-day canoe-making expedition with four others to the edge of Tawahka territory (see McSweeney 1999), as well as multiple one-day trips to fish, hunt, do agricultural tasks,

or extract forest products such as honey and thatch. In reaching and exiting the TABR by dugout canoe, I traveled the full length of the Patuca River. Because I was not accompanied by other foreigners at these times, my cultural immersion was near-thorough, providing ample opportunity to observe Tawahka livelihoods, regional geography, and talk with local peoples. The resultant field notes, photographs, and 8+ hours of video footage inform all data interpretation.

During the field season, I was also invited to participate in several organizational and political fora, both in Tegucigalpa and in the TABR. These included a workshop regarding the zoning of the adjacent Río Plátano Biosphere Reserve (BRP), a related five-day educational mission involving outreach along the Patuca River to the southernmost edge of the TABR, and a one-day round table discussion designed to clarify the status of the proposed “Patuca II” hydroelectric project. In all cases, I acted as impartial observer, although affiliation with the Tawahka and their concerns was commonly inferred. Participation in such events was strongly instrumental to my improved understanding of conservation and development issues affecting the Tawahka, and their reaction to them.

Other Data Collection

While in the field, I also gathered data on an opportunistic basis. Although tangentially related to the main research questions, these data were often summoned in support of, or to contextualize, the dissertation’s findings. For example, maps made of each community in 1998 later proved useful in understanding patterns of labour sharing amongst villagers; a land-use map made during a trip down the upper Patuca was consulted in the writing of Chapter Two (see Appendix VI). Consumer prices surveyed in Honduran city supermarkets are usefully compared against concurrent prices in the TABR; and GPS readings taken at different extractive sites helped to confirm Tawahka claims of the extent of their extractive activities.

Data Analysis and Data Sharing

I initially analyzed Phase II data in Montreal between June 1998 and September 1999; I organized quantitative data in an Excel spreadsheet program and ran descriptive and inferential statistics in a STATA statistical package. Initial analyses were conducted in 1998, and more rigorous statistical analysis from early 1999 on. Qualitative data were transcribed, organized, and interpreted concurrently.

At every opportunity, I have shared synthesized survey data with the Tawahka. I submitted a complete census of the TABR to the *Asociación Asang Launa* in 1998, and sent multiple copies of my publication (McSweeney 1999) to individuals and to FITH. The map I made of the Upper Patuca (see Appendix VI) was made available on the Internet, and copies sent to FITH. Village maps and basic agricultural statistics that I had compiled in early 1998 also formed part of proposal for long-term assistance to the Tawahka in the wake of Hurricane Mitch in late October 1998.

1.5 A Closer Look at 'Household-Level' Analysis

The term "household" has appeared repeatedly in the preceding text in reference to the unit at which I collected and analyzed the project's economic data. Here I define the term, describe a typical Tawahka household, and offer a critique of household-level analyses. The latter is intended to qualify those findings that are based on household-level sampling.

Definition

A "household" is composed of all those sharing a common hearth, regardless of the number of nuclear families or dwellings (in 1998, 8% of Tawahka households comprised more than one dwelling). In rural Latin America, a household typically includes a nuclear family (parents and children) and some 'extended' members such as grandparents or the families of married children, forming what de Vos (1995) calls "the complex household." In the context of peasant economies, the household is considered a social unit engaged in both production and consumption. As an

enterprise with a dual function, it is assumed to rely largely on internal labour, and to pool income and assets towards the common goals of producing food, reducing risks, providing for future needs and desires, and meeting social and political obligations (Ellis 1993; Schelhas 1996a; Upton 1996).

For these reasons, most microeconomic studies of rural populations are typically undertaken at the household-level; this analytical scale has also been applied, usually uncritically, in recent microeconomic studies of forest-dwelling indigenous societies (e.g., Henrich 1997; Santos *et al.* 1997; Simmons 1997; Godoy *et al.* 1998c). Because Tawahka also organize socially—at least at one level—in households, I chose to use this unit of analysis for this study, thus facilitating comparison with other rural populations.

The Tawahka Household

What constitutes the average Tawahka household? Arguably, there is no *average* household, but to frame subsequent discussion I describe one here using data collected during 1998's survey (summarized in Table 1.1). These data reveal that a visitor entering a typical Tawahka household's kitchen area at mealtime would likely find eight people assembled, four male and four female. About three would be adults between 15 and 64 years old. About four people would be under 15, half of whom would be children under five, requiring constant minding. One in ten households would include a member over 64 years; one in three would have a member absent, studying outside the TABR. Households in Parawas would be notably smaller than those in other Tawahka communities because this community was founded relatively recently.

In 1998, the majority of Tawahka households (67%) were formed of a nuclear family: one couple and their children. Fifteen households (13%) were headed by single women living with their children (in the three cases where a man was polygamous, I considered one of his wives single). But almost 20% included two or more nuclear families, usually an elder 'head' couple and their married children. Male household heads, however, had more children than female heads, either due to a

Table 1.1. Tawahka household characteristics, May 1998.

		Mean	Median	Range		n
				(min)	(max)	
Household Characteristics						
No. individuals/hhld	All	7.8	7	2	18	132
	Krausirpi	8	7	3	18	78
	Krautara	8.3	8	2	16	13
	Yapuwás	8.1	8	4	13	15
	Kamakásna	8.1	8	4	16	12
	Parawas	5.8	6	3	10	11
	Tegucigalpa	4	4	3	5	3
No. male workers (15-64 yrs)		1.6	1	0	6	132
No. female workers (15-64 yrs)		1.7	1	0	5	132
No. dependents < 5 yrs		1.75	2	0	5	132
No. dependents 5-14 yrs		2.63	3	0	7	132
No. dependents ≥ 65 yrs		0.1	0	0	2	132
No. couples (w/ or w/o children)		1.1	1	0	3	132
No. single mothers/widows		0.4	0	0	3	132
Max. education, all > 14 yrs		3.15	3	0	10	116
No. away studying, 1997		0.34	0	0	3	132
No. away studying, 1998		0.35	0	0	3	132
Characteristics of Male & Female Household Heads						
	Age, male	38.7	36	21	78	108
	Age, female	34.2	31	16	76	131
	Yrs resided in village, male	25.5	26	4	65	108
	Yrs resided in village, female	25.6	26	2	71	128
	Max. yrs education, male	3.2	3	0	12	100
	Max. yrs education, female	2.6	2	0	9	116
	Total living children, male	6.1	6	0	17	108
	Total living children, female	5.5	5	0	12	131
Tawahka language ability						
		male		female		
		n	%	n	%	
	mother tongue	20	17.7	13	9.9	
	learned; proficient	70	62	94	71.8	
	understands	9	8	11	8.4	
	no knowledge	14	12.4	14	9.9	
		113		131		
Where household head born						
		male		female		
		n	%	n	%	
	current village	56	51.8	85	64.4	
	Tawahka territory	24	22.22	21	16	
	elsewhere, Honduras	21	19.4	17	12.9	
	Nicaragua	7	6.5	9	6.8	
		108		132		

Source: Household survey, 1998.

previous marriage (male heads are typically older than their wives) or previous/ongoing liaisons.

In 1998, Tawahka male household heads were about 39 years old, had resided in their current village for about 25 years, had 3.2 years of completed formal education; three quarters of them were born in Tawahka territory and 80% spoke Tawahka either as their mother tongue or as a second language. Solo, female household heads were about five years younger than their male counterparts and had 0.6 fewer years of education. More female than male heads were born in Tawahka territory (80% vs. 75%), but the same proportion spoke Tawahka as a first or second language.

Intercultural Comparison

Tawahka households appear little different from those of neotropical forest peasants (*mestizo* or indigenous) elsewhere. A cursory review of several recent studies (Coomes 1992; Dodds 1994; Godoy *et al.* 1995; Godoy and Franks 1995; Pichón 1997; Coomes *et al.* 1998; Pattanayak and Sills 1999; Chanthaboune 2000) reveals the following. Tawahka households are consistently larger, by at least one individual, than those of Nicaraguan Mayangna, Honduran Miskito, Bolivian Mojeño and Yuracaré, and Peruvian or Brazilian *mestizos*. Despite larger household size, however, Tawahka households contain *fewer* adults of working age (15-64 years): 2.3 compared with 3.0 among Peruvian *mestizos* (Chanthaboune 2000). This finding will be revisited later in the dissertation due to its implications for Tawahka labour organization.

The mean age of the household head is remarkably consistent across studies, at about 40 years, but the Tawahka have a relatively high proportion of households headed by single women. Tawahka heads are little better educated than their counterparts elsewhere. Finally, Tawahka villages range in age from five to about 50 years, which is consistent with other studied populations. In fact, like many indigenous groups (e.g., Henrich 1997; Santos *et al.* 1997), the Tawahka have only settled in permanent villages within the past half-century. But a far greater share of Tawahka heads were born in their community than among their Peruvian *mestizo* counterparts.

This suggests that despite comparable village ages, Tawahka appear more likely to remain in their communities once established; low migration rates appear to bear this out (see Chapter Two).

Critique of Household-level Sampling

The Tawahka's overall parity with other neotropical forest households suggests household-level analysis to be a useful comparative tool and one that might be appropriately applied in a study of commercial forest reliance. Yet the drawbacks of a household-level approach became apparent to me early in fieldwork among the Tawahka, some of which were anticipated by the peasant economy literature (e.g., Wilk 1989; Katz 1991; Ellis 1993; Netting 1993; Doss 1996; Upton 1996).¹⁹ I review the most salient here, and describe their mitigation in subsequent data analysis.

Dynamism through Time

Researchers usually conduct household-level sampling for microeconomic studies once, over a large sample population. But when households are tracked over time, as in this study, fluctuations in household composition pose difficulties. For example, of the 132 Tawahka households on which I collected demographic data in 1998, 48% had undergone significant change (i.e., beyond births/deaths) since the 1996 sampling. Changes included household fission (usually married children leaving to form their own household), fusion (usually children separated from spouses returning home), or the loss or gain of a productive adult (by marriage, migration, or 'loan' to relatives).

Such demographic fluctuations can complicate data interpretation by blurring the reasons for, and implications of, household change experienced in an intercensal period. For example, a household that experienced a significant loss in wealth holdings between 1996 and 1998 may also have fissioned in that time. Does the

¹⁹ Wilk (1989:27) states, for example, "the slippery and insubstantial nature of many households leads many to question its corporate nature and its usefulness as a unit of analysis."

wealth differential, then, represent sell-off in the face of calamity or merely the division of assets between two nuclear families?

Gender Issues

In peasant economics, it is generally assumed that all household members act altruistically, pooling income, labour, and capital towards the common household good. But feminist critiques of the household argue that by ignoring *who* earns and controls income, and who makes decisions regarding productive activities, this “black-box” approach misses the very different outcomes that arise when the earner/spender is a man or a woman (Poats *et al.* 1989; Ellis 1993). For example, “we can expect women’s ‘utility’ to be much more oriented toward collective goods and men’s towards personal goods” (Katz 1991:42).

This is certainly so among the Tawahka. By their own admission, Tawahka men are likely to ‘squander’²⁰—usually in drink or fashionable clothes—hard-earned cash income (EA; CC; SO; ES2). Conversely, small amounts of money earned by women are more commonly spent on purchased food, school supplies, and medicines, and so are more likely to correlate to such indicators of household well-being as lowered infant mortality, children’s educational attainment, and lowered morbidity (EA; CH). Similarly, Tawahka acknowledge that by “gendering” asset ownership they can influence capital gains. For example, they recognize that female control over livestock leads to fewer sell-offs of animals to generate “quick cash,” thus serving households’ long-term needs better than male-owned beasts (CH). For this reason, calves are more commonly given to female children.

The following passage illustrates both propensities, in which an older Tawahka man explains why he has little to show for the substantial sums earned during a “boom” time in the 1970s:

²⁰ Drinking bouts may in fact serve to invest market earnings socially; what appears to be ‘squander’ can later translate into significant social capital. This certainly occurs in relatively ritualized, ceremonial drinking bouts and gift-giving sprees within communities. It is a less likely interpretation of drinking bouts, however, when drink is consumed in distant villages (as Tawahka men commonly do), although such behaviour may serve to strengthen *long-distance* social networks.

Ah, yes [it was good business]! There were times: 500, 1500, 4000 [Lempiras]—in your pocket! But I was like this—ask my wife: I worked until three [p.m.], then I'd go and bathe, change my pants—and drink. All night. I wasted 1,000 Lempiras a night, 1,000 Lempiras! So—I was bad. [So] she [his wife] looked after the money. But when I'm drinking—anything—down to a chicken—I'll sell it (ES2; Krausirpi, March 1998, *transl.*).

Such behaviour is cited by single Tawahka women as a reason to remain unattached; they point out that community support for single mothers is markedly greater than for women with lazy, sick, or even absent husbands (EA; JG; BR). The effectiveness of the social safety net, then, may help to explain the relatively high number of Tawahka households headed by single women.

Another way in which gender issues affect the usefulness of the 'household' as an analytical unit is through the propensity of Tawahka men to have children outside of their primary union. Such children typically reside with their mother, but make economic demands on their father in the form of money, food, and firewood. The result is a transfer of the male head's labour and resources from one household to another; his household's productivity, then, does not necessarily accrue wholly to the household in which he resides. In contrast, a woman's children from a previous marriage or liaison typically reside with her, and become productive members of her household.

Two Households in One

Among the Tawahka, it is common for boys, from about the age of 12, to start accumulating and managing their own land, under their father's supervision. Similarly, girls begin to accumulate their own fruit trees, chickens, and other livestock. Indeed, every item in the household wealth portfolio has a specific owner, from spoons to chicks. To an outsider, the identification of even the most seemingly trifling items as "mine" or "so-and-so's" rather than "ours" appears remarkable. Parents are constantly chastising their children for reaching for another person's possessions ("*Upla dukia!*"), and one often hears accusations of theft *within* a household. Although it is beyond the scope of this dissertation to speculate on the reasons for this extreme individualization of asset ownership, one outcome of the phenomenon is that by the

time children marry, their asset independence is often complete, regardless of where they are living. In other words, a son-in-law may be effectively functioning as a separate economic unit from the in-laws with whom he lives.

Where household-level analyses attempt to elucidate patterns of production with capital holdings, then, relationships are likely to be blurred for such two-in-one households, which represent some 20% of this study's households.

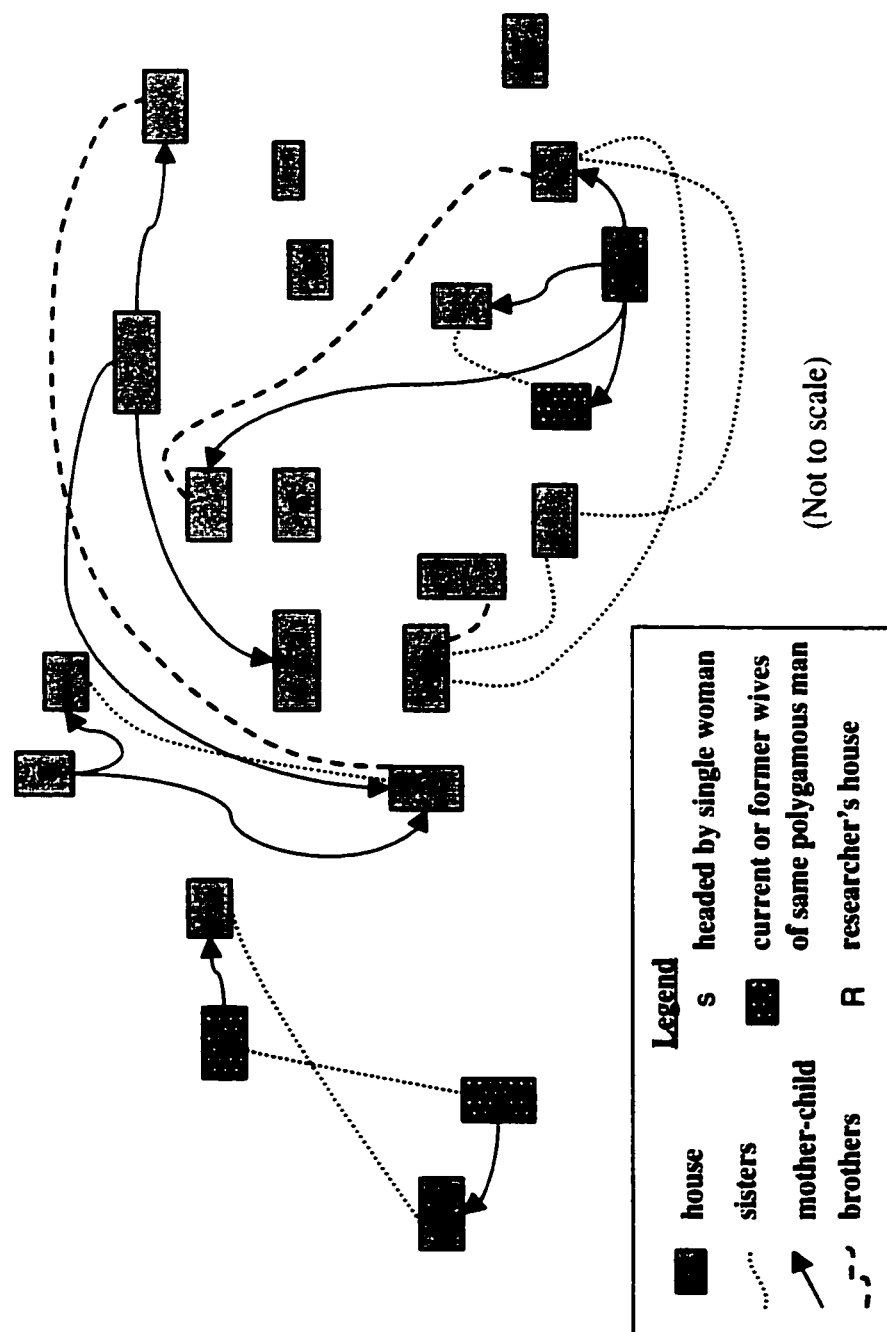
Household versus Larger Social Groups

Household-level analyses are typically applied to rural Latin American populations in the cultural context of the majority *mestizo* peasant. Such households are typically patrilocal; in recently settled areas or among highly migratory populations, such households may be geographically isolated from both kin and neighbour (e.g., Pichón 1997).

Indigenous populations (including *ribereños* and *caboclos* of the Amazon) do not necessarily conform to this pattern. They are more likely to settle in tight-knit communities, typically composed of two or more kin groups (see Dodds 1994; Chibnik and de Jong 1989). Thus, although household composition may be fluid, kin boundaries are clearly defined by culture and geography. Where labour is shared among the kin group, household demography may be a poor correlate of labour availability and related land use (Bedoya 1995); food sharing among kin also smoothes consumption among households. Also, the Tawahka, like the Miskito and other groups, are typically matrilocal, or at least ambilocal (Dodds 1994). This means that women are more often surrounded by, rather than isolated from, supportive female kin. Shared childcare is one way such organization can free women's time for economic pursuits. If analysis does not recognize such extra-household assistance, the economic performance of, say, the 13% of Tawahka households headed by single women may be poorly predicted by her individual household's composition.

Some of these types of inter-household relationships are graphically shown in Fig. 1.5, through a stylized rendering of my 'neighbourhood' in Krausirpi, ca. 1996. The figure illustrates only a few of the multiple kinship links by which labour is shared

Fig. 1.5 Inter-household ties affecting access to labour for Krausirpi 'neighbourhood,' TABR, Honduras, ca. 1996.



among households, as are food, tools, and other goods. Nevertheless, no clear pattern of kinship 'camps' emerges such as Helms (1971) was able to show for the Miskito. Rather, the diagram serves mainly to illustrate that although households appear as discrete units on the landscape, they may act more as open systems with regard to labour.

In sum, then, I have outlined the various ways in which the household is a problematic unit of analysis in forest peasant contexts. How can this evidence be reconciled with the use of household-level analysis in this dissertation? Rather than reject the use of the household outright, I used several techniques in the design of the survey questionnaire to mitigate the methodology's shortcomings. First, I minimized temporal inconsistencies by collecting household composition by name, which meant that I could trace individuals to their corresponding 1996 household "address." Second, I asked informants to identify the particular owner of selected household assets (land, trees, cattle, and firearms), as well as to estimate asset age, so I might retroactively assign their holdings to the appropriate 1996 household. This strategy compensated in part for the "two-in-one" problem. Where such strategies proved impossible, I conducted analyses solely with the 52% of households that had experienced only natural growth over the study period. Third, the household does not constitute the dissertation's only analytical focus. Data collected at other scales (individual, community) can corroborate, refute, or qualify the analysis of household-level data. For example, in-depth, personal interviews with individual household members serves to tease out the personal reasons behind, say, activity choice, from those identified at the household level.

Finally, because I collected asset and income data at the level of the individual (as suggested by Katz 1991) but summed to household, the gender of earner and owner is known, and so may qualitatively inform data interpretation. Similarly, kin ascription for all households is known through family genealogies and village maps. Thus, where household labour appears a poor predictor of production orientation, qualitative and quantitative measures of the social capital held in kin (such as brothers or grown children) can be incorporated into analyses.

In sum, then, this dissertation scales much of its empirical focus to the household level because of the conceptual clarity of this economic unit, which offers a practical framework to orient analysis and compare findings across studies. Nevertheless, I cast a critical eye on the household from the outset; its success as a unit of analysis in this study will be revisited in the Conclusion.

1.6 Organization of the Dissertation

This dissertation is composed of five empirically grounded, stand-alone chapters. Strong connecting threads nevertheless tie the different chapters into a comprehensive whole: all respond to some facet of the research question and rely on a common data set. Segues and links between chapters are made explicit.

Chapter Two describes the study region using ‘thick description’ to erect a detailed backdrop against which to frame and contextualize later findings. I pay particular attention to themes with a direct bearing on Tawahka livelihoods, including environmental parameters, subsistence and market systems, and characteristics of the local population. This chapter also acts as an effective literature review on the state of knowledge on the Tawahka today. Chapter Three then initiates the empirical ‘heart’ of the dissertation (Chapters Three to Six), by drawing from survey data to quantify and interpret summary statistics regarding Tawahka households’ use and reliance on commercial extractivism *vis-à-vis* other market activity choices. Chapter Four then seeks to reveal the determinant factors of Tawahka production patterns: that is, which households are most likely to turn to commercial extractivism, both now and over time? I orient analysis and discussion of results within prevailing debates regarding the nature of peasant off/non-farm diversification, and review the implications of such activities for natural resource use.

Chapters Five and Six are twinned in their focus on one particular forest product: the dugout canoe. The purpose of these chapters is to move from generic discussion of “forest products” to instead focus on the minutiae of commercial production of one forest product in particular. Essentially, these chapters illustrate

how the broad economic processes and social framework within which commercial forest extractivism occurs are specifically rendered in the case of one good. Chapter Five therefore ‘introduces’ the dugout canoe in the Mosquitia context, highlighting the canoe’s role as a productive asset to local peoples as well as the details of canoe manufacture. Chapter Six then focuses on the canoe as a trade item: first, by drawing on historical sources to recreate the canoe trade in the Mosquitia from about 1700-1900. Then, the geographical lens of the analysis focuses specifically on the Patuca basin, where Tawahka involvement in the canoe trade is described and analyzed.

Finally, the Conclusion in Chapter Seven summarizes the dissertation’s main findings in the form of specific themes, and the contribution of each to the dissertation’s original tripartite research question is laid out. I then review the broader implications of the research to ongoing conservation and development initiatives in the Mosquitia and elsewhere in the neotropics.

CHAPTER TWO

Cultural Ecology of Honduras' Tawahka Sumu

This chapter describes the cultural ecology of Honduras' Tawahka Sumu, and is intended to contextualize later chapters by outlining the environmental, historic, economic, and demographic context in which the Tawahka made livelihood decisions at the end of the 20th century. In particular, the discussion: a) highlights the risks and uncertainties that Tawahka weighed in determining their productive activities; b) illuminates the forest's role in all aspects of livelihoods; c) introduces elements of physical capital and identifies the basic rationale behind investment decisions; and d) emphasizes the richness of Tawahka experience while at the same time illuminating the unprecedented nature of some of the situations they face today. Also, comparisons are made with other Central and South American forest peoples to better place the Tawahka in their neotropical context. The discussion draws from my own observations and findings but also reviews previous research conducted in the Mosquitia and on Honduras' Tawahka Sumu. Where interview data are used, the Tawahka source is identified by his/her initials.

2.1 Ethnohistoric and Political Context

History and Settlement

The 2,300 km² Tawahka Asangni Biosphere Reserve (TABR) is centered close to 15°N, 85°W in eastern Honduras, abutting the Nicaraguan border and lying some 100-150 km inland from Honduras' northern Caribbean coast (see Fig. 1.3). The TABR lies within a region known as "La Mosquitia," or "The Mosquito Coast," terms that refer loosely to the coastal plain shared between Honduras and Nicaragua. The Mosquitia lowlands are flat, lagoon-pocked, and covered primarily in pine. Although "Mosquitia" has biophysical connotations, the term more commonly alludes to a geographically broader culture area: that part of Nicaragua's and/or Honduras' Atlantic slope in which indigenous, rather than Hispanic (*mestizo*, or *ladino*) culture dominates. Thus although

the Tawahka reside in an upland habitat distinct from their Miskito neighbours, they consider themselves members of a common, international indigenous region distinct in Central America.

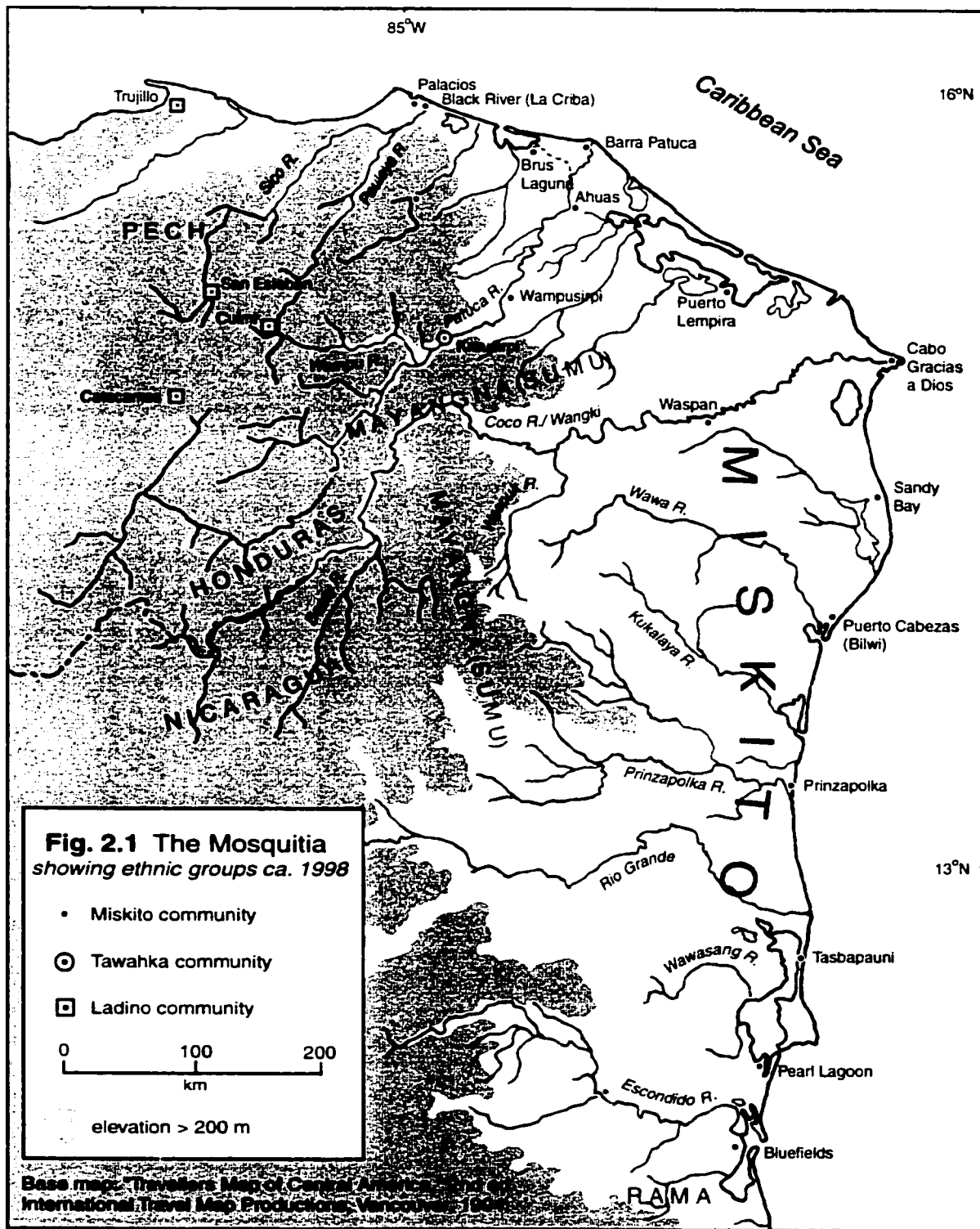
In fact, the Mosquitia derives its name from the Miskito Indians, who have historically been the dominant people along the Honduras' and Nicaragua's littoral. A 'contact' culture, the Miskito arose during the 1600s (Helms 1983; Offen 1999).¹ Their name likely derived from *musquet*, and it was owing in part to their acquisition of firearms from buccaneers in the mid-to-late 17th century that they came to dominate the original natives of the region, including Sumu (Mayangna) sub-groups,² Pech, and Rama (Dampier 1927; Helms 1971; Newson 1986). By the mid-1700s, 'Mosquito Coast' denoted the area of Miskito settlement bounded by Honduras' Black River to the north and Nicaragua's Escondido River to the south (Bell 1862; DeKalb 1893; Helms 1971; Newson 1986; Offen 1999). While the Miskito settled the coast and some inland rivers, their decimated co-indigenes moved increasingly inland over time, usually settling where uplands or rapids isolated them from Miskito slaving and other depredation (W. 1732; Uring 1928[1726]; Roberts 1827;); this cultural distribution remains today (Fig. 2.1).

The Tawahka in Honduras are part of a subgroup of Mayangna, or Sumu, a Misumalpan-speaking people of whom the majority live in Nicaragua (Herlihy 1995; Stocks 1996).³ The Honduran Tawahka were historically forager-horticulturalists who lived in mobile kin groups (Conzemius 1932; Newson 1986). First contact about 1604 (Davidson and Cruz 1995) initiated their decline and depopulation: throughout the 17th century they were brutally treated by Spanish missionaries based to the southwest (W. 1732:286; Wright 1808:24; Newson 1986), and appear to have been among the native groups killed or enslaved by the Miskito (W. 1732:288; Roberts 1827:116; Helms 1983).

¹ The Miskito likely formed through ethnic admixture of a native indigenous group, probably the Bawihka Sumu (Newson 1986) with escaped African slaves and European pirates and traders (see also Offen 1999).

² Sumu subgroups include the Ulwa, Panamahka, Kukra, Tawahka, and Bawihka (see Conzemius 1938; Herlihy 1995; Offen 1999).

³ Another group of Tawahka in Nicaragua probably arose after splitting from the Río Patuca Tawahka in the mid 19th century (Conzemius 1938; Herlihy 1995). The two groups are now effectively separated by distance, a distinct recent history, and only barely mutually intelligible language (CC; ES). Honduran Tawahka are generally unaware of coethnics in Nicaragua.



During the 18th century and well into the 19th century the Tawahka were subjected to forced labour and demands of tribute under the Miskito (Roberts 1827:116; Young 1842:81,87; Bell 1862), which disrupted subsistence patterns and fragmented the population.⁴ During the first half of the 20th century, harassment by well-armed *ladino* 'authorities' and gold seekers caused families to flee and villages to relocate (Cruz and Benitez 1994:302,312).

European disease also took its toll on Tawahka numbers. The first record to specify Tawahka deaths from 'foreign' disease comes from the late 1830s (Young 1842:87). By the early 1920s, Harrower (1925:48) found the Honduran Tawahka "terribly degenerated, and disease is playing havoc with them." Tawahka elders corroborate: they describe a time, perhaps in the 1930s, when villagers died daily from disease (see Calix and Cruz 1977; Cruz and Benitez 1994:303,312; Cahn 1996).

Toponymic evidence reviewed by Davidson and Cruz (1995) suggests that the Honduran Tawahka historically ranged over a wide area. But the consolidation of the traditionally peripatetic population was initiated in the late 1910s, when a Honduran government-funded school opened briefly on the Río Wampú (Martínez 1980). In the 1940s, settlement clustered around *bodegas*, or storehouses, when rubber was extracted from the region (Cruz and Benitez 1994; CC). Permanent settlement at Krausirpi was initiated with the construction of a government school there in 1958. Indeed, the desire to educate their children is one of the most important factors in the Tawahka's increasing sedentization in villages since the 1950s (Calix and Cruz 1977). Also influential was the need to maintain residence near fixed plots to accommodate the constant labour required for rice and bean cultivation, which became increasingly important in Tawahka subsistence and market production after the 1940s (von Hagen 1940; Adams 1972; CC; RS). In the 1980s, penetration of the Tawahka homeland by *ladino* agricultural colonists inspired the Tawahka Federation, FITH, to bring scattered Tawahka households (mainly from the Río Blanco and Río Cuyamel) within the politically defensible 'Tawahka

⁴ For example, a group of Tawahka men who were captured by the Miskito and brought to distant Black River seem to have either died or remained stranded there (Young 1842:87; Wood 1840:51). Also, in the mid 19th century, Conzemius (1938:938) claims that problems with Miskito caused large number of Tawahka to leave Honduras permanently for Nicaragua.

Reserve,' leading to the founding of new settlements (see Herlihy 1993, 1997; Cruz and Benitez 1994). By 1998, the Honduran Tawahka were settled in five permanent communities along the mid-Río Patuca (see Fig. 2.2).⁵ Characteristics of each community that are pertinent to subsequent discussion and analysis are summarized in Table 2.1.

Political Context

Today, the Honduran and Nicaraguan portions of the Mosquitia are divided by the Coco River.⁶ The Nicaraguan portion until recently had been politically encompassed by the Department of Zelaya Norte, but since 1986 has been divided into two indigenous-run autonomous political regions, RAAN and RAAS (Stocks 1998). The Honduran Mosquitia has, since 1957, corresponded roughly to the limits of the *Departamento de Gracias a Dios*, but the Tawahka homeland, and other indigenous zones, also overlap with portions of Olancho and Colón departments (see Fig. 1.3). The Honduran Mosquitia is inhabited by Miskito, Garífuna, Pech, Tawahka Sumu, and *ladinos*; Tawahka territory lies at the region's southeastern edge.

Within Honduras, the Mosquitia is a world apart. The region is unique in its dominant indigenous cultural ascription and language; no roads connect the Mosquitia to the rest of the country. Gracias a Dios is Honduras' most thinly populated department: it encompasses 15% of the national area but less than 1% of its population. Gracias a Dios is the only Honduran department without all-weather roads, and there is no state-maintained electricity or running water beyond the department capital (Canales 1998). To non-resident, *mestizo* Hondurans, the Mosquitia is alternately viewed as a wild, lawless place, where cholera is rampant and drug-trafficking the norm, or is perceived as a national storehouse of vast hydroelectric potential, where mahogany, gold,

⁵ In 1996, four households previously from Kamakasna formed a potentially sixth community, a satellite settlement upriver, which they named Parawasito. As of early 1998, they were still living there. Reconstruction following the devastation of Hurricane Mitch in late 1998 has since altered the location of upriver Tawahka communities, but probably not their number.

⁶ The Río Coco forms part of the border between Nicaragua and Honduras. The river is still occasionally mapped by its colonial name, Segovia. Among residents of the Mosquitia it is known as 'Wangki' from which was anglicized 'Wanks,' or 'Huancs,' which also appear on some maps.

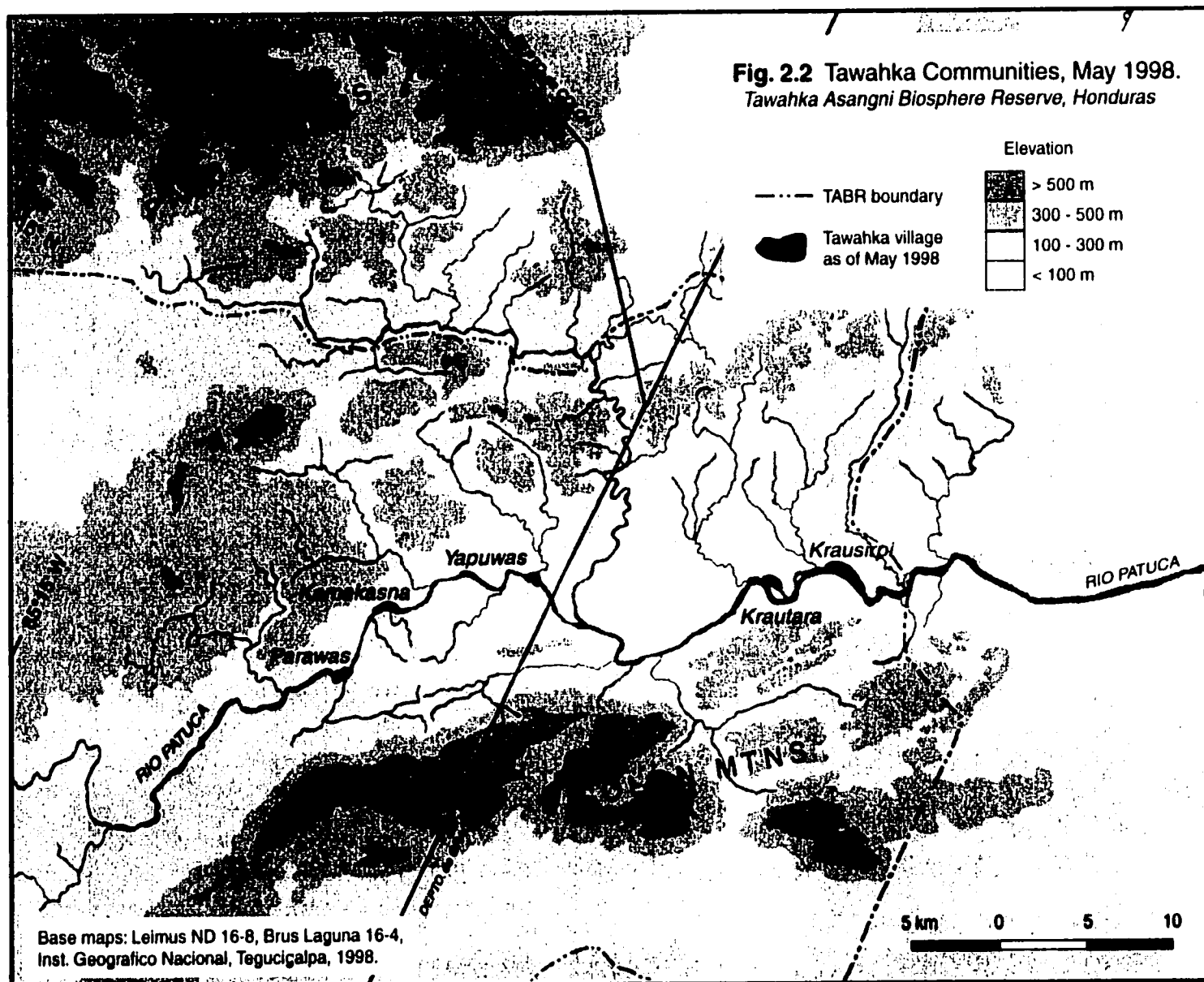


Table. 2.1 Tawahka community characteristics, May 1998.

	Krausirpi	Krautara	Yapuwas	Kamakasna	Parawas
'Feeder' settlements ¹	Sikiapihini, Dimikian	Wangkibila, Comandancia	Dimikian, Pautarbusna	Dimikian, Kungkungwas	Wasparasni, Rio Blanco
Approx. date of founding ¹	1958	1950	1930, 1988	1980	1988
Population, 1972 ²	115	24	18	-	-
Population, May 1998 ³	624	108	122	98	64
Share of TABR population ³	61%	10.5%	11.8%	9.5%	6.2%
No. households ³	78	13	15	12	11
Share of households interviewed	87%	92.3%	80%	67%	55%
Individuals/household ³	8	8.3	8.1	8.1	5.8
Languages most spoken ⁴	Miskitu, Tawahka	Miskitu, Tawahka	Tawahka	Spanish, Tawahka	Tawahka, Spanish
Date of first school ¹	1958	1982	1976 (1993)	1993	1993
School with teacher, May 1998 ⁴	yes	no	no	no	no
Max. education in yrs, adults (≥ 15 yrs) ³	4.1	4.3	1.9	0.9	0.8
No. stores operating ⁴	6	2	1 nearby	0	1
Staffed health clinic ⁴	yes	no	no	no	no
Source of drinking water ⁴	stream	pipd from stream	stream	stream	spring
No. outhouses ⁴	8	5	1	0	0
Time to municipal centre, Wampusirpi ⁴	5 hours	6 hours	8 hours	10 hours	11 hours
No. outboard motors ⁴	3	1	0	0	0
No. free-range cattle / pigs ⁴	81 / 31	29 / 23	12 / 12	8 / 3	0 / 14
Av. lowland holdings/household (ha) ⁴	7.0	12.6	1.4	5.3	2.3

Sources:¹ Calix and Cruz (1977); Cruz and Benitez (1994); 'Feeder' settlements refers to prior residence of founders; dual date reflects displacement, resettlement.² Adams (1972).³ Population census (see McSweeney 2000) and household survey, 1998.⁴ Field notes and household survey, 1998; distance to Wampusirpi measured downstream, by paddle, in the dry season.

fish, game, and, most importantly, land, are abundant. It is this view that draws land-hungry colonists from the interior.

Politically, Gracias a Dios has a tiny national voice, and has been largely neglected by the state since its geopolitical importance evaporated following the *contra*-Sandinista conflict of the 1980s. The development vacuum has been partially redressed by church groups and national NGOs, who, with international support, have established schools and clinics, and promote economic development and conservation. These groups include MOPAWI (*Mosquitia Pawisa*), CCD (*Comisión Cristiana de Desarrollo*), and the Moravian and Catholic Churches. FITH (*Federación Indígena Tawahka de Honduras*) and *Asociación Asang Launa* were created in 1985 and 1995, respectively, to specifically address Tawahka needs.

2.2 Biophysical Environment

Physiography

The heart of the Tawahka homeland lies near the confluence of the Patuca river with two of its tributaries, the Wampú and Sutawala, at what is termed the 'mid-Patuca.' Here, about 100 km from the Caribbean coast, hilly uplands form a sharp boundary with the flat coastal plain of the Mosquitia lowlands, corresponding to a broad geologic transition between young continental and marine sediments and the aged, complex volcanics and metamorphics that form Honduras' rugged interior.

Among these older uplands are two distinct ranges of hills that flank the mid-Patuca and effectively bracket, and isolate, Tawahka territory. They run generally east-northeast, and are extensions of a range that gives rise to parts of the Greater Antilles (West *et al.* 1989). To the north of the mid-Patuca is the Patuca Range (>500 masl), part of the 'Honduras group' of Mesozoic and early Cretaceous gneisses, graphites, and quartzes (Rogers 1995). Gold eroded from these weakly metamorphosed hills sustains the renowned placer gold cottage industry of the Guayape, Tinto, and upper Patuca rivers. Tawahka have long panned the deposits of the latter.

At the southern edge of Tawahka territory are the higher, and younger, Colón-Warunta mountains and the Cordillera Entre Rios (>800 masl). Formed in the mid-Cretaceous, these hills are exclusively karstic (Rogers 1995); portions explored in 1995 yielded ten caves (Sivelli and De Grande 1996). These mountains divide the Patuca basin from that of the Río Coco; they have not always done so. During and after its uplift, the Colón range was likely bisected by a paleoriver formed by the upper Patuca, Wampú, and Coco rivers, which was eventually captured by the lower Patuca (Rogers 1995). The river's former channel through the Colón range is now the Sutawala valley. This low valley (<100 masl) is an important transmontane corridor for indigenous populations of the Patuca and Coco basin, who trade, visit, and migrate along the trail known as *Wangkibila* (see Fig. 1.3).

Between the two mountain ranges, the majority of Tawahka terrain is hilly, generally over 200 masl, through which abundant streams form the most effective thoroughfares. The only level areas are the alluvial floodplains of the Patuca, which contain Quaternary alluvia, including unconsolidated lime, sand, and gravel. By Amazonian standards, the Patuca's floodplain is narrow and shallowly entrenched, with little terrace development. But small differences in floodplain width within the TABR have important agricultural implications: downstream communities enjoy up to 10 km of edaphically rich floodplain compared with half that figure for upriver communities (see Fig. 2.2; Table 2.1).

Climate and Hydrology

As a relatively low-lying sub-tropical region at the eastern edge of a northern landmass, the Honduran Mosquitia has a characteristically "Tropical" climate (Af in the Köppen classification). Climate data from the mid-Patuca⁷ indicate that average monthly temperatures vary little (the hottest months are April-June), and are consistently over

⁷ Including: ENEE (*Empresa Nacional de Energía Eléctrica*) data from climate stations at Kuhrpa (1975-1984; temperature data only. Source: Cruz and Benitez 1994), and Ahuas (1975-1984; precipitation data only. Source: Dodds 1994). Kuhrpa lies about 12 km from northern TABR boundary and should be representative of conditions within the TABR. Ahuas is about 75 km to the north of the Reserve, and would be expected to have higher daytime temperatures due to sparser vegetative cover. Both are compared against data collected over a much shorter period, by myself and colleagues, at Krausirpi (Sept 94-Nov 96).

20°C; the diurnal temperature range does not generally exceed 10°C. On the Patuca, rainfall peaks in July and plummets in March and April. Generally, the Tawahka consider the rainy season to begin in June,⁸ and the dry season in late December, but the onset of both can vary by as much as a month. This inter-annual weather variability is one of the most significant uncertainties farmers face, since they risk losing entire crops by misjudging weather events by as little as week or two.

Several small rivers drain the Tawahka zone; those to the north include the Wampú, Tabacón, Wasparasni, and Cuyamel rivers (which today provide the main entryways for colonists into the TABR), all of which empty into the Patuca. The Patuca River bisects the TABR; at 500 km, the Patuca is Honduras' longest river, and second longest in Central America (Canales 1998). The Patuca's upper course has a steep gradient and is frequently whitewater as it passes through narrow gullies (e.g., *Portal del Infierno*; see Appendix VI), resulting in reduced river access to Tawahka lands from the south. As the river widens through Tawahka territory it begins to meander; villages are typically located on higher cut-banks and agriculture practiced on point bars. Where the river loses energy over the Mosquitia lowlands it is excessively meandering. Until about the 1950s, a large tributary of the Patuca ("Tom-Tom Cut-off"; see Keenagh 1937) emptied into Brus Lagoon, linking communities there directly to the Patuca (see Fig. 2.1).

The Patuca's discharge averaged 513m³/sec between 1955-1973, but seasonal fluctuations were—and are—great. Discharge rates have been recorded as low as 13.34m³/sec, and as high as 1060 m³/sec (ENEE, in Cruz and Benitez 1994). Rapid discharge rates reflect the massiveness of the Patuca's drainage basin: nearly 25,000 km², or 22% of Honduras' area (Canales 1998). The basin's size has important implications for the Tawahka, as a riverine people. First, discharge rates do not correspond to local precipitation events; in fact, peak discharge recorded on the mid-Patuca typically occurred in October (ENEE, in Cruz and Benitez 1994). This means that flooding is difficult to anticipate; important assets such as canoes and cattle can be

⁸ In both Tawahka and Miskitu languages, the month of June corresponds to a time known as "rain month" (*was lakni* and *li kati*, respectively).

swept away in sudden flood waves. Second, the Patuca's largest tributaries support some of Honduras' most important agro-industrial complexes (Cruz and Benitez 1994) and are considered completely deforested (Harcourt and Sayer 1996). Pollutants and excessive sedimentation from these sources are blamed for fish decline in the TABR. Finally, the Patuca's size attracts hydroelectric developers. As recently as 1998, for example, a large dam with a potential capacity of 270 MW was slated to be built just 6 km from the southern boundary (i.e., upriver) of Tawahka territory (Johnston-Dodds and Dodds 1998; see Appendix VI). Construction was officially canceled in May 1999, in part due to pressure from indigenous and conservationist citizens' groups. Were such a project to be built, however, Tawahka and other indigenous groups are concerned for its potential downriver effects, including entrapping needed sediment, interrupting navigation, and initiating massive colonization into their territory (Ahuas Declaration 1998).

Hurricanes

Between July and late October, Honduras' north coast is prone to hurricanes generated by maritime air masses moving over the warm waters of the Caribbean. Dodds (1994) lists those that have had an impact on the Honduran Mosquitia, of which the hurricanes of 1935, 1941, and 1974 are still invoked as temporal signposts by elder Tawahka. To these must be added Hurricane Mitch of November 1998, which caused unprecedented destruction throughout Honduras and neighbouring countries. In an unusual pattern, Mitch 'sat' off Honduras' north coast for three days, then moved inland with little loss of energy, and dropped an estimated 40 cubic km of rain over Honduras and Nicaragua (Clawson 2000). Rather than wind damage, then, it was flooding associated with massive rainfall that caused most damage. Flooding in the mid-Patuca was historic. In all, 14 Tawahka homes were completely destroyed, most were damaged; cattle and other livestock were swept away. At Krausirpi, the river spread over some 1.3 km of floodplain, scouring the rich agricultural lands there and subsequently covering them with 0.5-1.5 m layer of sand (Cruz *et al.* 1999). Virtually all (90%) of cacao orchards were deemed to have been totally destroyed.

Biota and Conservation Status

The rugged topography that distinguishes the mid-Patuca basin from its lower reaches corresponds to a transition in vegetation from the pine-dominated savanna of the Mosquitia lowlands to the more lush broad-leaved rain forest of the uplands. The savanna-forest boundary lies fully outside Tawahka territory, whose natural vegetative cover is almost exclusively lowland moist and montane tropical rainforest (see Fig. 1.3; Herlihy and Leake 1993; Harcourt and Sayer 1996; House 1997).⁹ These forests exhibit high local floral diversity. House found over 100 woody plant species within a 1-ha plot near Krausirpi (reported in House and Sánchez 1997).¹⁰ The TABR's geomorphic heterogeneity also seems to engender beta-diversity. Tawahka insist, for example, that on the calcareous hills of the Colón range, mahogany (*Swietenia macrophylla*) and cedar (*Cedrela* spp.) have never grown at the density or to the size of those over gneissic metamorphics of the upper Río Wampú (IM; IS). They also distinguish other broad vegetation types, including *bajales* (low-lying, naturally disturbed bamboo-dominant communities), waterlogged *suampos*, and a variety of associations corresponding to high densities of economically important species, including *tunu* (*Castilla* spp.), thatch-palm *suita* (*Asterogyne* sp. and *Geonoma* sp.), and *chicle* (*Manilkara* spp.). Tawahka agricultural practices add to the Reserve's biotic heterogeneity by creating a patchwork of non-synchronous fallows that favour disturbance-adapted species.

Tawahka forests contain many Honduran faunal species considered to be globally endangered, including jaguar (*Panthera onca*) and ocelot (*Felis pardalis*), spider and howler monkeys (*Ateles geoffroyi* and *Alouatta palliata*), giant anteater (*Myrmecophaga tridactyla*), king vulture (*Sarcoramphus papa*), and harpy eagle (*Harpia harpyja*). In fact, despite the fact that the Tawahka zone represents only 2% of the Honduran national territory, the TABR includes much of the country's faunal diversity: 90% of Honduras'

⁹ Scrub pine communities only exist on scattered hilltops within the TABR. These are apparently maintained by recurrent anthropogenic and lightning-set fires. They include the tops of Cerro Wampú, Asangbusna, scattered hills along the Wampú River, and hills near Kamakasna. They provide the only local source of *ocote* (S.), *ahuas* (M.), or pitch pine, which Tawahka rely on to start kitchen fires and for torches. If not obtained locally, pitchpine must be acquired from Miskito communities downriver, usually for a price.

¹⁰ By contrast, Boot (1997) notes that the most biodiverse hectares of forest in the world approach 300 woody species/ha.

mammal species, 50% of the country's birds, 40% of freshwater fish, 70% of reptiles, and 40% of the country's amphibians (Cruz and Benitez 1994).

The biodiversity of the forests that surround them influence Tawahka production choices (for a conceptualization of the relationship between forest diversity and forest peasant production, see Pattanayak and Sills 1999). The variety of plants and animals offers a host of responses to subsistence needs, both in terms of the diversity of extractive products that can be obtained (wood, thatch, resins), and within-use variety (e.g., Tawahka can choose from an array of timber species). Biodiversity also means that forest users face a long learning interval in order to master species identification and extraction methods. Finally, Tawahka mention how the forest's diversity holds hope that yet another previously overlooked resource become economically attractive to outsiders, and so form the basis for new market opportunities, as did latexes and animal skins in the past.

In 1992, about 10% of Honduras' remaining moist forests were contained within the Tawahka Reserve. That the Tawahka have been able to maintain their homeland under intact forest is attributed to the benignity of their land use practices (Herlihy 1993, 1997; House and Sánchez 1997). In 1998 for example, data from this study show that only about 15 km² (or about 1% of the total TABR) were compromised to Tawahka agricultural pursuits (including active and fallow lands), although agricultural reorganization in the wake of Hurricane Mitch will likely occur at the expense of primary forest. The extent of deforestation by *ladino* agricultural migrants has not been quantified. Nevertheless, the rapidity of colonist immigration, and the extensive nature of their agricultural activities is such that colonist-driven deforestation is seen as the prime threat to the region's biodiversity (Herlihy 1993, 1996, 1997).

Indeed, the majority of Honduras' remaining rain forests lie within the indigenous lands of the Mosquitia (Harcourt and Sayer 1996). Conservation efforts have recognized the link between indigenous forest use practices and biodiversity maintenance. As of November 1999, the Tawahka's homeland was declared the "Tawahka Asangni Biosphere Reserve" (Fiallos 1999; Honduras 1999). The TABR forms a keystone in the so-called 'Mosquitia Corridor' by connecting the UNESCO-

declared Río Plátano Biosphere Reserve and its buffer zones with the Patuca National Park (also ratified in November 1999) into a contiguous parcel of wildlands covering approximately 12,500 km² (Herlihy 1996, 1997, 1999; see Fig. 2.3). In turn, the Mosquitia Corridor is connected with Nicaragua's Bosawas Reserve to form an international system of protected areas named "Solidaridad" (Stocks 1996). The region is "recognized as a world-class conservation area...forming the largest contiguous tract of rain forest remaining in Central America" (Herlihy 1996). As of mid 2000, the international conservation community had linked this core of Mosquitia wildlands to other protected patches in Central America, to create the Mesoamerican Biological Corridor, which stretches from Colombia to Mexico (Carias 2000).

The future of the TABR continues to be considered under an umbrella management plan being developed for the Río Plátano Biosphere Reserve (BRP).¹¹ Implementation of this plan will have important implications for the way in which Tawahka farm and harvest forest goods, mainly through the zoning of forest areas for agricultural, extractive, or other activities (e.g., Proyecto BRP 1998).

2.3 Tawahka Subsistence

Until about 1950, Tawahka subsistence revolved around hunting, fishing, and gathering. A riverine people, they traveled annually in small family groups to exploit seasonal resources (W 1732:287; Roberts 1827; Martínez 1980; Helms 1982). They also maintained small, scattered agricultural plots as low-maintenance sources of starches and sugars (Conzemius 1932; RC; ES1). As forager-horticulturists, the Tawahka differed little from their coethnics, the other Mayangna sub-groups in Nicaragua (Conzemius 1932).

¹¹ The BRP management plan was due to be finished in 1999. Backed by the German development group GTZ in association with Honduras' forestry agency COHDEFOR, it was created using an innovative bottom-up approach, involving every affected local community in every aspect of the decision-making process. Ethnographic cartography forms an important core of such work. For a full description of the process, see Herlihy and Leake (1997) and Herlihy (1999).

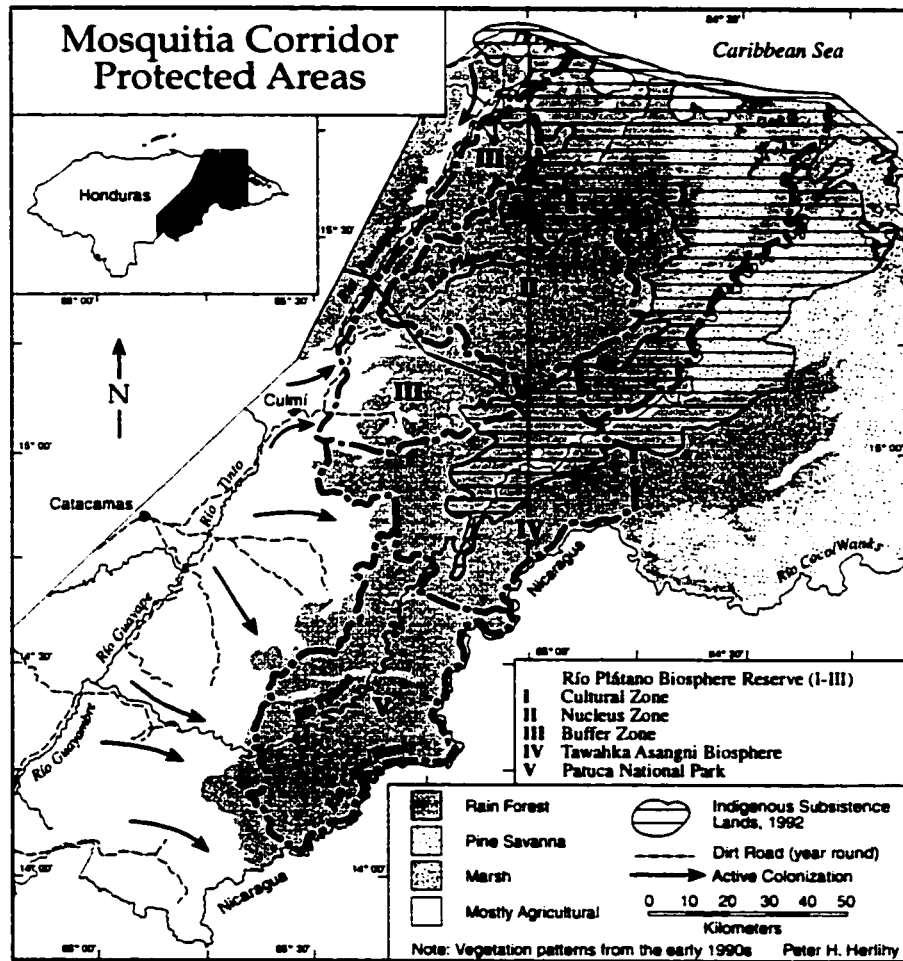


Fig. 2.3 Protected areas of the Mosquitia Corridor. Map by P.H. Herlihy, 2000; updated version of map in Herlihy (1997:122). Reproduced with permission.

Over the past half-century the balance of Tawahka subsistence has shifted: although they remain strongly oriented towards the river for settlement and subsistence, they may now be considered *horticulturist-foragers*, who rely primarily on a diversity of cultivated calories (staples, in order of frequency of consumption, are: bananas, cassava, rice, beans, and plantain) that are supplemented from wild and domestic protein sources, and purchased foods. Forests also provide multiple non-food products. Each aspect of farming and foraging is described below.

Tawahka Agriculture

Note: The following description of Tawahka agriculture is based on observations made between 1994 and 1998, prior to the devastation visited upon Tawahka lands by Hurricane Mitch. Although post-Mitch agricultural patterns are reportedly roughly similar to those described here, the reader should be aware that agricultural reorganization was ongoing at the time of writing.

The Tawahka combine traditional slash-and-burn agriculture with permanent agroforestry and annual horticulture in two broad agricultural zones. *Vega* plots—riverbank and floodplain lands combined—comprised some 46% of Tawahka agricultural holdings in 1998. Upland, or *alto* holdings made up the remaining 54% of active and fallowed lands overall. But this is an average ratio; in fact, differential endowments of *vega* and *alto* among villages exert strong controls on a community's agricultural choices. For example, Yapuwas is particularly bereft of *vega*; households there grow relatively little cacao, beans, and other floodplain-reliant crops.

Fig. 2.4 illustrates how Tawahka agriculture exploits several distinct zones. Sandy depositional riverbanks are exposed in the dry season, and are cleared of wild *gamalote* grass, let dry, and planted with beans, vegetables, and other annuals. Above the bank, on the periodically inundated floodplain, orchard gardens are permanently maintained. There, various fruit trees (including cacao, citrus, breadfruit) are interplanted with peach palm (*Bactris gasipaes*), *Musa* (bananas and plantains), and underplanted with beans. Some hardwoods may also be grown, including mahogany and cedar. In edaphically poorer uplands, Tawahka annually clear and burn secondary or

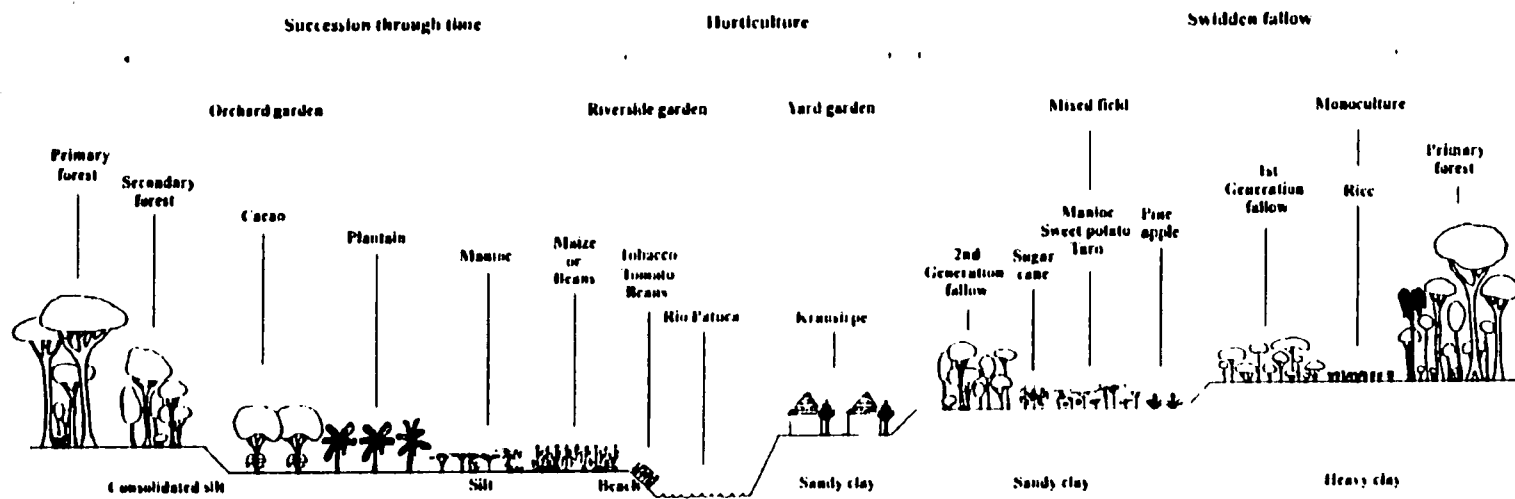


Fig. 2.4 Cross-section (2 km) of primary agricultural environments of the Tawahka at Krausirpi, Río Patuca, Honduras. Reproduced with permission from House (1997:10).

primary forest cover,¹² and sow the plot mainly in upland rice, maize, and cassava, which after one or two harvests is left fallow. Forest fallows are generally neglected but for firewood extraction and the harvest of persistent fruit crops, especially bananas and pineapple, and as hunting zones. Finally, land within Tawahka villages is planted in fruit trees, including mango, coconut and other palms, and citrus trees. Where cattle and pigs are least bothersome, medicinal plants and herbs such as lemongrass and *cilantro* can be grown; few such plantings, however, could be considered *bona fide* dooryard gardens. The range of crops Tawahka harvest from these environments is indicated by the number of cultivated foods brought into a subsample of Tawahka households over about 45 days in 1996 (Table 2.2). These 40+ cultivars sampled represent about 71% of the Tawahka's total agricultural diversity, as found by House (1997).

Field Size and Site Selection

The average size of Tawahka fields in 1998 was generally typical for subsistence farmers: household bean fields averaged 0.43 ha¹³ (1994-98 mean), and rice fields, 0.74 ha (mean of 1994, 1995, 1997).¹⁴ Tawahka claim that the amount of land cleared is determined most by labour availability. But bigger fields are not necessarily better. Farmers may opt to clear two small fields rather than one larger one: in 1997, data show that 20% of Tawahka households planted rice in two separate fields of roughly the same

¹² Tawahka farmers weigh various factors when deciding whether to clear primary rainforest or the less laborious secondary forest. For the 62% of households that chose the latter in 1998, the majority (32%) cited lack of time; others mentioned that they already had plenty of secondary forest (i.e., did not need to create more from primary forest); that secondary plots were better, especially for a given rice variety; that it might rain early (secondary growth dries more quickly); that they had no land and were borrowing a fallow; and that to clear fallow was less costly with regard to labour. For a closer examination of socioeconomic determinants of primary forest vs. fallow conversion for rice cultivation among the Tawahka, see Godoy *et al.* (1996a).

¹³ The Tawahka, like many Latin American farmers, measure field size in *tareas* or *manzanas* (four *tareas*=one *manzana*). A *manzana* is usually considered equivalent to 1.2 ha, a conversion that has been used by some researchers of Tawahka landuse (e.g., Herlihy 1993). Throughout this study, however, I use the conversion of 1 mz=1 ha. This decision is based on HIID field measurements in 1995 that indicated one Tawahka manzana to be very close to 1 ha (see Godoy *et al.* 1996a), and follows House (1997:8). The field areas given here, then, are thus likely to appear high when compared with previous estimates (e.g., Herlihy 1993).

¹⁴ It is difficult to determine if Tawahka field sizes have changed over the long term. In a survey of Miskito and Tawahka fields, Adams (1972:38-39) found average size to be 1.3 ha, but the median closer to 0.8 ha. He does not distinguish field by crop grown, however. Oral histories suggest fields today are a little larger than in the past (RS).

Table 2.2. Agricultural goods harvested by Tawahka households,* 1996.

	Krausirpi ¹		Yapuwas ²	
	Freq.	%	Freq.	%
Annuals & Biennials				
Bananas & Plantains (14+ var.)	580	50.39	506	48.98
Beans	70	6.08	50	4.84
Cabbage	5	0.43	0	0.00
Chile	4	0.35	0	0.00
<i>Cucurbitaceae</i> (squashes)	6	0.52	12	1.16
Lemongrass	1	0.09	0	0.00
Maize	20	1.74	44	4.26
Pineapple	12	1.04	5	0.48
Rice	93	8.08	27	2.61
Sugar cane	31	2.69	138	13.36
Taro	1	0.09	2	0.19
Tobacco	0	0.00	8	0.77
Tomato	1	0.09	0	0.00
Watermelon	0	0.00	7	0.68
Yuca/Cassava	59	5.13	95	9.20
Perennials (fruits)				
Achiote	0	0.00	1	0.10
Avocado	2	0.17	1	0.10
Breadfruit	6	0.52	6	0.58
Cacao (creole & hybrid)	107	9.30	19	1.84
<i>Cacao pataste</i>	6	0.52	19	1.84
Calabash	0	0.00	2	0.19
<i>Ciruella</i>	1	0.09	0	0.00
Coconut	24	2.09	9	0.87
<i>Frutipan</i>	5	0.43	1	0.10
Grapefruit	6	0.52	5	0.48
<i>Guama</i>	0	0.00	11	1.06
<i>Guanabana</i>	0	0.00	0	0.00
Lemon, lime	3	0.26	19	1.84
Mango	3	0.26	1	0.10
Orange	32	2.78	0	0.00
Papaya (domestic & wild)	0	0.00	5	0.48
Peach palm	68	5.91	38	3.68
<i>Pera</i>	4	0.35	0	0.00
Sapote	1	0.09	2	0.19

* Includes all agricultural goods harvested by Tawahka households (n=33) during randomly selected "weigh days" in 1996. "Frequency" refers to the no. of times a good was brought into sample households, regardless of quantity. Purchased food and gifts are not included; this is not a estimate of consumption.

¹ In Krausirpi, 16 households were sampled over 42 randomly selected days, Jan.-Dec.

² In Yapuwas, 17 households were sampled over 44 randomly selected days, Jan. - Dec.

Source: HIID Weigh Day Data 1996.

size. In fact, large, contiguous holdings are only considered preferable where soils are reliably good and river access nearby (for ease of harvest transport). Otherwise, scattered plots of edaphic heterogeneity maximize chances of one flourishing, while simultaneously minimizing damage from a single marauding forest herbivore, as well as reducing the chance of discovery by thieves (JM).¹⁵ Indeed, families constantly reorganize their field locations over time, because edaphic quality may change from one season to the next (as Hurricane Mitch dramatically illustrated).

In 1998, the time/distance (by foot and/or canoe) to rice fields averaged 34 minutes from the farmer's home. But the convenience of proximity is weighed against varied environmental risks and social constraints. For example, proximity is only desirable where water separates fields from free-range pigs and cattle, where flooding is least likely to do damage, where neighbours' lands do not limit expansion, and where crops can be surveyed to minimize pest damage and theft. Also, maintaining distances between neighbours' plots reduces the potential for damage from their runaway fires (UM). The result is that a household's land may be spread out in a temporal and tenure patchwork, and so scattered that not all holdings can be visited in one day (SO; CS).

The Agricultural Calendar

The timing of field preparation, planting, weeding, and harvest is summarized in Table 2.3.¹⁶ The busiest times in the agricultural calendar are between February and May. Demands on labour are then particularly high, as they are again during the rice planting rush. At this time, farmers must roughly synchronize their sowing because the household that plants too early will attract excessive predation by birds. Sickesses or

¹⁵ Praedial larceny, or crop theft, was of epidemic proportions in Tawahka communities during the study period. For example, watermelon growers were required to camp near their plots from the time the first fruits appeared, and station a child there at all times, to prevent theft. In general, crop thieves are known to the community: they are the ones who leave for the fields when the majority are returning! Communal reprisals are not overt, but combine ostracism with reduced wage and other opportunities. Overall, the result of crop thieving is to lower the hard-working farmers' interest in non-staple crops by markedly raising the time that must be invested to successfully harvest them.

¹⁶ Which must in turn be coordinated with the phases of the moon. Like peasants throughout Central America, the Tawahka time every agricultural and extractive activity to fall within the 'right' moon. Awaiting the appropriate lunar phase may delay tasks for up to eight days. Cutting wood in the 'wrong' moon guarantees that it will split or rot; yields are compromised if planting is done at this time.

Table 2.3. Calendar of labour demands for staple crops, TABR, Honduras.

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
Rice												
Clearing: machete		*****	*****									
Clearing: axe			*****	*****								
Burning				***	*****							
Planting				*****	*****							
Weeding						*****						
Harvest								*****	*****	*****		
Beans												
Clearing		*****									*****	
Planting		*****	*****								*****	
Weeding		*****	*****									
Harvest		*****	*****	*****	***							
Yuca												
Clearing			*****									
Burning		*****	*****	*****								
Planting			***	*****	*****							
Harvest (continuous)												

Source: Field observation 1994-96, 1998; Interviews; HIID data.

injury that befall farmers at these busy agricultural times place a particularly heavy burden on households. The high opportunity cost to labour during agricultural bottlenecks also controls the scheduling of other productive activities; off-farm activities such as extractivism, wage labour, and hunting become particularly attractive during the relatively 'free' time between May and October and in November-December.

Agricultural Technology and Innovation

Machetes, long-handled axes, and the files to sharpen them form the staple agricultural toolkit.¹⁷ Some cacao-growers use pruner blades. Chainsaws are occasionally used to clear forest, but overall, the most modern aspects of Tawahka agriculture come in the form of chemical herbicides and germplasm. In 1994, 43% of sample Tawahka households used chemical herbicides; 75% used improved rice and bean seeds (Godoy *et al.* 1996a, 2000a, 2000b). Agriculture extension workers have visited the Tawahka region sporadically since the early 1980s (e.g., Meléndez *et al.* 1983), and have served to introduce new cultivation techniques, seed varieties, and cacao hybrids. Itinerant traders have also played an important and ongoing role in introducing seed stock and popularizing herbicides and the equipment required to spread them.

Labour

Men are responsible for all field clearing, and women and children participate in planting, weeding, and harvest.¹⁸ Family labour is relied upon for most tasks. Where family labour is insufficient, Tawahka may pay for labour, either in cash or by trading meat, crop surpluses, etc. Wage labour is relatively unusual and an option only for richer households. For some community members, including lay pastors and the very old, voluntary work parties provide field clearing, planting, and harvest assistance. Most commonly, however, households meet excessive agricultural demands with *pana-pana* (M., *mano vuelta*: S.). This system of reciprocal labour often takes the form of multi-

¹⁷ Martínez (1980:6) mentions the use of hoes (*azadón*). Today, hoes are only used to clear house patios, and modified for use in canoe construction. They are not used agriculturally by the Tawahka.

¹⁸ Gender division of tasks among the Tawahka appears to have been more acute in the past. Martínez (1980:6) describes how men *only* cleared fields; women alone planted, weeded, and harvested.

household groups planting, weeding, or harvesting each member's plots consecutively, and is a typical example of an "exchange labour group" (Chibnik and de Jong 1989).¹⁹ Tawahka argue that work is more quickly completed this way; *pana pana* is particularly common when many agricultural tasks must be completed over a short period (e.g., February-May). *Pana pana* is not always in-kind: for example, field-clearing labour may be exchanged for planting labour, as long as the two are temporally close. Thus single mothers, who may lack 'in-house' male labour to clear their own fields, are nevertheless able to have one made for them. Among the drawbacks to *pana pana*, Tawahka cite the loss of quality control among 'workers,' and point out that the act of introducing others to one's land can lead to more theft and jealousies if yields are good.

Land Tenure

The roving nature of Tawahka households until the mid 20th century meant that small land parcels, usually along riverbanks, were cultivated briefly and then essentially abandoned (RC). Any persistent crops—particularly peach palm and bananas—were left as living food caches for whomever should require them. Permanent settlement and growing populations have changed this *laissez-faire* pattern. Today, land ownership is conferred to the person who first converts primary forest to another use. That person then, in principle, owns the land in perpetuity, whether s/he uses it continuously or not. In reality, however, overgrown fallow can be lost to others if considered unused, or mistaken for primary forest (CC).²⁰ This outcome can be obviated in long-cycle fallows by planting fruit trees to mark field borders. Some Tawahka have encircled fields in barbed wire (EC; JD).

The majority of Tawahka households respect this system of tenure, particularly the 68% residing in Krausirpi and Krautara, where relatively dense settlement has precipitated keen interest in field demarcation and 'defense.' But there are significant inter-village variations which skew land portfolios and resound in Tawahka investment

¹⁹ Distinct from the "festive work party" described by Chibnik and de Jong (1989) and Coomes (1994). Among the Tawahka, the 'host' group is held to no standard in terms of supplying food and drink. Often, only water and rice is offered.

²⁰ A common lament of village patriarchs, who cleared land up to 40 years prior (CC). Because they do not maintain the fields, neighbours consider them without owner.

strategies and production options. At Yapuwas, for example, a “traditional” system prevails: that is, fallows typically return to community ownership.²¹ The most noteworthy differences arise among Kamakasna’s households, where *ladino* men predominate as heads and have demarcated land by Olancho tradition. That is, they have claimed land merely by blazing (*brecheando*) through primary forest; any forest upland from a riverside plot is understood to be owned by its cultivator. In this way, 33% of Kamakasna households have effectively monopolized hundreds of hectares of the best village-proximate land. Apparently following the Kamakasna lead, as of 1998, five households in Krausirpi (7.6% of that village’s households) had also claimed standing primary forest in response to rumours that zoning rules for the BRP would soon allow families only 50 ha each. This initiated a scramble to stake out prime lands up to that amount.

Land transfer was similarly variable during the study period. Land may be inherited by males or females, but it is rarely divided by any set tradition; rather, it is apportioned more by need. Thus at the death of a 55-year old man in 1996, his lands were assigned to only one of his two wives, on the basis that the recipient had no grown male children to “open up” new land for her (OH). The lands of another patriarch who died in 1997 were not divided equally between his ten children (CH; CM). Rather, all went to his wife, to be worked—and eventually owned—by his youngest son, who was not yet old enough to have accumulated his own land.

By law, no land within the TABR may be sold,²² and land has no established market value. But among Tawahka, sales occasionally occur. Most common is the cashless barter of one plot for a more convenient one. Orchards—their value assessed by fruit production—have also been pawned. In fact, despite the absence of a *bona fide* land market, land ownership among the Tawahka is dynamic. In 1998 alone, about 20%

²¹ Residents of Yapuwas claim this to be the “traditional” Tawahka system, whereby one uses the land one needs, then moves on. One may take advantage of a previous settler’s fallows, just as theirs may subsequently be used also. Yapuwas is the oldest of Tawahka villages; the system is likely maintained because so much of surrounding lands have been used by so many through time. In addition, large areas were cleared in the 1980s by since-repatriated Nicaraguan refugees, adding more “ownerless” land to the community pool.

²² The law’s intention is to prevent cash-needy Tawahka from selling off parts of the Reserve to outsiders, including land-hungry colonists or outside resource prospectors.

of Tawahka households claimed to have lost an average of 8 ha of land over the previous year, either by hostile takeover, sale, or abandonment (due to distance, weed load, etc.). A smaller number (13%) claimed to have gained about the same area of previously farmed land (8.21 ha), either in trade, purchase, or as a gift.

The most common form of land transfer, however, is the temporary loan, which in the late 1990s served to smooth production among households with very different land portfolios. Although the land-wealthy often borrow more convenient or better quality land from others, the tradition of land ‘borrowing’ is particularly important for the 4.7% of Tawahka households—mainly those of single women—that owned no land at all in 1998. Land loan is not land *rent*: Tawahka lend each other land fairly willingly at no cost, and the concept of charging for the soil’s fertility is typically dismissed as miserly. But such land ‘loans’ are not risk-free. Although the lender stands to curry future favour from the borrower, s/he also expose their lands to takeover. As a Tawahka elder explained:

[A relative comes to me,] he says: ‘*Compa*, why not lend me a little land, to plant beans, no more?’ But when he planted, he also planted yuca, peach palm, coconuts, all sorts of things. Now he says, ‘I won’t pay’ (CC; Krausirpi, 1998; *transl.*).

In general, however, land was still sufficiently abundant in early 1998 for it to behoove the land-rich to be generous with the land-poor. How these conditions have changed since the devastation of Hurricane Mitch remains to be seen.

Animal Husbandry

Tawahka keep cattle, pigs, chickens, turkeys, ducks, and dogs. They also occasionally raise, but rarely breed, forest animals, either as pets or for sale (including parrots, macaws, pavas, quashes, tapirs, and monkeys). Dogs protect homes and are used in hunting. Livestock are consumed when fish are scarce or hunters luckless; cows’ milk and eggs are important dietary supplements. But the investment and insurance function of livestock remains important, and Tawahka are usually reluctant to eat an animal that

they might sell or breed (see Table 2.4).²³ But chickens, owned by 80% of households, are frequently used in barter transactions (see Fig. 2.5). In 1996, for example, one household traded 20 chickens for one dugout canoe (CC).

Table 2.4. Domestic animals owned by Tawahka households ($n=116$), 1998.

	<u>Total</u> <u>Owned</u>	<u>% households</u> <u>owning</u>	<u>Total eaten by</u> <u>owner ('97-'98)</u>	<u>Total lost</u> <u>(death, theft)</u>
Chickens	819	80	419	313
Cattle	121	30	n.a.	n.a.
Dogs	94	50	n.a.	n.a.
Pigs	84	19	44	34

The care of pigs and cattle can be described as benign neglect: animals roam freely in villages and adjacent secondary growth, feeding on kitchen scraps and natural pasture. In the past pigs were often penned and raised for lard (SO), and were owned by most households. Today, ownership of a free-range pig is prohibited in Krausirpi for community health reasons.²⁴ Cattle are also a community nuisance, because they soil clothes laid out to dry, crush or eat incipient kitchen gardens, scare children, and eat drying seed. Since 1994, two households have been establishing pasture near Krausirpi, but as of early 1998 no animals had been transferred from the village.

In 1998, Tawahka owned 121 head of cattle—an average of almost one per household—mainly Brahmin mixed with Creole breeds. For outsiders sensitive to the “hamburger connection”—the link between cattle ranching and tropical deforestation—it is perhaps counterintuitive that an indigenous forest people should raise cattle. In fact, Tawahka have held cattle since at least 1916 (Martínez 1980:8), which were introduced

²³ Martínez (1980:7-8) notes that in 1916, neither pork, chicken, or eggs were eaten by Tawahka, who considered them bland. Today all are considered palatable, and pork especially.

²⁴ Most households cannot afford to feed penned pigs. Thus pigs roam the village where they commonly consume human feces (outhouses are scarce). This habit is blamed in part for cholera outbreaks, the most recent of which hit Tawahka communities in 1995 and 1998.



Fig. 2.5 Tawahka woman tending chickens, Yapuwas, TABR, Honduras, May 1998. Photograph by the author.

to the Mosquitia shortly after Contact (Newson 1986). Tawahka raise cattle for the same reasons forest peasants throughout the neotropics do (see Macdonald 1981; Hecht 1993; Loker 1993; Humphries 1998). First, beef prices typically keep pace with inflation, providing households with a secure form of holding wealth. Godoy *et al.* (1996b) found overall positive rates of return to cattle production among the Tawahka, mainly due to the minimal labour inputs required to raise cattle, and the low transaction costs required to sell them (cattle are self-transporting in the dry season). Constant markets and the mobility of cattle also mean that they may provide an important insurance function: households can readily sell off cattle in the face of sickness or other crises. One Tawahka had such logic in mind when he opined:

Everyone should have a cow for their health. In an emergency, who is going to lend you 2,000-3,000 Lempiras? Even with family, they don't lend it...(IS, Krausirpi, May 1998; *transl.*).

It is not surprising, therefore, that Tawahka mention cattle purchase as the most desirable way to invest large cash earnings (see Appendix VII). Unlike their Miskito neighbours to the north and *ladino* settlers to the south, the Tawahka do not use horses, either for transport or as beasts of burden, nor have they done historically. They are also unfamiliar with oxen.

Extraction

Hunting

The Tawahka, like the Miskito, have a term for “meat hunger” (“*upan ai daukisa*”: M) distinct from regular hunger (“*plun ai daukisa*”). Most preferred is wild game: iguana, monkey, peccary, and deer are particularly appreciated. But the Tawahka are opportunistic hunters. In the course of routine extra-village activities, or during extractive trips, they may take a wide variety of animals near rivers, in active fields, and from secondary and primary forest. Table 2.5 summarizes species brought home by a subsample of Tawahka hunters over about 45 days in 1996, and shows the variety of habitats in which they were obtained.

Table 2.5. Fish and game extracted by a subset of Tawahka households,* 1996.

	Good	Species, if known	Krausirpi ¹		Yapuwas ²		Habitats in which animal reported captured				
			Freq.	%	Freq.	%	Orchard/ Field	Fallow	Primary forest	River- bank	River/ Stream
Shell/Fish	Crayfish		3	4.2	5	1.9					
	Fish		43	60.6	154	58.3					
	Mussel		2	2.8	2	0.8					
Reptiles	Iguana		0	0.0	1	0.4					
	Turtle		4	5.6	6	2.3					
Birds	Crested guan	<i>Penelope</i> sp.	4	5.6	1	0.4					
	Great curassow	<i>Crax rubra</i>	1	1.4	0	0.0					
	Plain chachalaca	<i>Ortalis v. vetula</i>	0	0.0	1	0.4					
	Slaty-breasted tinamou	<i>Crypturellus</i> sp.	2	2.8	0	0.0					
Mammals	Chestnut-mand. toucan	<i>Ramphastos swainsonii</i>	0	0.0	1	0.4					
	Agouti	<i>Dasyprocta punctata</i>	0	0.0	1	0.4					
	Armadillo	<i>Dasypus novemcinctus</i>	4	5.6	66	25.0					
	Coati	<i>Nasua narica</i>	1	1.4	2	0.8					
	Collared peccary	<i>Tayassu tajacu</i>	0	0.0	4	1.5					
	Paca	<i>Agouti paca</i>	3	4.2	12	4.5					
	Red brocket deer	<i>Mazama americana</i>	1	1.4	0	0.0					
	Squirrel		2	2.8	0	0.0					
	Tapir	<i>Tapirus bairdii</i>	0	0.0	8	3.0					
	White-lipped peccary	<i>Tayassu pecari</i>	1	1.4	0	0.0					

* Includes all fish and game entering a subsample of Tawahka households during randomly selected "weigh days" in 1996.

This is not a measure of consumption, and underestimates the range of faunal goods obtained by Tawahka. Purchased food and gifts are omitted.

"Frequency" refers to the number of times the good was brought into sample households, regardless of quantity.

1 In Krausirpi, 42 randomly selected weigh days measured all products entering a subsample of 16 households from January to December.

2 In Yapuwas, 44 randomly selected weigh days measured all products entering a subsample of 17 households from January to November.

Source: HIID Weigh Day data, 1996.

A hunter's success depends on local and seasonal species availability, skill, and hunting technology. Local species availability varies by village. Whereas the extensive agriculture around larger communities renders primary forest species relatively distant (particularly monkey and white-lipped peccary), the patchwork of fallow fields provides attractive habitat to other mammals, including deer, tapir, and collared peccary. Indeed, symbiosis between game and cultural landscapes is not uncommon among neotropical indigenous groups (see Smith 1998). Seasonal variation also affects hunting success. Many animals are more easily taken, for example, when they flock or group around certain fruit trees, or for mating or nesting purposes (e.g., *pava*, peccary).

Third, there is the hunters' skill. Among Honduran indigenous groups, the Tawahka are considered the most knowledgeable about animal species, habitat, and lifecycles (Cruz and Benitez 1994).²⁵ Although Tawahka deem most adult males capable hunters, skill levels vary. Tawahka boys begin to accompany male relatives on hunting trips from about the age of 12; men under 20 rarely hunt alone. They must learn tracking, hunting techniques such as call mimicry,²⁶ and become aware of the myriad risks they face, including weapon-related accidents, aggressive prey, and poisonous snakes. But even within age groups the Tawahka recognize several men as particularly gifted hunters. This 'gift' is attributed to luck, interest, the use of medicinal herbs, and family training.

Finally, the technology he uses—machete, dog, rifle, shotgun—is most determinant of what a Tawahka hunter is likely to acquire (bow and arrows are no longer used to hunt game,²⁷ nor are traps used in subsistence). With only a machete, hunters seek burrowing animals or those likely to take to water.²⁸ With a firearm, hunting

²⁵ Adams (1972:15) notes that Miskito of the Patuca claimed the Tawahka to be more frequent hunters than they.

²⁶ I witnessed one occasion where mimicry of the cry of an abandoned baby monkey lured a troop of white-faced/Capuchin monkeys closer to the hunter.

²⁷ Conzemius implies the bow and arrow were still common among the Sumu in the later 1920s (1932:79). Adams (1972:19) states that in 1969, "Only the [Tawahka] from Rio Cuyamel mentioned using bows and arrows for hunting."

²⁸ The most common animals taken this way are armadillo, forest rodents, and iguana. But I have also witnessed a tapir killed in water, using a machete lashed to a stick as an improvised spear (*rejón*). Deer caught crossing rivers have also been killed with machetes.

strategies depend largely on the presence of hunting dogs.²⁹ Without loud dogs, hunters capitalize on stealth and surprise to take birds and other shy animals—both arboreal and terrestrial—in secondary and primary forest. They also hunt nocturnally (with flashlights) in active fields, using a sit-and-wait strategy to take deer, tapir, and other crop pests. With dogs available to flush and route game, however, hunters are more likely to take such large prey by day.

Firearms

In 1998, Tawahka owned 39 guns, or one for every 3.6 households. They included 12-, 16-, and 18-gauge single-barreled shotguns, .22 single-shot rifles, and one or two semi-automatic Sandinista-era AK-47s. Guns are obtained through trade, usually from Miskito or *ladino* farmers or traders, and are rarely bought new. Many are decades old, their wooden portions replaced several times. In the past, most Tawahka men owned guns (Martínez (1980:4) implies they were common in 1916). During the 1970s, an economic boom resulted in gun ownership among the majority of households, at least in Krausirpi (Adams 1972; Calix and Cruz 1977; ES2). The relative thinness of firearms ownership today reflects the high cost of buying and owning them: guns are increasingly expensive, episodically confiscated by military personnel, and ammunition only sporadically available. An idle gun is quickly sold. Thus gun ownership earmarks households who consider the returns from guns to outweigh the costs, signaling a strong forest orientation. Investment in firearms is one way Tawahka would invest a hypothetical cash windfall (see Appendix VII). As relatively precious assets, guns are rarely shared (unlike other productive assets); fathers are even reluctant to lend to sons.

²⁹ The Tawahka have used hunting dogs at least for the past century (Martínez 1980), and likely much longer (Conzemius 1932). Dogs good at hunting are considered valuable assets; they are all named, and medicines are even occasionally bought to help them in the hunt. Hunters also invest time in developing a rapport with their dogs. The author was consistently puzzled, therefore, by the overall neglect of dogs, which has also been noted by most historical observers (Conzemius described them as “sneaky, repulsive curs” (1932:59)). Rarely fed—even after a kill—they are rake-thin and parasite-ridden, sometimes too weak to return from the hunt, and must be carried. Though commonly injured during hunts (by prey or machete cuts), they more routinely die from hunger. Most Tawahka say that hunger makes dogs keener hunters. Yet for the odd hunter who does feed his dogs—usually after a kill—the results in performance are noticeable to all.

Hunting Territory and Scarcity

If measured by frequency of trips, most Tawahka hunt within a day by foot or canoe of their village, usually in groups of one to five men and boys. Women do not accompany hunting parties, although they did in the past (Martínez 1980:3). The areal extent of day hunts corresponds roughly to a 8-10 km radius from the home village. In theory, any forest resources are available to any Tawahka, but in fact each community has a corresponding hunting area. Hunting areas often overlap, and there are occasional disputes regarding hunters from one village 'poaching' on another village's lands. When hunters go out for longer periods (up to a week), the available hunting territory is much expanded, and includes areas within and outside the Reserve that are considered traditional hunting zones open to any Tawahka; their limits coincide with that of most forest extraction, as mapped by Herlihy (1993).

Tawahka claim that local scarcity of certain species is the main motivation for multi-day trips. But scarcity is hard to determine, and anecdotal evidence is contradictory. On the one hand, older Tawahka routinely lament the local scarcity of once-abundant mammals, especially around the largest communities (CS). On the other hand, they agree some that species appear to thrive in the anthropogenic settings of field and fallow around villages (RC). They also claim that young hunters are more wanton (killing more animals than they can carry home, for example), and point out that a wider range of animals are now taken than in the past (tapir, for example, was not eaten previously). But others claim that game populations overall are in fact still rebounding from devastation wrought by Nicaraguan refugees, who, during the 1980s, with little to do and with weapons at their disposal, exacted a heavy toll on the regional fauna (GS).

Aquatic Resource Use

Tawahka reliance on fish protein is much lower than might be expected for a river-dwelling population, and negligible compared with Amazonian forest dwellers (e.g., Barham *et al.* 1999). Fish consumption is a weekly, rather than daily, event, and is often little more than *sardinas*, or finger-size fish garnish, although fish are more frequently harvested food than game meat (Table 2.5). Though never exceptional, fish

abundance in the Patuca appears to have declined over time (RC; CS; RS). The deforestation of the Patuca's watershed is blamed for excessive upstream siltation and loss of fish habitat. Settlers in the upper Patuca and its tributaries also routinely dam and dynamite streams. Fish diversity is also compromised by recent introduction of exotics, especially the accidental introduction of the *tilapia* in 1985 (Cruz and Benitez 1994). Differences in fish availability between communities are suggested by different frequencies of fish harvest between villages (see Table 2.5).

Fishing is most frequent in the dry season, when waters are clear enough for fish and bait to be seen. Fishing intensity peaks in the month prior to Easter Holy Week, when fish consumption is a cultural necessity. Salted fish are often sold at this time. Fishing strategies vary. Children and women catch small fish with baited hook and line, and they also routinely search along riverbanks for crayfish while washing clothes. Some households dig and eat mussels, but this is considered an undesirable Miskito practice; turtle and iguana eggs, however, are considered a delicacy. At night, fish are attracted to lights held from canoes and are killed with machetes. Women also trawl ephemeral pools, catching fish, turtles, and eels with their feet and hands (Caicedo 1993). The use of poisons to stun fish in such confined habitats is unconfirmed. Cast nets are rarely used; in 1998, only two households owned them. Large fish in riverine shallows are speared by men with bow-driven lances;³⁰ large fish are even occasionally shot with rifles. But most large fish are obtained today with mask and *pistoleta* (speargun, usually homemade) by men and boys who snorkel or skin dive into deep riverine pools. Management plans being developed for the nearby Río Plátano Biosphere Reserve would likely forbid this highly efficient technique.

Gathering

Beyond starches and proteins, Tawahka obtain myriad other wild goods from their varied environment. All such goods are "free" to any Tawahka, although community extraction limits are recognized, and some cultural controls on overharvest

³⁰ The tips of these spears are made from metal rods hammered flat and filed into a point. They are connected to a detachable peach-palm central piece, which is attached to a long hollow wooden shaft. The whole spear is about 1.5 m long. Bows are made from peach palm wood.

exist (see Cahn 1996). The most frequently extracted product is firewood,³¹ but also include medicinal plants, seasonings, bark, honey, wild fruits, construction materials (such as hardwood lumber, poles, vines, bamboo, and palm-leaf thatch), leaf wrappings, dyes, resins, pitchpine, cordage, and the hardwoods required for mortar, pestles, paddles, and in canoe construction. Such products are taken from a wide variety of species. For example, 36 different woody species were represented by tree products brought home by a subset of Tawahka households over only 45 days in 1996 (Table 2.6). Canoe construction alone accounted for over 14+ species over eight years (see Chapter Five); House and Sánchez (1997) list 115 plants recognized for their medicinal properties.

‘Heavy’ extraction of hardwoods and bamboo is typically undertaken by men. Women and children participate in all other types of extraction, especially of medicinal plants, bark (for blankets and crafts), fibres (for hammocks and bags), and firewood.

House construction

The Tawahka’s wood and bamboo homes, together with their dugout canoes, provide the most obvious and durable expression of forest product use. At first glance, the 123 structures that comprised Tawahka dwellings in 1998 appear remarkably alike. But subtle differences in materials, size, and style, both between households and over time, tell much about local resource availability, changing forest pressures, household wealth and investment priorities, and social status. Houses also form an important insurance role: components can be sold in response to sudden cash need.

Traditionally, Tawahka homes were dirt-floored and circular, and may have been communal (Conzemius 1932:31). A ring of upright poles lashed together formed the walls, and a single central pole supported a thatched roof (Calix and Cruz 1977; CC), as illustrated in Keenagh (1937:212). One or two such houses were still found in Parawas in 1996, but the majority of modern Tawahka homes are rectangular. Some remain dirt-floored, but the majority are raised on stilts 1-2 m from the ground, with average dimensions of 4.5 m by 6 m. Although 8% of Tawahka households comprised more than

³¹ The Tawahka do not make charcoal.

Table 2.6. Floral forest products extracted by Tawahka households,* 1996.

Species, if known	Tawahka name	Part harvested/Intended use							
		Wood	Fire-wood	Bark	Leaf	Sap	Pole	Stem	Other
<i>Acacia</i> sp.	sir sir								
<i>Ampelocera hottlei</i>	kuhunak								
<i>Anacardiaceae</i> sp.	rusut								
<i>Asterogyne</i> sp.	ahtak yal								
<i>Bactris gasipaes</i> (semi-wild)	supa								
Bamboo	suku								
	basparat								
<i>Calophyllum brasiliense</i>	karasa								
<i>Casipurea</i>	awaspi								
<i>Castilla elastica</i>	tass								
<i>Castilla tuno</i>	tikau, amat								
<i>Cecropia</i> sp.	plang								
<i>Cedrela</i> sp.	suhun								
<i>Cedrela</i> sp.	pankalkal								
<i>Cordia alliodora</i>	sum pihini								
<i>Cupania</i> sp.	tukrunak								
<i>Dialium guianensis</i>	silam								
<i>Ficus</i> sp.	ani, sutipat								
<i>Geonoma</i> sp.	ahtak almuk								
<i>Hyeronima</i> sp.	pan awal								
<i>Inga</i> sp.	kaas								
<i>Luehea seemanni</i>	inpu								
<i>Miconia</i> sp.	wiramama pihini								
<i>Miconia</i> sp.	wiramama pauni								
<i>Ochroma lagopus</i>	kuhnkuhn								
<i>Pinus caribea</i>	ahuas								
<i>Salix</i> sp.	awisut								
<i>Swietenia macrophylla</i>	yulu								
<i>Tabebuia</i> sp.	auka								
<i>Tetragastris panamensis</i>	sakal								
<i>Trichilia pallida</i>	babasnak								
<i>Trichspermum</i> sp.	wah suh								
<i>Virola koschnyi</i>	bahanak								
<i>Vochysia ferruginia</i>	duhuran								
<i>Vochysia hondurensis</i>	yamari								
<i>Xylopia frutescens</i>	sina								

* Includes all wild floral goods extracted by Tawahka households (n=33) over randomly selected "weigh days" in 1996. 42 weigh days were conducted in Krausirpi among 16 households between January and December, and 44 conducted with 17 Yapuwas households between January and November.

Source: HIID Weigh Day data, 1996.

one dwelling in 1998, Tawahka homes have traditionally lacked the separate kitchen that characterizes Miskito dwellings (Helms 1971).

Rectangulation and stiling also require many more materials than did traditional Tawahka houses. The construction of the most basic stilted home, for example, requires at least nine posts (3 m long by 15 cm diameter; usually the heartwood of termite and rot-resistant species), over 20 poles (the trunks of small trees), vines, at least 15 bamboo stems, to be split and dried for walls and floors, and well over 1,000 *suita* palm leaves for thatch. As a result, at least 20 different species may be used in construction.

Photographs of Tawahka communities taken about 1970 (Adams 1972) show that this bamboo-walled/floored type of home predominated at that time, but a minority of Tawahka homes are built this way today. The advent of the two-handed saw in the interim meant that logs could be sawn; correspondingly, nails became a necessary part of construction (AO; CS). Today, floorboards are found in most homes, and boards form walls or parts of walls in many. The most sophisticated Tawahka home today is formed exclusively of sawn woods, with the exception of the support posts. Chainsaws were first used in house construction in the 1990s, and allow for much harder, more durable woods to be exploited than is possible with manual saws.

Some Tawahka have bought corrugated aluminum roofs, which are appreciated for their durability, as status symbols, and because rainwater can be collected easily from them. But so-called 'zinc' roofs can cause homes to become unbearably hot by day and cold at night; pounding rain produces a deafening roar. For these reasons, thatch remains a preferred roofing material, but must be replaced every four to six years. In general, Tawahka are eager to work on their homes, and cite home improvement as a possible sink for cash windfalls (see Appendix VII).

Subsistence Cycles

It is important to realize that the breakdown of Tawahka subsistence into discrete activities, as presented above, is highly artificial. In reality, different classes of subsistence pursuits often coexist in time and space. For example, forest clearing for agriculture and the extraction of goods such as honey or poles are often coincident; or,

women may fish from boats while waiting for a rice harvest load. Also, the output from one activity can be input to another, such as the burning of fields yielding firewood. Other flows are more serendipitous. In 1998, for example, one farmer had lost a significant portion of his bean harvest to predation by deer, but was later able to recoup his crop losses when he finally shot the deer and used the meat windfall to finance rice planting labour.

Also significant is the fact that subsistence flows are not constant over the course of a year, or even between years. Overall, the dry season is considered a time of plenty: game and fish are most easily taken, fruits and beans are harvested. Cows calve at this time and milk is therefore available. Casual observation suggests overall nutrition is high and morbidity relatively low at this time. In contrast, the rainy season is a time of relative deprivation. Asynchronous crops, such as peach palm and *pera*, or crops with limited seasonality, such as bananas and coconut, thus become particularly important in smoothing consumption (Table 2.7). Market-oriented activities—especially those that can be accomplished in off-peak agricultural months—therefore come to play an important role in accommodating nutritional deficits at this time (see next section).

2.4 Within the Patuca Economy: the Nature of Tawahka Market Involvement

What the Tawahka cannot, or choose not, to derive from their local environment, they obtain through trade. The following discussion offers a broad overview of Tawahka involvement in the Patuca basin trade network and describes basic aspects of the local market economy which are elaborated upon in later chapters.

Geographical Scope of Trade

The Tawahka's economic sphere is best prescribed by the Patuca basin, from which they are linked, in various ways, to national and international markets. To the south (i.e., upriver), the Tawahka buy and sell labour and products as far as the Spanish-speaking frontier settlement of Nueva Palestina, which is connected by road to the markets of the Honduran interior. To the north, they trade with the Miskito

Table 2.7. Peak availability of selected food goods, TABR, Honduras.

	Jan.	Feb.	March	April	May	June	July	August	Sept.	October	Nov.	Dec.
Selected Food Crops												
Beans												
Bananas & Plantains												
Coconut												
<i>Cucurbitaceae</i>												
Maize												
Mango												
Peach Palm												
<i>Pera</i>												
Pineapple												
Rice												
<i>Sapote</i>												
Sugar cane												
Tomatoes												
Yuca/Cassava												
Watermelon												
Other Foods												
Milk (at calving time)												
Wild honey												

Source: Field observation 1994-96, 1998; Interviews; HIID data.

communities as far as the mouth of the Patuca. Ships arriving there link Tawahka to markets in the cities of Honduras' north coast, including La Ceiba and Puerto Cortés. Some trade is also conducted with Culmí and Catacamas via the Río Wampú, and some market exchange (especially of cattle) occurs over the Wangkibila trail with Miskito communities of the Coco River (Fig. 1.3).

With the exception of the overland route to Nicaragua, all significant trade is conducted by boat. Tawahka communities are effectively equidistant between the upriver and downriver poles of trade: up to ten days are required for a return trip to Palestina *or* to Brus Laguna. Indeed, despite the apparently isolation of the Tawahka homeland, the Tawahka are well-placed to engage in trade with both the Miskito of the coast and Spanish-speaking *ladinos* of the interior, and to some extent, mediate the economic relationship between these two. Certainly, they have traded with both groups—under varying levels of duress—since shortly after contact about 1604 (W. 1732; Martínez 1980; Davidson and Cruz 1995; see Chapter Five).

Imports to the Tawahka Reserve

Goods “imported” by the Tawahka into the TABR are typically those bought from itinerant river traders, and those brought in by Tawahka store owners and retailed locally.³² Goods include foodstuffs, livestock, medicines, clothing, and a variety of consumer durables (see Fig. 2.6). Among the most vital productive assets are buckets, machetes, guns, flashlights as well as the items required to maintain and run them (bullets, files, nails, kerosene, gasoline, batteries). These preferences emerge in Table 2.8, which lists all physical goods purchased by 30 households between 1994 and 1996. In terms of total expenditures, about 60% of the money spent on ‘foreign’ purchases goes to four staple items: vegetable oil, sugar, flour, and washing soap. (This calculation, however, does not incorporate the possibly substantial number of *services* that the Tawahka “import,” including medicinal services, education, and labour).

³² In comparing imports and exports from the TABR, it is perhaps not inappropriate to compare the Tawahka's economic sphere to a country given their geographic isolation, complete lack of government intervention in trade, and distinct culture.



Fig. 2.6 Tawahka villagers purchasing clothing from itinerant *ladino* trader (left) at Krausirpi, TABR, Honduras, May 1998. Photograph by the author.

Table 2.8 Estimated annual household expenditures on imported goods,
Krausirpi, TABR, 1996.

	Total expenditure ¹ (Lempiras)	Estimated expenditure per household/yr (L) (US\$) ²		Share of total (%)
Vegetable oil	1879	974.20	83.23	23.32
Sugar	1271	658.97	56.30	15.77
Flour	910	471.80	40.31	11.29
Washing soap	870	451.07	38.54	10.80
Coffee	550	285.16	24.36	6.82
Gasoline	532	275.82	23.56	6.60
Clothing & footwear	354	183.54	15.68	4.39
Mattress	280	145.17	12.40	3.47
Salt	176	91.25	7.80	2.18
Chips, etc.	111	57.55	4.92	1.38
Powdered soup mix	111	57.55	4.92	1.38
Axe	100	51.85	4.43	1.24
Lighting fluid ('kerosene')	98	50.81	4.34	1.22
Baking soda	90	46.66	3.99	1.12
Tomato paste	87	45.11	3.85	1.08
Cigarettes	70	36.29	3.10	0.87
Coca-Cola	64	33.18	2.83	0.79
Cookies	60	31.11	2.66	0.74
Yeast	53	27.48	2.35	0.66
Beer	48	24.89	2.13	0.60
Batteries	43	22.29	1.90	0.53
File	40	20.74	1.77	0.50
Machete	35	18.15	1.55	0.43
Clothing dye	31	16.07	1.37	0.38
Bleach	28	14.52	1.24	0.35
Bucket	27	14.00	1.20	0.34
Pasta	27	14.00	1.20	0.34
Drink mix	24	12.44	1.06	0.30
Modern medicine	21	10.89	0.93	0.26
Cosmetics	16	8.30	0.71	0.20
Sardines	16	8.30	0.71	0.20
Flashlight	12	6.22	0.53	0.15
School supplies	10	5.18	0.44	0.12
Bullion cubes	9	4.67	0.40	0.11
Matches	6	3.11	0.27	0.07
	8059	4178.32	356.96	100.00

¹ Sum of purchase value of all foreign goods bought by 16 Krausirpi hhlds over 44 selected days, 1996.

² Using period average market exchange rate for 1996 of 11.7053 Lempiras: 1 US\$.

Source: HIID Weigh Day data, Krausirpi, 1996.

The basic suite of market goods purchased by Tawahka appears to have changed little this century (Adams 1972; Calix and Cruz 1977; Martínez 1980; CC; RS). There have been some changes through time, however. Guns appear to be owned by fewer households than in the past; sewing machines, considered common 80 years ago, are now a rarity despite sustained demand (Conzemius 1932; Martínez 1980). Modern technologies such as chainsaws and outboard motors have only recently been owned by Tawahka households, but everyday household items such as radios and flashlights are considered no more available now—and perhaps less so—than they were 30 years ago (Calix and Cruz 1977). Indeed, older Tawahka are generally unanimous in their assessment of their relative impoverishment, especially with regard to “luxury” items, over time. They attribute this to a “lack of money” today, due in part to the absence of foreign interest in local products (CC; AO; ES).

Exports from the TABR

How do Tawahka earn income to purchase ‘foreign’ goods? Tawahka finance their imports with a variety of exports, which are sketched out below with emphasis on their historic underpinnings. Contemporary patterns of market income generation are discussed in greater detail in the next chapter.

Wage Labour

Tawahka occasionally hire out their labour within the basin, usually as unskilled farmhands but occasionally as skilled *mayordomos* (chainsaw operators) and *pipanteros* (canoe carvers). Much of such wage work is seasonal, TABR-proximate, and varies annually. During the late 1990s, I witnessed virtually no sustained, seasonal migration for wage work. In this, the Tawahka’s wage experience is very different from that of downriver Miskito communities, from which labour is drawn for months at a time by lobster and other maritime industries (Dodds 1994, 1998; Padilla 1995:47).³³

³³ But individual Tawahka, particularly when young, seize on wage work as an opportunity to travel. Most older Tawahka men—and women—recount periods spent on the coast, or in the ‘interior.’

Indeed, the Tawahka traditionally eschew economic activities that take them away from their homeland for long periods, especially if the work involves labouring alongside Miskito, although some older men spent time in Nicaraguan timber industries in their youth (e.g., CC; RH). For example, Martínez (1980) reported Tawahka men working for brief periods in mahogany camps in Nicaragua, and “only a few” Tawahka reportedly cut mahogany with Miskito and Creole crews on the Patuca in the 1930s and 1940s (HM).

Forest Products

The sale or barter of extractive products (wild floral and faunal goods) has historically been the most important way for Tawahka to obtain outside goods. For example, they have traded dugout canoes, pelts, cordage, and other goods to the downriver Miskito for at least 250 years (Roberts 1827; Young 1842), and the most important economic “boom” periods in the Tawahka experience have been those associated with forest products (see Table 2.9). For example, most Tawahka men tapped rubber during World War II, *tunu* (a latex used in chewing gum manufacture) in the 1960s and 1970s, and *chicle* (also for chewing gum) in the late 1970s (Cruz 1977; see also Offen 1998). Animal skins were also sold for a brief but intensive period in the 1970s (Appendix IV).

By the 1990s, markets for all of these products had disappeared. By 1998, the Tawahka were exporting extractive goods only on an informal and opportunistic basis. Some sold sawn mahogany lumber from the TABR; others sold bark and fiber crafts to a regional NGO; pets, some animal pelts, dried fish, and game meat were also occasionally sold to traders or ‘passers-by.’ The Tawahka also continued to sell dugout canoes and paddles to downriver Miskito as well as in emergent upriver markets (see Chapter Six).

Agricultural Surpluses

Tawahka are steady suppliers of rice and beans to national markets, and they also export plantains and cassava to downriver Miskito communities. It would be a mistake to term these goods “cash crops” however, for the majority of Tawahka households plant

Table 2.9. Periods of greatest Tawahka involvement with external economies, Patuca River Basin, Honduras, 1900-1998.

<i>Export Product</i>	<i>Primary Period of Involvement</i>	<i>Nature of Involvement</i>	<i>Comments and Source</i>
Rubber (various spp.)	1899-1901(?)	tappers	Concession for rubber plantation at Valencia, Upper Patuca (Honduras 1938; Cruz and Benitez 1994)
Mahogany/Cedar	1910-1928	'cutters'	Sporadic exploitation of government-granted logging concessions on Patuca and tributaries (Honduras 1938; von Hagen 1940). Tawahka also cut mahogany on Rio Coco at this time (Martinez 1980:4).
Bananas (var. <i>minimo</i>)	1920-1940	producers	Plantations along Patuca and Rio Wampu; bought by German planters at Bodega (Keenagh 1938; von Hagen 1940; Cruz and Benitez 1994; CC; LD; ES)
Mahogany/Cedar	1936-1941 1939-1944	'cutters'	American and Mexican concerns log upper Patuca and Warunta (Keenagh 1938:216; von Hagen 1940; HM)
Rubber (various spp.)	1942-1945	tappers	Rubber Development Corporation establishes <i>bodegas</i> at Dimikian, Pimienta, Rio Cuyamel and Rio Blanco (Cruz and Benitez 1994; HM)
Chicle latex (<i>Manilkara</i> spp.)	1955-1957	tappers	Companies exploit Winpi, Warunta, and Entre Rios forests (Cruz and Benitez 1994; Offen 1998; JB; CC)
Tunu latex (<i>Castilla</i> spp.)	1967--1976	tappers	American pilot bought <i>tunu</i> , brought to Wrigley plant on Rio Coco (Adams 1972; Offen 1998; LD; AS)
Animal skins	1968-1972(?)	trappers	Salvadorans, others buy wild cat, deer, reptile skins (Adams 1972; Cruz and Benitez 1994)
Chicle latex (<i>Manilkara</i> spp.)	1977-1979	tappers	"El Polco" Co. hires Tawahka exclusively to tap Rio Blanco and Patuca watersheds (Calix and Cruz 1997; Cruz and Benitez 1994; SO; IS; PS)
[Refugee period]	1982-1991	wage work	Nicaraguan refugee settlement along Patuca; UNHCR bases at Wampusirpi, Pimienta; World Relief office at Wampusirpi; Tawahka benefit from related employment, services (COHDEFOR 1986; Cruz and Benitez 1994)
[Placer gold]	~1976-1979 1990-1995	dredgers (wage) pan, dredge	American runs dredger at Ocote (Calix and Cruz 1977) Gold prices >100L/g (LC; SO; IS)
[Cacao]	1995-1998	producers	Incipient 'boom' in cacao cut short by Hurricane Mitch; 90% of crop destroyed (Cruz <i>et al.</i> 1999)

Source: Interview data 1995-98; secondary sources (cited).

[] indicates period of diversification, not *bona fide* 'boom' conditions

For locations, see maps in Fig. 1.3, Fig. 2.1, and Appendix V.

them for subsistence and only sell surplus harvests. Overall, the bean market is considered the most lucrative, because bean harvests in the Mosquitia precede those of the Honduran interior. This means that bean buyers come from great distances to purchase this national food staple. Rice is less marketable because national demand is lower; earnings are significantly higher if the rice can be sold de-husked.

Cash Crops

During the 1930s, the Tawahka grew *minimo*-variety bananas exclusively for purchase by German-run banana farms below Wampusirpi (von Hagen 1940; LD; AC; see Table 2.9). To this day, the feral descendants of these banana plantations line riverbanks within the TABR. Bananas are no longer exported. Markets for cacao, however, first developed in the early 1980s, had, by the late 1990s, formed the singlemost constant export from the TABR, aided by constant markets and year-round production. Now largely destroyed, cacao plantings are estimated to require some four years to begin to recover from the damages associated with Hurricane Mitch (Cruz *et al.* 1999).

Placer Gold

Tawahka have panned the Patuca's placer gold deposits over the past century (Keenagh 1937; Calix and Cruz 1977; Cruz and Benitez 1994). But buyers and increased gold prices made the activity particularly attractive in the mid-1980s (FC; SO). In the early 1990s, households were relocating to upriver beaches to spend the entire dry season panning and selling gold dust directly to *ladino* traders. Several years later, however, participation in gold panning had slackened considerably as deposits ran out and prices stagnated.

Livestock

Tawahka occasionally export cattle, sometimes driving head as far as Nicaragua via the Wangkibila trail. Upriver communities sell pigs to itinerant traders; chickens are exported from all communities.

Internal Markets

The Tawahka also buy and sell internally, among villages and households. The range of goods and services exchanged is great. The Tawahka trade labour, services (especially domestic and medicinal), foods (rice, beans, forest meat, chickens, eggs, milk), canoes, thatch, wood, and domestic animals. During the study period there was a vibrant market for medicinal plants, and several *curanderos* were kept busy. Any household good can be traded, and many consumer durables, such as watches, radios, and guns, may have passed through numerous hands. Table 2.10 indicates the range of goods that Tawahka have purchased from one another, including staple foods, livestock, medicines, forest products, and firewood. Note that the significant local markets in services, including labour and medicinal plant treatments, are not represented.

Cash Needs vs. Cash Availability

In interviews, Tawahka claimed that cash is most abundant following the bean harvest, because “[outsiders] always come to buy beans” (SO). This ‘money-rich’ period is coincident with a time of cash need, in the form of Easter and Mother’s Day celebrations (EA; EC). In contrast, “nobody buys rice at harvest time” (EA), in September/October. Indeed, the dry season is considered a time of abundant cash, when harvests come in and cash is readily available from bean sales and agricultural wages; the rainy season, however, is considered a time of “no money” (*‘lala apu’*) and relative deprivation (see Table 2.7), especially given season-specific cash demands such as school uniforms and supplies (15 September) and Christmas expenses. This temporal disjuncture between earning and spending are important because they mean that households are encouraged to save their earnings towards leaner times.

Market Characteristics of the TABR

In the 1990s, state involvement in the Tawahka economy, through so-called meso-level policies, was minimal. Government presence was felt only through the spectre of future restrictions on, and sporadic taxing of, forest exports; Tawahka also sold cacao through a state-run agency. Otherwise, no state-run credit initiatives were in

Table 2.10 Estimated annual household expenditures on local goods,
Krausirpi, TABR, 1996.

	Total expenditure ¹ (Lempiras)	Mean estim. expend. per household/yr		Share of total (%)
		(L)	(US\$) ²	
Rice, husked	1561	809.33	69.14	31.41
Livestock: cattle	1500	777.70	66.44	30.18
Meat (domestic)	1260	653.27	55.81	25.35
Meat (wild)	253	131.17	11.21	5.09
Beans	100	51.85	4.43	2.01
Firewood	65	33.70	2.88	1.31
Various fruits	63	32.66	2.79	1.27
Livestock: chicken	51	26.44	2.26	1.03
Milk & cheese	45	23.33	1.99	0.91
Traditional medicine	20	10.37	0.89	0.40
<i>Musa</i> varieties	13	6.74	0.58	0.26
Eggs	12	6.22	0.53	0.24
Palm leaf thatch	10	5.18	0.44	0.20
Fish	7	3.63	0.31	0.14
Yuca/cassava	4	2.07	0.18	0.08
Honey	4	2.07	0.18	0.08
Pineapple	2	1.04	0.09	0.04
	4970	2576.78	220.14	100.00

¹ Sum of the purchase value of all locally-obtained goods purchased by 16 Krausirpi households over 44 randomly selected days in 1996.

² Using period average market exchange rate for 1996 of 11.7053 Lps: 1 US\$ (Banco Central 1999).

Source: HIID Weigh Day Data, Krausirpi, 1996.

place, although agricultural credit programs are relatively common in other remote forest peasant areas (e.g., Chibnik 1990; Coomes 1996b; Smith 1996). Neither was any form of insurance available to farmers, and no price-leveling policies were in place. This latter lacuna is especially significant in the Patuca basin, where traders exploit what can be marked inter-temporal and interregional price variations. NGOs filled this vacuum to some extent during the 1990s through a series of banking and micro-credit programs, all of which ended in failure. Tawahka villagers nevertheless were able to obtain credit—in goods or cash—from shopkeepers and itinerant traders; interest was rarely charged (AG; CM). Agricultural extension is provided by NGOs for cash crops, including cacao, rice, and beans. Price information—albeit thin and incomplete—appears to be well-shared with and between villages, facilitated by the Tawahka's tight-knit settlement pattern and use of radios.

In early 1998, the Lempira (Honduran national currency) was valued at approximately 13L to 1US\$ (Banco Central 1999). Money, however, was relatively scarce on the Patuca, and barter transactions common. Many Tawahka described cash as perishable, not only because circulating bills were quickly worn out, but because savings were rarely held in cash.

In sum, the Tawahka economy is characterized by market uncertainty, few formal means of holding wealth, and weak credit markets. Tawahka livelihoods are therefore expressed in a context of environmental risk *and* market uncertainty. The situation presumably compounds households' preference for risk-averse behaviours, such as income diversification and investment in varied forms of wealth.

History of "Boom" Times

Tawahka participation in the market economy has been characterized by periods of intense engagement and relative stagnancy (see Table 2.9). Indeed, it is important to understand the modern economy of the Patuca in light of the Tawahka's historic experience with the region's so-called 'boom-and-bust' periods.

Since Europeans first reached the Mosquitia's shores, international demand for particular coastal, marine/forest, mineral, and agricultural products has linked the region

and its inhabitants in a direct way to the world's market economy (see Helms 1971; Nietschmann 1973; Offen 1993, 1998). Interior river basins such as the Patuca have given up their timber, gold, tree latexes, skins, and bananas whenever international markets set prices high enough to make extraction of their scattered resources feasible, especially given a thin and migratory labour force. During such periods of international interest, local people were incorporated into the world's capitalist economic system at its base: as primary producers/extractors of unrefined products.

As such, the Tawahka have been involved in several episodes of foreign-funded ventures to tap the Patuca's biological, geologic, and edaphic wealth over the past century (see above; Conzemius 1932; Adams 1972; Cruz 1977; Cruz and Benitez 1994; CC; LD; HM; RS). Peak periods in the extraction/production of each of these products rarely overlapped. Rather, most were separated by a hiatus, or bust, sometimes lasting up to two decades, in which no activity predominated. The stop/start, boom/bust nature of foreign economic interest in the Patuca resonates in the communal memory of local peoples, for whom the temporal distinctiveness of past economic eras act as timeposts. For example, it is standard for Tawahka to refer to past events not by year, but in relation to different extractive eras, such as "*chicle taim*" or "*yulu taim*" ("in the time of *chicle*/mahogany"). Interstitial periods between these 'boom' periods (e.g., the ten-year hiatus between *chicle* and *tunu* tapping eras, 1956-1967; see Table 2.9) are given no economic character except as "*tunu kriwan taim*," or "the time when *tunu* era was over."

In their economic organization, boom periods on the Patuca displayed a pattern typical of extractive economies in which labour is thin, local capital nonexistent, transaction costs in a lowland river environment high, and the resource supply scattered and distant. Foreign companies established a chain of storehouses reaching evermore upstream, linked by weekly or monthly boat travel (Palmer 1945; see Offen 1998). Consumer goods and extractive technologies moved inland along this chain; the 'boom' product moved out. Only rarely was labour relocated. In the case of the Patuca, companies sent non-local *contratistas*³⁴ into Tawahka territory to run the *bodegas* or *kamiseri* (commissary stores). The location of these stores/storehouses balanced ease of

³⁴ That *contratistas* were non-local was essential to the easy conduct of business (AS).

transport with benefits of proximity to areas of greatest labour concentration, and in turn served as nodes of settlement (e.g., the villages of Dimikian and Río Blanco were formed around rubber 'warehouses': HM). Some located directly in Tawahka villages, others on uninhabited tributaries closer to production zones (Calix and Cruz 1977). The *contratistas* provisioned workers with food and tools, extended credit, and received the product. Cash was rarely necessary because upon delivery of their goods, Tawahka labourers claim to have immediately made up for their sum in canceling prior debt; the balance went into purchase of household necessities and luxuries, including rum. Indeed, many Tawahka men claim to have drunk the vast majority of what they earned from months of toil in the forest within the first two or three days of returning home (CC; DC: ES2).

Although such testimonies evoke images of a coercive, near-usurious form of labour relations, or 'debt-peonage,' the Tawahka see the experience differently. First of all, they consider "booms" times of plenty when luxuries were available and money abundant. Indeed, price ratio comparisons and oral histories suggest that local people's buying power during extractive eras may have been considerably higher than in the late 1990s. Also, there is considerable evidence that the Tawahka had various means of recourse when a debt burden became too heavy, not the least of which was default (CC; DC; HM; IM; see Appendices VIII, IX). Overall, testimonies accord with recent revisionist approaches to economic upswings in forest environments, which highlight the mutual risks of production for both producers and buyers (e.g., Hugh-Jones 1992; Barham and Coomes 1997; Offen 1998; see also Chapter Six).

2.5 Tawahka Demography

Chapter One has already hinted at the importance of demographic factors to understanding economic patterns within households and within populations. Here I look more closely at the demographic character of the Tawahka, because the quantity and quality of in-house and extra-house labour are incorporated into later analysis of Tawahka production patterns. In Table 2.11, I summarize the demographic characteristics of the

Table 2.11. Demographic indicators¹ for Tawahka population of the TABR (1995-97) and Honduras (1998).

	1995	1996	1997	Mean 95-97	Honduras 1998 ³
<i>Total population at mid-year</i> ²	919.0	969.0	1016.0		
<i>Fertility</i>					
Total live births	56.0	48.0	60.0		
Live births/1000 population	60.9	49.5	59.1	56.5	32.0
No. women 15-49 years	181.0	190.0	199.0		
General fertility rate	336.5	260.7	296.8	298.0	
Age-specific fertility rates					
15-19*	254.9	235.3	358.5	282.9	81.2
20-24	348.8	229.2	300.0	292.7	190.5
25-29	411.8	371.4	394.7	392.6	202.7
30-34	263.2	263.2	285.7	270.7	151.9
35-39	461.5	466.7	214.3	380.8	104.1
40-44	272.7	0.0	133.3	135.4	52.9
45-49	0.0	0.0	0.0	0.0	11.6
Total fertility rate (per woman)	10.06	7.83	8.43	8.78	4.1
<i>Mortality and Migration</i>					
Total deaths	6.0	1.0	8.0		
Deaths/1000 population	6.5	1.0	7.9	5.1	7.0
Total infant deaths (< 1 yr)	5.0	0.0	4.0		
Infant deaths/1000 live births	89.3	0.0	66.7	52.0	42.0
Immigration into Reserve	2.0	1.0	24.0		
Emigration from Reserve	1.0	12.0	11.0		
Net migration rate (%)	0.0	-1.4	1.3	0.0	
<i>Rates of Increase</i>					
Rate of natural increase (%)	5.4	4.9	5.1	5.1	2.5
Annual rate of growth (%)	5.5	3.5	6.4	5.1	2.3
Doubling time in years	12.8	20.3	10.9	14.7	

¹ All indicators calculated using standard international formulae outlined in Haupt and Kane (1986).

² Averaged from beginning-of-year estimates, from May 1998 baseline of 1030 censused individuals (Source: Household surveys 1996, 1998).

* Includes mothers less than 15 years old.

³ Source: U.S. Bureau of the Census (1999).

just over one thousand Tawahka ($n=1030$) who made their permanent home in the TABR in May 1998 (see also McSweeney 1996, 2000); those most relevant to the dissertation are discussed below.

Age Structure

One of the most striking features of Tawahka demographic structure is its extreme youth: in 1998, the Tawahka's *median* age was 12, and 75% of all Tawahka were under 24 years old. If children under 15 are combined with the scant number of elderly (1.35% of the population 65 and over), a full 58% of Tawahka were, by demographic convention, considered economically dependent,³⁵ reliant on a minority of economically active adults. This high dependency ratio—essentially child dependency—shows that adult Tawahka carry an unusually large economic burden in the form of children. At the household level, this is translated into generally high consumer/worker ratios, differences in which should hold strong explanatory power in understanding households' production and investment choices through consumption demand and labour supply.

But the Tawahka's overall youth also has important community-level implications. For example, youthfulness tells us much about the supply of wealth held in production experience. As a *people*, the Tawahka combine a diverse array of production experience earned through participation in successive extractive, agricultural, and political eras on the Patuca. But this knowledge is held by the fraction of Tawahka old enough to have lived through these periods. The population's steep intergenerational gradient means thin transmission of this knowledge to the 75% of the population under 24 years old. Thus the death of one Tawahka elder is a severe blow to the communal knowledge base, a fact well-recognized by villagers. At the recent death of one Krausirpi patriarch, for example, a common lamentation was that "it's as though a library has burned" (DS; LT).

³⁵ In fact, children often start to contribute significantly to the household economy from about the age of five. Both boys and girls mind younger children, haul water, fish, plant, and wash pots and clothing.

Growth Rates

The Tawahka's bottom-heavy population structure is graphically displayed in a population pyramid (Fig. 2.7).³⁶ The pyramid's overall shape is characteristic of a developing population in the early stages of demographic transition. But in comparison to that of rural Honduras overall, it is exaggeratedly expansive, suggesting growth rates that are unusually high even in the national rural context. To calculate the demographic indicators behind this pattern, I analyzed census data that I had compiled in 1995, 1996, and 1998, and averaged over the three years to minimize the effect of natural fluctuations in such a small population (Table 2.11; see also McSweeney 2000).³⁷

The most influential in explaining the Tawahka's youth is the extremely high fertility rate that Tawahka women exhibited during the study period, at 298 per 1,000 women. In other words, every year, about one in three Tawahka women of childbearing age (15-49 years) gave birth. The more refined measure of *total* fertility (TFR) suggests that by the end of her childbearing years, a Tawahka woman can be expected to have on average 8.78 live births. Though not extraordinary in the super-fertile context of the Mosquitia's subsistence populations (e.g., Adams 1972; Dodds 1994, 1998), this rate is twice the Honduran national average (US Bureau of Census 1999) and approaches the highest TFR ever recorded for a human group (Hern 1992).

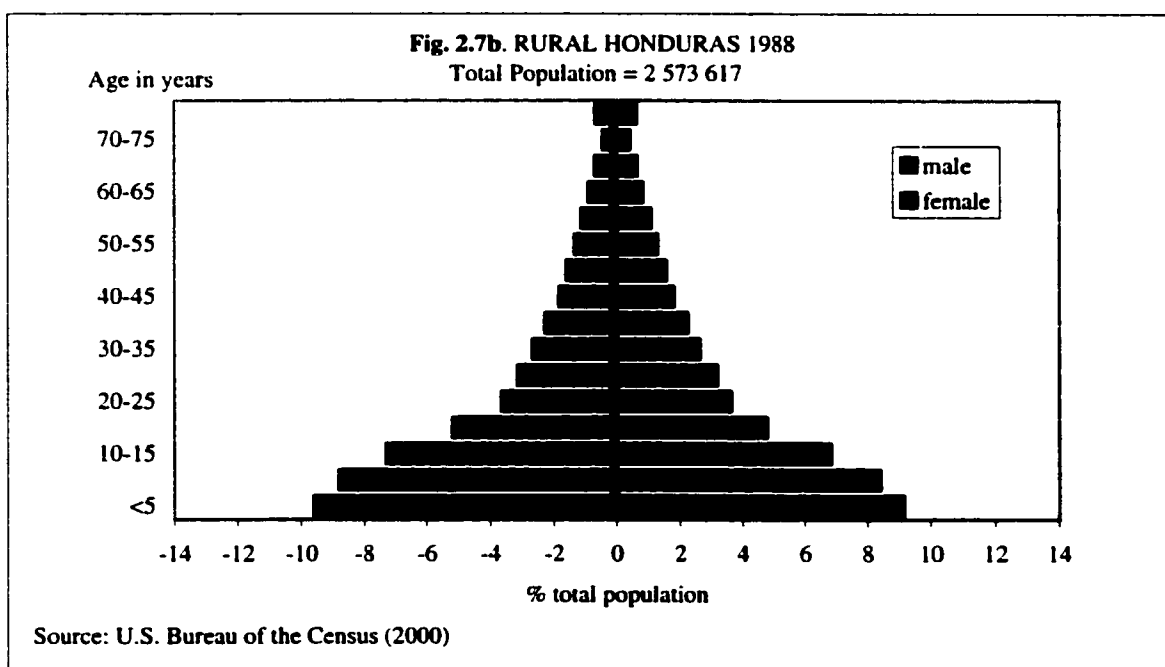
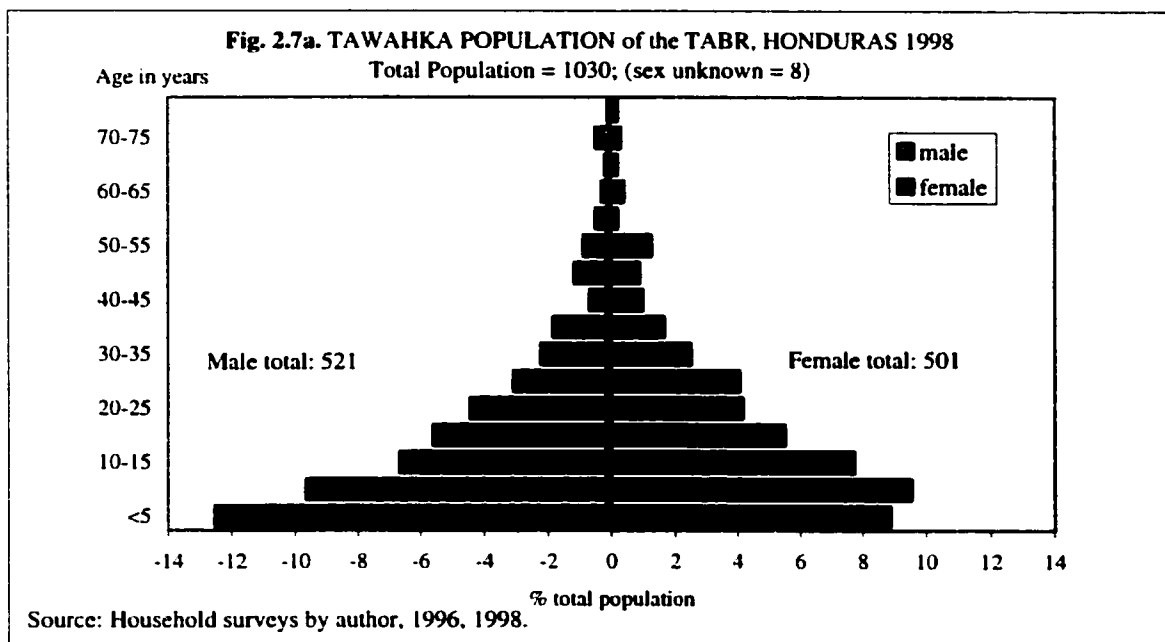
At least four factors appear to have contributed to high fertility among the Tawahka during the study period. Among them, the incidence of stillbirths was virtually nil, due in part to improved emergency medical services on the Patuca. Nevertheless, only one of 35 births in Krausirpi in 1995 was attended by a medical professional; deliveries, like most prenatal and postpartum care, were overseen by female kin and traditional midwives.³⁸ Second, the incidence of infertility was negligible: every living

³⁶ The markedly larger number of males under five years old is unexplained. The Tawahka do not practice infanticide and in general do not favour male children over female. This may be only an exaggerated example of human's standard birth ratio, which favours males. Sex ratios are then balanced by differential mortality to eventually favour females.

³⁷ All calculations and definitions for demographic indicators follow the standard outlined by the Haupt and Kane (1989).

³⁸ About five Tawahka women had received modern training as midwives. One is frequently called on; others fear practicing lest they be blamed for birth difficulties or stillbirths.

Fig. 2.7 Population pyramid for the TABR (1998) and rural Honduras (1988).



Tawahka woman over the age of 22 had successfully delivered.³⁹ Third, the Tawahka are highly tolerant of casual relationships among teenagers, which commonly produce 14 or 15 year-old mothers,⁴⁰ resulting in unusually high fertility rates for this young age cohort (Table 2.11). Indeed, both men and women may have several partners in their lifetimes; one quarter of all Tawahka women had already had at least two 'husbands.' Fourth and most importantly, modern contraceptive options have been so haphazardly introduced by health workers that they remain poorly understood, and in addition were only sporadically available. Some women claimed contraceptive success with herbs and the rhythm method, others paid for expensive sterilization at the Moravian hospital in Ahuas. Many Tawahka women, both young and old, acknowledged interest in spacing births more widely, and having fewer children overall.⁴¹

One of the economic implications of high fertility is the toll it takes on women and infant health. Short birth intervals typically translate into more sickly children, and the subsequent consignment of precious household resources to health care. Tawahka women of child-bearing age are chronically anemic, a condition that increases with the number of births (CR). We can expect, then, that households in which the female head is in her later child-bearing years to be ones where her resources—in terms of time and energy to devote to non-reproductive tasks—are most severely compromised. She is less likely to help out with agricultural tasks, and her ability to engage in market-oriented activities such as handicraft production are greatly diminished.⁴² Overall, investments are likely to be strongly biased towards human capital in such households, in the form of health and child care, and child education.

³⁹ Births are not considered a 'big' event. What Keenagh noticed among Patuca villagers in the mid-1930s still held during the study period: "The question of birth he dismissed airily: it happened daily and no notice was taken of it..." (1937:152).

⁴⁰ The Miskito term *tiara maia* in fact denotes such relationships as a woman's 'teenage husband' that may or may not flower into a long-term relationship.

⁴¹ Based on informal discussion with Tawahka women. In a formal study, Dodds (1998) found that among the Honduran Mosquitia's coastal indigenous groups, women at the end of their childbearing years desired about two fewer children than they in fact had.

⁴² Chances for Tawahka women to alleviate the burden of childcare are somewhat more frequent, however, than might be expected. The fact that households are large, and group matrilocally, means that there are often related, lactating women to care for a baby if the mother wishes to spend the day fishing, for example. Similarly, when a child is born, it is typically first nursed by a related female—grandmother, aunt, sister-in-law—while the mother recuperates.

Relatively low death rates⁴³ during the study period may be due in part to increased medical care during the past several years, since a medical clinic opened in Krausirpi and a doctor has been available in Wampusirpi. Tawahka also rely heavily on herbal healers, often eschewing clinic visits in favour of expensive traditional treatments (see House and Sánchez 1997). Low death rates combined with modestly positive migration rates to accentuate the overall effect of high fertility on Tawahka population dynamics during the study period. Rates of natural increase were twice the national average; with migration accounted for, the Tawahka of the TABR exhibited an annual growth rate of 5.0%. This rate is faster than that of other indigenous groups in northeastern Honduras and Nicaragua (Dodds 1998b; Stocks 1998), and twice the national average (U.S. Bureau of the Census 1999). This figure suggests a doubling time for the Tawahka population of only 14.7 years.

The Tawahka's rapid growth rate, then, explains the population's youth, and accounts for the relatively low number of adult workers per household (see Chapter One). Furthermore, the Tawahka's growth rate warrants that we look anew at the pressures on indigenous lands and resources. Modern conservation/development discourses typically depict forest indigenes' livelihood strategies as constrained by exogenous forces, usually in the form of colonist encroachment or outsider resource appropriation (see earlier). As a result, such concerns have informed the initial establishment, management, and zoning of indigenous lands, including the Tawahka's (e.g., Herlihy 1993, 1997). But the Tawahka's doubling time of ~15 years demonstrates that such issues must also be complemented by recognition of the *internal* pressures indigenous groups will increasingly exert on their own reserves' resources. In other words, Tawahka patterns of forest use should also be interpreted in light of *self-imposed* scarcity.

⁴³ But infant death rates are relatively high. Of four that I witnessed, all appeared due to dehydration associated with the diarrhea of intestinal infection.

2.6 Education: Invisible Investment

Numerous studies have shown that educational attainment can strongly condition the way in which neotropical forest peoples use the natural resources around them (Godoy 1994; Coomes 1996; Murphy *et al.* 1997; Lanjouw 1999). Because the specific links between education and resource use are explored elsewhere in the dissertation (see Chapter Four), a brief discussion of the Tawahka's educational history is warranted.

Most adult Tawahka have received some formal education (see Table 1.1), and are functionally literate and numerate in Spanish and Miskitu: a result of the Tawahka's long history of formal, non-ecumenical education. In 1916, the Honduran government sent teachers to the lower Wampú and encouraged peripatetic households to settle in El Sumal, where children were taught for several years (Martínez 1980). No teachers reached the zone again until 1958, when a school was built in Krausirpi (Calix and Cruz 1977; Cruz and Benitez 1994). There, a succession of Miskito teachers taught basic Spanish literacy and numeracy to children 6-15, and did so until at least 1998. The school made Krausirpi a settlement focus for the upper/mid-Patuca, and drew children from neighbouring *ladino* and Miskito settlements until the 1980s (JB; Cruz 1977), when these communities constructed their own schools (see Table 2.1). Nevertheless, the quality of teachers has typically been of greater concern than the provision of a schoolhouse; a recent push by the Tawahka Federation to train Tawahka teachers will mean that teachers reside permanently in communities, and teach Tawahka language and culture.

Students interested in secondary-level education must leave the TABR. There are high schools in the downriver Miskito communities of Brus Laguna and Wampusirpi. Students board, and must pay for materials and uniforms. Subsequent education, usually involving training as a health worker or teacher, has been pursued by Tawahka students in Tegucigalpa, Choluteca, La Ceiba, and Puerto Lempira. The first Tawahka student graduated from such a program in 1997.

The Tawahka have a strong belief in the value of education. In their words, they see that those who "work with a pencil" are better off than those who "work with a

machete” (AS). Besides improved earning power, they see that literacy and numeracy gives them an edge in trade and makes them better able to deal with outsiders; this is especially so for women. As one Tawahka elder pointed out:

We were brought up blind—we didn’t study. So I gave my children everything—they can read, write. I see that now it’s more important. It’s nice to study—how nice to be able to read—who could trick you? [*¿quien le va engañar?*] (ES2, Krausirpi, March 1998; *transl.*)

In addition to being less gullible, a better-educated person is seen as more hygienic, more able to follow the Bible, and better able to speak Spanish. Tawahka are proud of their relatively high communal levels of education, especially when compared with illiterate *ladino* peasants.

For these reasons, many households go to near-Herculean lengths to educate their children. Households pay a high short-run cost for education, especially in terms of lost labour. But education is generally perceived as investment that “can’t be lost” (DC; JD). The Tawahka’s willingness to invest in education has already led to sharp intergenerational difference in production portfolios among families. For example, the first Tawahka to graduate from high school—having completed nine years of education and graduated as a teacher—was funded in his studies by the canoe sales of his illiterate father. The son does not know how to make canoes.

CHAPTER THREE

Patterns of Commercial Extraction among Tawahka Households, Honduras

3.1 Introduction

The preceding chapter outlined the varied ways in which the Tawahka use forest products for subsistence and commercial purposes. But given that the Tawahka, like most forest peasants, derive market income¹ from a variety of sources, how can we isolate the *relative* importance of forest product sale in the commercial portfolio of the Tawahka as a people, and for individual households? The question is important because the scale and methods that are used to assess forest peoples' financial 'reliance' on the wild goods around them very much conditions the way scholars and conservation/development practitioners subsequently think about the forest/peasant relationship. Researchers, in fact, have used several measures to assess the importance of forest resources to rural households, including forest product consumption rates, time allocation data, and the composition of productive household assets (see de Beer and McDermott 1996:160-165). But perhaps the most common measure of forest use within the environment/development literature is the *income* households derive from the sale of forest products. Income data, however, are often difficult to obtain in forest peasant environments (Barham *et al.* 1999), and then can be secured in different ways and at different scales.

The purpose of this chapter is to examine the role of forest products in the production strategies of the Tawahka between 1994 and 1998 using data on market income. The chapter is intended to set the analytical framework for Chapter Four by categorizing commercial forest use by the Tawahka; effectively, this chapter establishes what the dependent variables will be in subsequent analyses. At the same time, the chapter examines the strengths and drawbacks of a forest use measure that many

¹ I use the term 'market income' rather than 'cash income' because much commercial exchange on the Patuca River includes barter.

researchers have employed largely uncritically. Specifically, this chapter seeks to:

- distinguish forest-derived income from other income sectors and explore the links among them;
- establish patterns of extractive income distribution, reliance, and specialization, at the level of the Tawahka Asangni Biosphere Reserve (TABR), village, and household;
- illustrate how income data can be used to address issues of inter-annual fluctuations in forest use, towards distinguishing constant from sporadic forest users; and,
- finally, explore whether forest-derived income is influential in raising household incomes overall.

In so doing, the chapter contributes in three specific ways to the interdisciplinary literature concerned with the microeconomics of forest product marketing. First, the analysis explores the process of measuring and classifying forest use through income, and contributes to the issue of rain forest 'reliance' (see Coomes and Burt 2000). I clearly define forest-derived income, and locate it within the broad range of income-generating opportunities that households face, from wage work to mineral extraction to petty trade. Thus this chapter complements an emerging body of research that is able to quantify the *relative* contribution of forest resources to forest households' production portfolios (e.g., Gunatilake *et al.* 1993; Godoy *et al.* 1995a; Coomes 1996; Hedge *et al.* 1996; Kant 1997; Reddy and Chakravarty 1999; Takasaki *et al.* 2000b). In contrast, many studies have assessed households' commercial forest-based activities in isolation from other income-generating sectors. Without placing forest use in a comparative context, the studies' claims that householders are "forest dependent" or "extractive specialists" share no common standard,² making inter-regional comparisons difficult (see Byron and Arnold 1999).

Second, the chapter is distinct in incorporating multi-year data to look at patterns

² For example, FAO (1995) and Reddy and Chakravarty (1999) describe householders' "dependence" on the forest, but do not explain what dependence constitutes; Jepma (1995:32) describes the "economic importance" of NTFPs but does not compare extraction to other sectors in the rural economy. The definition of key terms also varies. Barham *et al.* (1999) establish households that derived more than 30% of their total income from forest product sale as forest 'reliant'; Godoy and Bawa (1993) and Godoy *et al.* (1995a) do not define forest "specialization"; Wickramasinghe *et al.* (1996) use householders' own opinion of whether forest products formed a primary, or secondary source of income. Gunatilake *et al.* (1993) and Kant (1997) do, however, present both total and market (cash) income.

of forest use *over time*. I do so in part to distinguish sporadic from constant forest users, but also to recognize market income formation as an ongoing, flexible *process* (after Ellis 1998). This longitudinal approach also serves to minimize one of the main drawbacks of inferring forest use patterns from income data. Unlike a household's asset profile, its annual market income portfolio lacks temporal depth: how a household gained income in one year says little about how it earned income the year before or will earn in subsequent years, largely because of the incompleteness of markets and high environmental risks characteristic of forest environments (see Upton 1996; Murphy *et al.* 1997; Barham *et al.* 1999).³ Yet many studies present income data from a single year or less, and infer from them constancy in householders' production strategies.⁴ Yet researchers have no way of knowing whether they are sampling an anomalous year, either for the household or community, unless they sample over time.⁵ As FAO (1995:19) states: "The key to good forest management is to identify trends in use, not merely static facts." Other researchers have also argued for the superiority of long-term studies (Godoy and Lubowski 1992; Godoy *et al.* 1993).

Finally, the discussion lends Tawahka-specific findings to the debate on the role of forest products in raising rural incomes. Some researchers argue that forest product marketing is an effective tool in conservation and development because the commercialization of forest products can serve to value forests while raising incomes for traditionally marginalized and often indigenous rural populations (e.g., Nepstad and Schwartzmann 1992; FAO 1995; Clay 1996; Kant 1997; Pimentel *et al.* 1997). Others have countered that: a) because forest products are rarely processed at their source, middlemen stand to gain more than extractors (Ryan 1991); b) the unskilled nature of forest extraction offers returns that are no higher to what forest peasants already earn (Southgate 1998); c) or, as incomes rise, households will be drawn out of extraction (Godoy 1993; Gunatilake *et al.* 1993). But as Coomes (1996) and Kant (1997) have

³ This is especially the case in economic environments where participation in one industry is not overdetermined, as occurred previously during "boom" periods for particular export goods.

⁴ Some studies have used data from a single calendar year to effectively illustrate the valid point that forest use also varies *seasonally*, and may help to smooth income between months.

⁵ Ganesan (1993) is an exception, presenting six years of NTFP extraction data. Obviously, this approach has serious practical limitations. Takasaki *et al.* (2000b) obviate this problem by gathering longitudinal data in the form of questions to householders about their production histories in specific years.

pointed out, the debate is stalled in our poor understanding of forest peasant microeconomics, and in the absence of rich data on overall market income portfolios and the forest-based activities within them. Both forms of Tawahka-specific data are used here to test the relationship.

Market vs. Total Income

As outlined in Chapter One, the present study seeks to assess the degree to which the Tawahka rely on the forest to generate market income (i.e., income from the sale of goods and services). In this regard, I have chosen to focus on market income rather than total income (i.e., value of *all* production) for two reasons. First, remote subsistence-based societies such as the Tawahka are often perceived as entirely self-sufficient. But in fact their long—if sporadic—trade history with outsiders means that a variety of ‘foreign’ goods and services, including certain foods, tools, formal education, and modern medicine, have come to be considered fundamental to local peoples’ perceived well-being (Helms 1971; Hugh-Jones 1992). Thus the acquisition of such goods through participation in local and regional market networks may become, after basic caloric satisfaction, a livelihood priority. Does the sale of forest products, then, have a role in assisting households to obtain these goods? Second, Tawahka households appear to have highly varied success in generating market income, especially compared with the relative equality of their overall production.⁶ This means that analysis of market income data offers the best opportunity to illuminate the determinants of difference among households, towards isolating factors that appear to improve overall well-being.

The chapter is structured as follows. Section 3.2 describes the categorization and

⁶ As indicated by comparing Gini values between total income and market income. The Gini coefficient is used to compare income distributions between populations. The coefficient measures the deviation between equitably distributed income and actual income distributions of a Lorenz curve: $G = 0.5 \sum_{i=1}^n |a_i - b_i|$, where n is the number of groups into which income is divided, and a_i and b_i are the relative frequencies for the x and y axis scales, respectively. A Gini value of 1 indicates that the top share of households earns 100% of income; a Gini value of 0 means that income is equitably distributed. Honduras’ overall Gini in 1996 was 0.54; Canada’s was 0.32 in 1994 (World Bank 2000). Among the Tawahka, the Gini values for total rice and bean production in 1997 (total quantity produced) were low, at 0.36 and 0.38, respectively, and would likely have been even less skewed had I controlled for household size. In contrast, the distribution of market income from the proportion of the rice or beans *sold* was twice as skewed, with Gini values of 0.77 and 0.63, respectively.

analysis of one year of market income data (1997-98). Section 3.3 then details analysis of a more longitudinal income data set (1994-1997); the discussion reviews the relevant findings of each.

3.2 One Year of Income Data (1997-98)

Methodology

This section draws from data I collected during interviews with 88% of the Tawahka households of the TABR between February and May, 1998 (see Chapter One). I asked household heads to estimate all members' total earnings from a list of goods and services that prior research suggested would capture the most important income-generating activities. I also used an open-ended question to ask respondents about any other sources of income. Questions were designed so that one year of productive activity (March 1997-March 1998) could be reconstructed for all income-generating sectors. This particular time interval was chosen because March usually coincides with Easter Holy Week, a memorable timepost.

Respondent recall of some market transactions was occasionally problematic. This was expected because of the informality of the Tawahka economy: no records are kept and market transactions occur in a variety of locales. To jog memories, I often incorporated prior data into interviews (i.e., 'you used to have chickens—what happened to them?'). Nevertheless, it seems likely that respondents' answers are uniformly biased towards more memorable market events, such as larger sales and longer work contracts. This bias is suggested by the fact that data from monthly, in-depth income interviews collected by HIID between 1994-96 show a wider range of income sources than occur in this data set. These include the sales of eggs, meat, fruit, and so on—transactions that are easily forgotten over the course of a year. Thus data presented here should be considered *conservative* estimates of market income, and likely underestimate the full breadth of income sources.

Some respondents were unable (or, in rare cases, unwilling), to answer all questions. This was most often due to the absence of household members who were known to have generated income, but the details of which were not known to the

respondent. As a result, I was able to obtain a full set of market income data for only 100 of the 116 households sampled (87% of the study sample, or 76% of the TABR's Tawahka households).

Isolating 'Market Income'

Tawahka responses were reviewed to clearly isolate "market income" from other forms of exchange. For example, within-household exchanges were discounted. Remittances were also excluded because it proved impossible *post hoc* to distinguish transfers *within* households from those between households. No loans, credit, or earnings from pawn were included. Every effort was made to distinguish wage income (e.g., as a gold-dredge diver) from self-employment (e.g. independent gold panning), though respondents often confused the two. Only the completed portions of transactions were recorded. Thus if a household sold 400 Lempiras worth of rice but had only been paid half that amount, I recorded only 200 Lempiras.

The Tawahka economy is only partially monetized. Because cash is often scarce, 'market' income is not synonymous with 'cash income.' To simplify the analysis, I assumed that no premium on cash existed (see Chapter Two). Income estimates therefore reflect the sum of any cash earnings plus the cash value of barter income, as valued by the respondent.⁷

During interviews, I occasionally found it necessary to clarify whether a transaction was indeed barter, i.e., had an explicitly market, or commercial intent, or was a form of reciprocity. The latter is better considered within non-market, subsistence income (Ellis 1998). Thus labour exchanged for meat is considered barter income, valued at the mutually recognized market price of the meat. But labour exchanged in kind is excluded, since such exchanges are probably best perceived as payment to or from a household's stock of social capital.

The land, homes, and firearms sold by seven households were also excluded from the sample. This is because these sales were known to have occurred at least one year—

⁷ I considered local peoples' assessment of product values reliable for two reasons: a) price information appeared well-shared within Tawahka communities; b) only the respondent knew the temporal context of the sale—an important factor given intra-annual price variations.

if not a whole decade—after the good’s acquisition or production by the household. Without information regarding original buying prices, land values, or measures of depreciation in the interim, the sale value of these items could not be discounted to properly assess the *revenue* thus accruing to households.

Categorizing Market Income Sources

I divided the Tawahka’s market income into seven sectors. The main intent of this division was to isolate forest-derived income from all other forms, but a merely binomial analysis would have obscured inter-sectoral links and prevented analyses of specialization. There is no template for categorizing income sources in forest landscapes, and researchers have broken down peasant incomes in a variety of ways (see the different sectoral divisions in Gunatilake *et al.* 1993; Coomes 1996; Hedge *et al.* 1996; Kant 1997; Simmons 1997; Reddy and Chakravarty 1999; Takasaki *et al.* 2000a). But how income is broken down is important, because the number of sectors into which income is divided influences measures of specialization. Furthermore, as Ellis (1998) points out, studies among peasants have shown that when households alter their activity mix over time, they are more likely to shift within sectors (from bean to rice farming for example) than between them (farm to non-farm). Income data must therefore be categorized to reflect what local peoples see as comparable or distinct activities.

This study bases market income categories on geographical (e.g. farm/forest) and functional (e.g., wage work/self-employment) criteria. The division does not adhere exactly to the income source categorization suggested by agricultural economists (e.g., Ellis 1998), largely because forest peasants do not operate under the same conditions as the classic agrarian peasant. Agriculture and livestock, for example, are traditionally paired in standard peasant contexts (e.g. Upton 1996:53) but are kept separate here because Tawahka cattle do not receive agricultural inputs and livestock range freely on common land. Nevertheless, income sources are presented in such a way as to facilitate later re-aggregation into alternative categories for inter-study comparisons. The rationale for the specific income categorization used here is outlined below. Specific goods sold by the Tawahka are illustrated in Figs. 3.1 and 3.2.



Fig. 3.1 Forest products sold by Tawahka households, 1997-98 (clockwise from upper left): thatch palm leaf, bark (for cloth), mahogany lumber, bamboo; TABR, Honduras. Photographs by the author.



Fig. 3.2 Goods and services sold by Tawahka households, 1997-98 (clockwise from top): cacao, medicinal plant treatments, placer gold; TABR, Honduras. Photographs by the author.

Commercial Extraction. This sector includes all gross sales of forest goods, including sawn lumber and canoes (thus 'forest product' is used in favour of 'non-timber forest product'). Annual firewood and handicraft sales were extrapolated from a four-month period between January and April 1998. Canoes sales were not excluded, as were other liquidated household assets (see earlier) because data show all canoes sold in 1997 and 1998 were one year old or less when they changed hands, suggesting that they were made for sale, rather than for household use (indeed, 14% of all canoe sold were sea canoes, which are produced only for export).

Overall, the sector encompasses the sale of both river and sea canoes (see Chapter Five), lumber, bark and *majau*-fibre handicrafts (sold by women to a regional NGO), firewood (sold between Tawahka households), thatch palm leaf, bamboo, and wooden poles and posts. The occasional sale of game meat and wild honey was not included, for reasons described earlier.

Agriculture. This sector comprises gross income from the sale of rice (husked and unhusked), beans, and cacao. Only the sales of beans from the 1997 harvest are included, although some households sold from the 1998 harvest within the study's time frame. Cacao sales over one year were extrapolated from reported sales over a four-month period.⁸

Livestock. This sector includes all gross income from the sale of chickens, pigs, and cattle from March 1997-98.

Business. "Business" includes all forms of non-farm and out-of-forest self-employment: the net annual income of stores, rental of homes, net income from forest-based enterprise, as well as income from the sale of food, drink, and medicinal plant treatments. Although all medicinal plants are largely derived from the wild, their sale is not included under 'forest extraction' since it is diagnosis and treatment by a *curandero*, rather than the mere provision of herbs, that Tawahka patients typically purchase. Annual food and medicinal services were extrapolated from a four-month sample.

⁸ Because all cacao production was sold, this calculation presumes that cacao production between January and April 1998 is typical of production throughout the year. In fact, the majority of respondents with producing cacao trees (n=44) opined that yields over this period were lower than during the rest of the year (54%); 11% thought they were higher than the rest of the year, and 36% found them normal. Thus extrapolated data probably slightly underestimate cacao's annual contribution to market income.

I calculated net store income as 20% of what store owners estimated to be their average gross monthly earnings (multiplied by a year or the period of the store's existence). Store owners most frequently reported their *ganancia* (profit) from different products at 20%, although estimates varied between 10% and 40% (net earnings of 25% were not unusual). During the study period, store owners only rarely charged interest, and then at 10-15%. Store income data should thus be considered conservative.

Forest-based enterprise became an important income-generating sector in 1997, when Tawahka entrepreneurs made contact with outside mahogany buyers and exported over 20,000 cubic feet of timber from the TABR and adjacent forests (AS). Because three Tawahka shopkeepers acted as middlemen between Tawahka sawyers and outside buyers, maximum earnings from this sector were expected to be high.

Mining. This sector includes earnings from the sale of placer gold by households that independently panned between March 1997 and 1998.

Wage Labour. Wage labour was divided into two separate sectors: those in agriculture ('off-farm'), and any other form of employment ('non-farm' or 'other wage'). The division is intended to improve parity to the significant off-farm employment sector in most rural economies, and because field experience suggested to me that wage labour for agriculture was the most common type of wage work within Tawahka communities. In addition, the Tawahka engaged in an array of 'other' wage activities, including several that were forest-related, such as employment as a forest guide or sawyer. They also earned from domestic work (washing clothes and cooking). Agricultural and domestic work are the sectors in which women's wage opportunities are best captured.

Salary or contract work was also available to some Tawahka, and was an important source of *cash* income. For example, some Tawahka resided semi-permanently in the Honduran capital, Tegucigalpa, where they were employed as members of an ever-changing array of NGO and government-funded *proyectos*. Workshops, meetings, and administration comprise the majority of their duties. Other Tawahka were elected members of the Tawahka's political organization, FITH, and received for their duties a stipend intermittently provided by an array of national and international organizations. There were also at least five Tawahka on the government

payroll as teachers or nurses in 1997-98. Another 45 received a monthly cash stipend as participants in a multi-year bilingual education program funded by the government and a national NGO.

All data regarding wage labour between March 1997 to March 1998 are estimates derived from actual wage earnings over four months, from January-April 1998 (and doubled, rather than tripled in order to derive annual wage income, since the early part of the year typically offers a disproportionate amount of wage opportunity, according to field notes and Tawahka informants). Respondents were only asked to report for this period because of the generally poor recall of wage activities over longer periods.

Findings

TABR-Level Income Patterns

For the 100 Tawahka households for which data were complete, the mean market income for 1997-98 was 14,266 Lempiras, or US\$1,080 (median: 9,950 L; range: 145 - 95,500 Lempiras).⁹ As such, the total value of market income generated by the TABR's 132 Tawahka households in 1997-98 can be estimated at US\$142,552, or an annual per capita market income of US\$138.

Table 3.1 describes income data from all sectors and sub-sectors; Fig. 3.3a illustrates the mean income structure of Tawahka households. The latter shows that non-farm wage work contributed the most (almost 30%), followed by agricultural product sale (25%), forest product sale (18%), off-farm wage labour (12%), and mining (6%); livestock sales and business were tied for last at 5%. This order is largely maintained when sectors are ranked by the average earnings accruing to participants, except that livestock sales and agricultural labour appear by this ranking the least remunerative to participants.

Agricultural product sale accounted for 25% of market income, but posted the highest participation rates, at 75%. High participation in this sector is not surprising considering that two-thirds of participants were selling rice or beans—surplus

⁹ All conversions to U.S. dollars use an exchange rate of 13.21 Lempiras:1 US\$. This figure was derived from the average of the monthly average dollar selling price for the months of March 1997 to March 1998, inclusive (Banco Central de Honduras 1999).

Table 3.1. Total market income by sector and sub-sector, TABR, 1997-98.

Sector	Income source ¹	No. hhlds responding ³	Income in Lempiras ⁴				Household participation	
			mean	s.d.	min	max	no.	% sample
Forest Product Sale*	total	110	2401	4027	0	29000	68	61.8
	dugout canoe	115	1149	3708	0	29000	24	20.9
	sawn wood	115	821	1592	0	6000	37	32.2
	handicrafts	110	289	1133	0	9000	17	15.5
	firewood	110	22	91	0	600	9	8.2
	thatch palm leaf	110	21	111	0	788	10	9.1
	unsawn wood products ²	115	8.1	41	0	352	8	7.0
Agro. Product Sale	total	111	4673	5912	0	63600	82	73.9
	cacao sale	111	3471	8047	0	60000	53	47.7
	rice sale	115	1045	1045	0	9000	30	26.1
	bean sale	114	861	1896	0	15000	56	49.1
Livestock Sales	total	111	634	1700	0	13000	65	58.6
	pig	111	140	489	0	3000	16	14.4
	chicken	111	59	103	0	490	48	43.2
	cattle	111	436	1547	0	13000	15	13.5
Mining	gold panning	112	397	1302	0	10000	21	18.8
Business/Self-Employment	total	109	1026	4713	0	37200	35	32.1
	net store earnings	114	410	2511	0	19200	7	6.1
	net forest-based enterprise*	115	353	2234	0	18000	3	2.6
	curandero services	110	127	497	0	3750	21	19.1
	house rental	115	66	321	0	2160	5	4.3
	prepared food & drink sales	115	26	202	0	2100	4	3.5

(continued next page)

Table 3.1 (cont'd) Total market income by sector and sub-sector, TABR, 1997-98.

Sector	Income source ¹	No. hhlds responding ³	Income in Lempiras ⁴				Household participation	
			mean	s.d.	min	max	no.	% sample
Off-farm Wage Work	total	106	571	1376	0	12200	56	53.0
	in beans	111	206	1900	0	3300	44	39.6
	in pasture	114	62	318	0	1120	7	6.1
	in cacao	108	42	132	0	800	16	14.8
	other agricultural work	115	226	1176	0	12000	21	18.3
Other Wage Work	total	107	4833	10392	0	89000	74	69.2
	NGO/gov't employee	107	1967	10062	0	89000	16	15.0
	teacher	107	416	1920	0	14000	6	5.6
	bowman	115	174	1160	0	11000	5	4.3
	gold dredger	107	108	946	0	9600	2	1.9
	forest guide*	107	36	224	0	1800	4	3.7
	sawyer, raftsman*	108	1950	3186	0	12200	40	37.0
	canoe carver*	115	75	628	0	3000	20	17.4
	domestic work	115	36	176	0	1500	7	6.1
	other	115	60	514	0	5400	3	2.6
Total Income 1997-98		100	14266	16020	145	95500	100	100.0
* Forest Sector		107	3826	4794	0	29000	81	76

¹ Note: subsector means do not sum to the total mean due to differing numbers of respondents by sector.

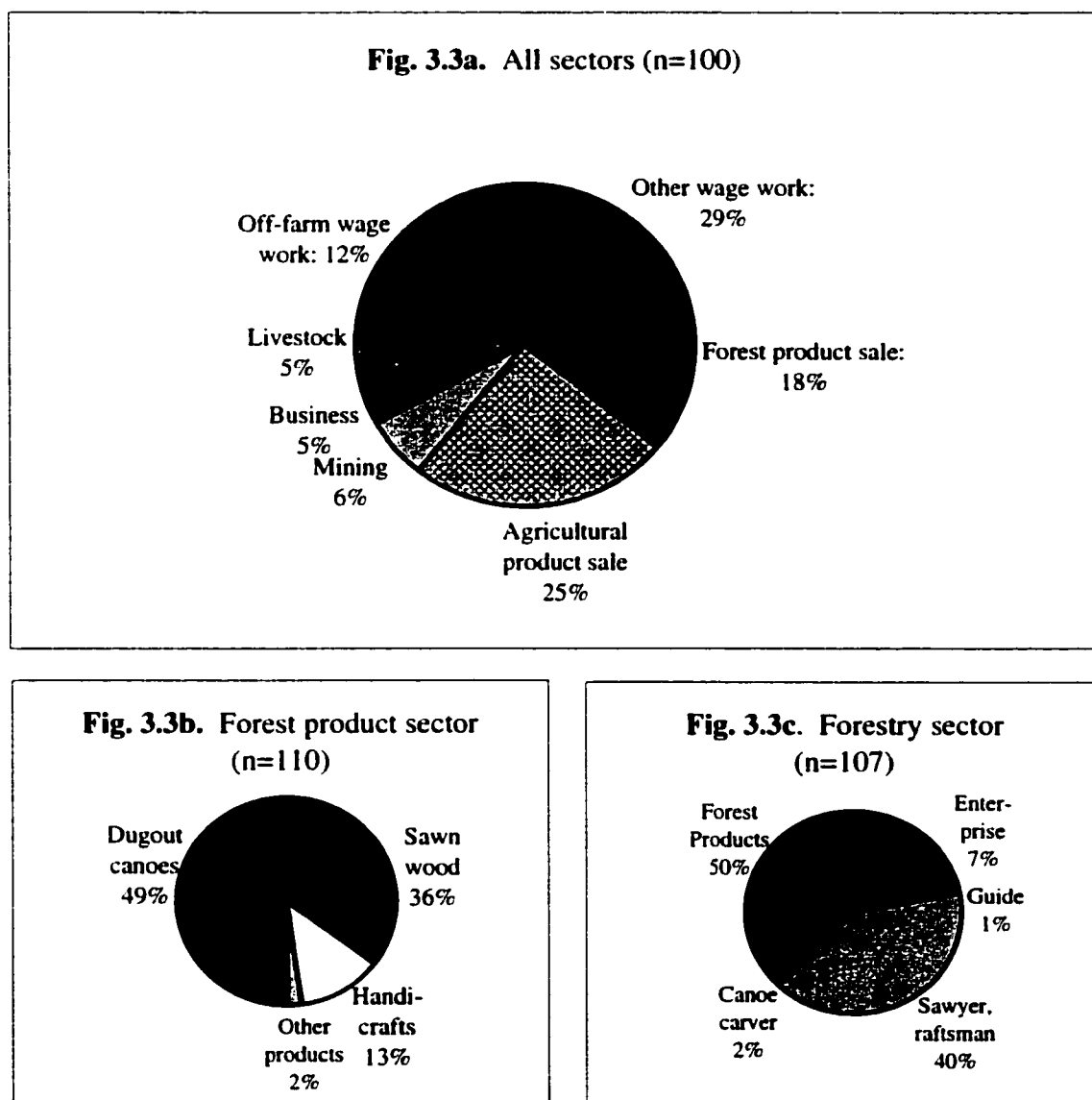
² Including poles, posts, and bamboo.

³ The number of households responding varies because not all respondents answered all questions; 100 questionnaires are complete.

⁴ Gross income, unless otherwise indicated.

Source: Household survey, 1998.

Fig. 3.3. Mean market income structure of Tawahka households, TABR, 1997-98.



Source: Household survey, 1998.

subsistence produce that might be expected to provide households with a relatively effortless door into market involvement. Nevertheless, 18% of households participating in the agricultural sector sold *only* the perennial cash crop cacao, signaling a purposeful, long-term orientation to the market through cash cropping.

The sale of forest products—commercial extraction—was ranked third in both share of total market income and the most remunerative to participants (62% of households). The contribution of individual forest products are compared in Fig. 3.3b. Dugout canoes were the most important, followed by timber and handicrafts, with negligible contributions from firewood, thatch, and the sale of other tree products. These data show that total forest product income for the TABR in 1997-98 can be conservatively estimated at about US\$24,000, or approximately US\$23 per capita. The sums become significantly greater, however, if we interpret ‘forest-derived income’ more broadly, to include forest-based services, forest-related business, and forest-based wage work. Then, the share of total income contributed by this ‘forestry’ sector represents 27% of total market income; the 76% of households participating in this sector alone generated an estimated US\$62,842 of market income during 1997-98 (see Fig. 3.3c).

Grouping data into a ‘forestry’ category usefully shows that the ‘market’ potential of the forest to Tawahka households exceeds the sum of forest product sale alone (see discussion in Pimentel *et al.* 1997). The forestry sector as a whole, however, is not of interest here, since subsequent analyses seek to determine why households turn directly to commercial extraction, rather than indirectly as wage workers. ‘Secondary’ forest-based activities would not be expected to be influenced by the same factors.

On average, Tawahka households engaged in 3.74 of the seven income sectors (s.d.=1.49; range: 1-7), or a little over half of the market sectors available. A more refined ‘specialization coefficient’¹⁰ also accounts for the relative contribution of each sector within the span of sectoral participation. By this measure, one (1) represents complete specialization (i.e., a household that earned 100% of its market income from

¹⁰ Adopted from Coomes (1992:360), who adapted the Herfindahl-Hirschmann Index of Market Share Concentration to estimate a Coefficient of Specialization (SC), as

$$SC = (\sum_{i=1}^n X_i^2) / 10,000$$

where X_i is the percentage of total household market income contributed by product (or in this case, sector) i ; and n is the number of products sold (here, the number of sectors in which the household is engaged).

one sector); and zero, complete diversification (i.e., earning an equal share of market income from all sectors). The average specialization coefficient for Tawahka households was 0.52 (s.d.=0.22; median: 0.48; range: 0.2-1). Combined, both indices show that as a people, the Tawahka not only participated in a mid-range of sectors, but balanced income share relatively evenly between them.

Village-level Income Patterns

Chapter Two described some of the differences among the Tawahka's five villages in 1998, including size, environmental endowments, ethnic influences, settlement history, and educational opportunities. Because such attributes influence villagers' economic risks and opportunities, a comparison of village income profiles would be expected to reveal significant differences. Those most salient here are laid out in Table 3.2.

Data show that total average incomes are significantly different across villages. In Krausirpi and Krautara, incomes are five to seven times greater than those of Yapuwas and Kamakasna, and more than twice those of Parawas. Broken down by terciles of market income, we find that this pattern holds even among the 'poorest' terciles: the 'poorest' third of Krausirpi and Krautara are still two to five times 'richer' than the poorest third in the other villages. Yet it is in these 'poorer' communities that incomes are more equitably distributed, as indicated by their low Gini values. The strikingly different income range across communities is illustrated in Fig. 3.4a.

Significant difference also emerged in income structure across villages. For example, Yapuwas and Kamakasna both posted low average incomes from the forest sector, and participation rates below 50%. Interestingly, the smallest and youngest village, Parawas, had the highest average income from extractive product sale, accounting for almost half of households' total income (Fig. 3.4b). Yet participation rates were higher in Krausirpi and Krautara, although the share of market income from extraction did not exceed 20%. By contrast, no significant differences were found in the average number of sectors in which villagers engaged, nor their degree of specialization. For both measures, values were consistently in the mid-range.

In short, Table 3.2 confirms expectations that village ascription is important in

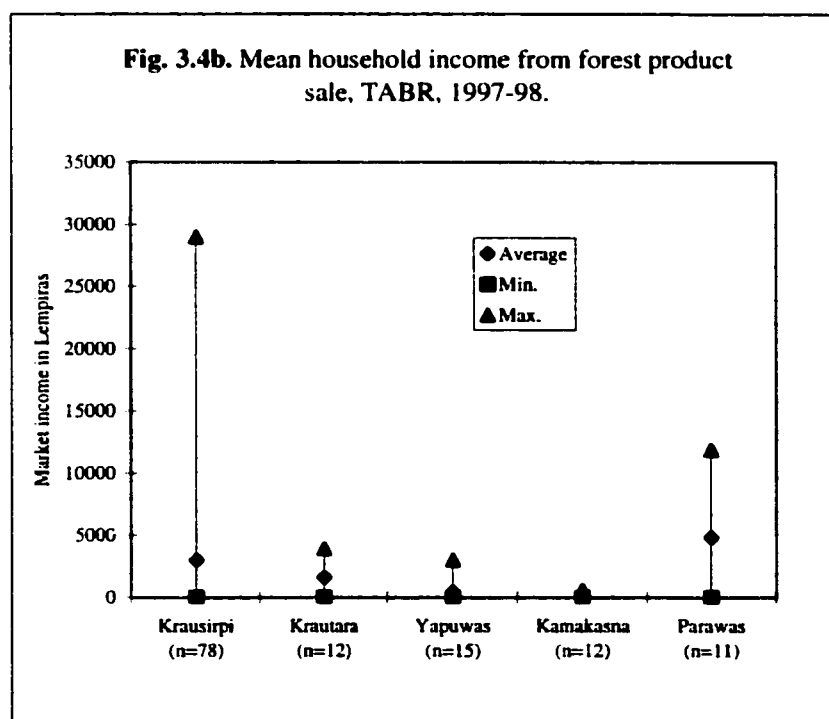
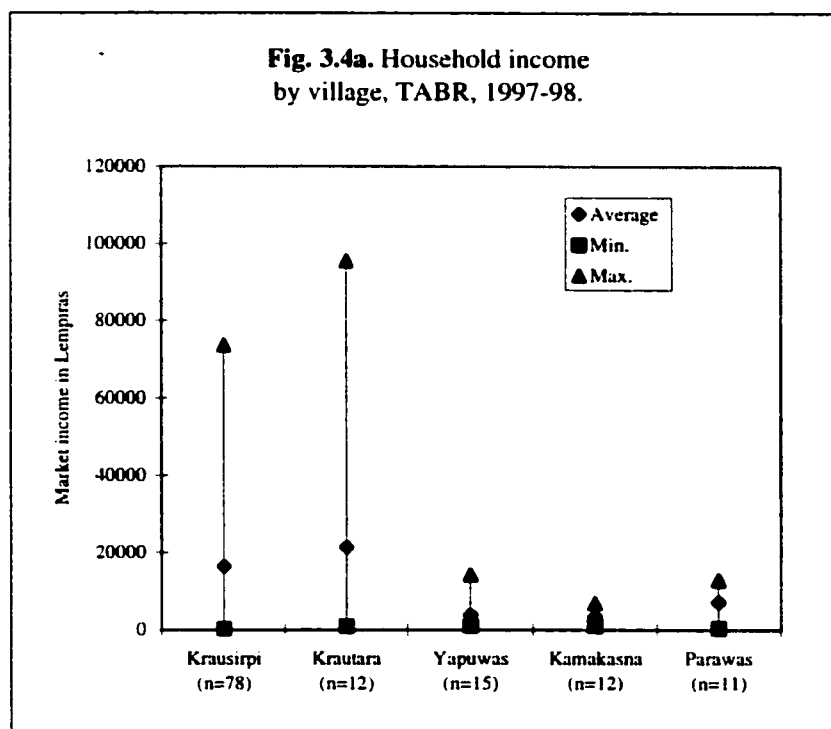
Table 3.2. Market income structure and distribution by Tawahka village¹, TABR, 1997-98.

	Krausirpi	Krautara	Yapuwás	Kamakásna	Parawás	Significant difference ² test <i>P</i>
Village size (total no. households)	78	12	15	12	11	
No. hhlds sampled	68 (87%)	13 (92.3%)	12 (80%)	8 (67%)	6 (55%)	
Total household market income						
mean (L)	16,283	21,289	3,758	3,477	7,100	kwallis ***
Upper tercile mean	32,181	44,631	8,765	5,390	12,795	
Middle tercile mean	13,114	13,175	2,122	3,303	7,470	
Lower tercile mean	4,132	6,062	1,230	2,318	1,035	
Gini coefficient of m.i. distribution	0.33	0.41	0.40	0.16	0.22	
Specialization indices						
mean no. sectors (of 7)	3.95	3.75	3.5	2.57	3.66	anova
specialization coefficient	0.51	0.55	0.48	0.61	0.61	anova
Forest product market income						
mean (L)	2,982	1,586	429	69	4,833	kwallis **
% hhlds participating	72	70	42	13	67	
share of total m.i. (%)	20	10	15	3	47	kwallis
Forestry sector market income						
mean (L)	4,995	2,078	948	264	4,915	kwallis ***
% hhlds participating	82	69	58	50	83	
share of total m.i. (%)	31	13	23	7	48	kwallis **

¹ Tegucigalpa-dwelling households (n=1) excluded.² Using oneway ANOVA (anova) or Kruskal-Wallis (kwallis) tests for difference of means and medians, respectively;• $P \leq 0.05$; ** $P \leq 0.01$; *** $P \leq 0.005$; no asterix indicates no significant difference.

Source: Household survey, 1998.

Fig. 3.4 Household income range by village, TABR, 1997-98.



Source: Household survey, 1998.

predicting household involvement in extraction and overall income generation patterns, as other studies have also found (e.g. Godoy *et al.* 1995; Wickramasinghe *et al.* 1996; Kant 1997; Barham *et al.* 1999; Takasaki *et al.* 2000a). Subsequent analyses will therefore accommodate village-level differences by the use of a 'dummy' variable for each village.

Household-level Income Patterns

Four household-level indices of forest use are described below. The indices illustrate the need to clearly define terms when describing a population's forest use patterns. Links between indices are explored to reveal trends within use patterns for the Tawahka. The benefits and drawbacks of each measure are evaluated and the stratification necessary for future analyses discussed.

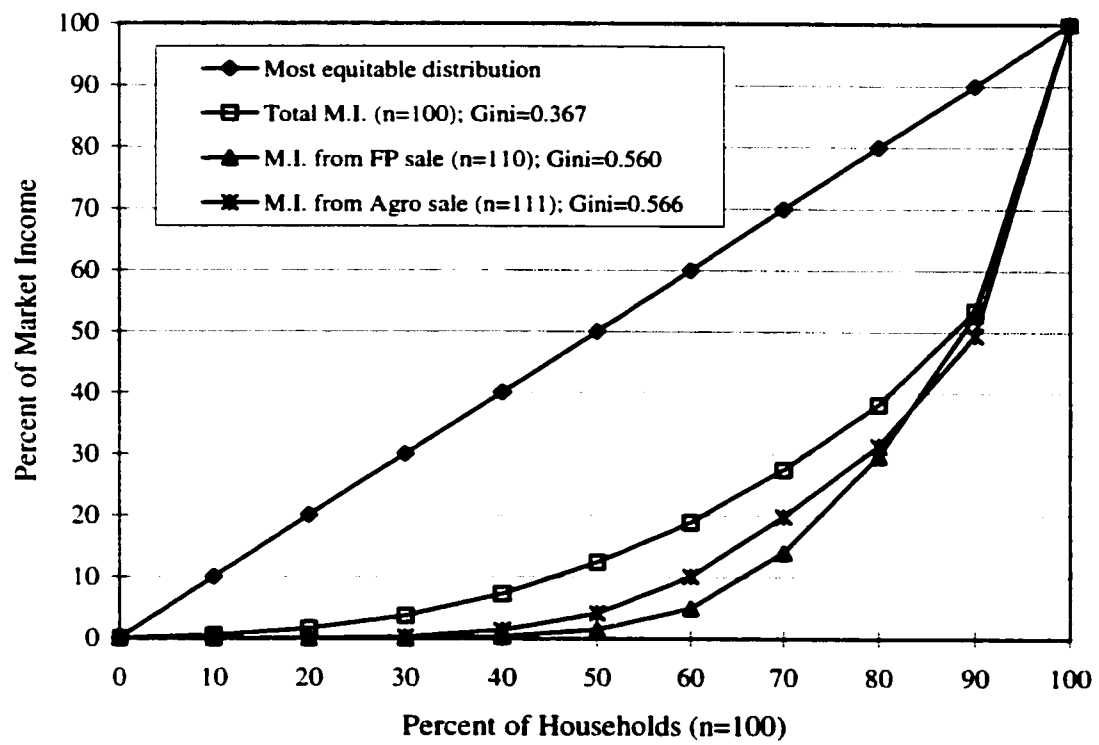
Market Income Distribution

All sampled households earned *some* income in 1997-98, but the range in market income was very high: the most income-rich household earned some 650 times more than the most income-poor. Grouped by terciles, the 'poorest' third of households earned almost 12 times less than the 'richest' third. Fig. 3.5 illustrates this skewed distribution in the form of a Lorenz curve. The curve shows that although half of Tawahka households earned less than 15% of total market income, the richest 10% of households garnered over 45% of the total income. These data not only confirm field observation of different levels of income-earning 'success' among households, but in fact suggest a higher level of income inequality than might be expected in a small, non-hierarchical indigenous group. The corresponding Gini value was found to be 0.367.

When total market income is decomposed, the distribution of forest-derived extractive income was found to be even more skewed, with a Gini coefficient of 0.56. This higher figure is in part influenced by the fact that data are censored at zero. But even when extractors are isolated and stratified by terciles, we find that the lowest tercile of extractors earned about 16 times less income from commercial extraction than the upper tercile; the differences are highly significant (Kruskal-Wallis test; $P \leq 0.001$).

The Gini value for the extractive sector, however, appears little different from the

Fig. 3.5 Cumulative market income (M.I.) distribution for Tawahka households by sector, TABR, 1997-98.



Source: Household survey, 1998.

Gini values of other market income sectors. All were consistently above 0.5, suggesting that within every sector are households that earned a disproportionately large share of market income. But Gini values do not tell the whole story. Both extraction and the sale of farm produce posted nearly identical Gini values, but as the shape of the Lorenz curve in Fig. 3.5 illustrated, extractive income was more upwardly skewed, meaning that a particularly small share of households accrued the largest share of extractive income.

Participation

All households in the sample participated in the market economy in 1997-98. But as Table 3.1 shows, there was no one income source from which all households drew. Most importantly, only 62% of households can be termed 'extractors'; 38% did *not* sell forest products in that one year period.¹¹

Participation in the various product markets within the extractive sector was uneven. Although 37 households sold lumber, 24 sold canoes, and 17 bark handicrafts, fewer than ten sold thatch, firewood, or unsawn wood products. The fact that fewer than 33% of households sold any single forest product suggests that extractor households were product specialists. By pooling all extractor households into a common extractor population, then, the different motivations for engagement in different types of extraction might be obscured. For this reason, future analyses will distinguish between product markets.

In contrast to evidence of within-sector, product-level specialization, data show that commercial extraction proved to be a common activity choice for households that pursued a diversified income approach overall. For example, extractor households participated in an average of 4.5 sectors (range: 2-7; note that no household relied *exclusively* on forest products to generate income), whereas non-extractor households engaged in only 2.5 sectors (a t-test showed the difference is significant: $t=-8.29$; $P\leq 0.001$). A comparison of specialization coefficients also supports the finding that forest extractivists are more generalized than non-extractivists (t-test: $t=5.78$; $P\leq 0.001$). In fact, households appeared to embrace market-oriented forest extraction *while* they

¹¹ This split provides enough data points in each camp for Chapter Four's analysis to use Probit regression to reliably draw out determinants of extractive participation.

were earning in at least two other sectors (most commonly wage work and the sale of agricultural products). Does this finding mean that participation in other sectors can predict involvement in commercial extraction? While no two sectors are mutually dependent nor mutually exclusive, Chapter Two showed how the agricultural calendar can influence which forms of income generation a household can participate in, and when. A household devoted to cacao cultivation, for example, might be less willing to make canoes at distance. Yet when I cross-tabulated participation by sector (Table 3.3), I found that the most common sectoral overlap occurred between commercial extraction and agricultural product sale: 90% of the households that sold agricultural produce also sold forest goods, and 74% of extractors sold agricultural products. Overall, extraction ranked third as the activity in which participants in any other sector were most likely to have engaged, following agricultural product sale and non-agricultural wage labour. This means that on average in 1997-98, 68% of households involved in *any* other income activity was also involved in commercial extraction.

Participants in extraction seem to have earned similar levels of total market income as non-extractors (a t-test found no significant difference in means). Within the extractor population, however, incomes rose significantly with an increase in the number of market sectors in which households were engaged (Kruskal-Wallis test; $P \leq 0.01$).

Draw

For households participating in forest product sale, forest-derived income can be used as a *rough* measure of their 'market consumption' of, or draw on, forest resources (see Godoy and Bawa 1993).¹² The average income earned from commercial extraction by extractor households was 3884 Lempiras/year, or about US\$295 annually (s.d. 4531; median 3000; range: 40 -29,000 L). As the Lorenz curve in Fig. 3.5 showed, the distribution is highly skewed. Divided into terciles, the 'lightest' extractors earned an average of one-fifth of mid-level extractors, who in turn earned only about a third of the 'heaviest' extractor households.

¹² In fact, the actual resources accounting for the Tawahka's combined extractive income for 1997-98 are partially known: 44 canoe trees, approximately 21,000 ft³ of mahogany lumber, and innumerable lesser forest products.

Table 3.3. Cross-tabulation of household participation by market income sector, TABR, 1997-98.

	<u>Forest extractivism</u>	<u>Agriculture</u>	<u>Mining</u>	<u>Business</u>	<u>Live- stock</u>	<u>Agricultural wage</u>	<u>Other wage</u>
Commercial extractivism	100	74	67	71	69	66	69
Agriculture	90	100	62	89	77	73	80
Mining	39	15	100	17	15	25	23
Business	37	40	33	100	37	36	38
Live-stock	65	60	48	60	100	63	58
Agricultural wage work	54	54	71	54	58	100	54
Other wage	76	72	86	77	71	71	100

* Read: Of all households involved in commercial extractivism, 74% also sold agricultural produce.

Source: Household survey, 1998.

Reliance

For the purposes of understanding the economic relationship between peasant households and the forest, a better measure than draw is reliance (i.e., the share of total income contributed by income from forest product sale), because this measure best captures households' *relative* economic dependence on the forest (see Coomes and Burt 2000).

Obviously, the 38% of Tawahka households that did not sell forest products in 1997-98 were not financially reliant on commercial extraction in that year. For extractor households, the average share of total income derived from the sector was 29%, but the range was large: 1-93% (s.d. 24, median: 22.5). The heavy positive skew in the distribution means future analyses will use pooled samples sparingly, even if logarithmic or other transformations could normalize their distributions. Here I stratify sub-samples into terciles, and find that the most reliant tercile derived an average of 57% of their market income from the forest, the mid-reliant, 23%, and the least reliant, 7%; the differences are significant (see Table 3.4).

Are the households that were most reliant on commercial extraction also those that earned the most from the sector? A significant Pearson's correlation coefficient of 0.75 finds reliance and draw to be strongly correlated. Table 3.4 lends further credence to the idea that extractive income increases significantly with (terciles of) reliance. In other words, as households earned more from the forest, the sale of forest products accounted for a larger share of their total income. This finding suggests that successful extractors are those that benefit from economies of scale to focus increasingly in that sector.

But does a strategy of increased reliance on commercial extraction 'pay off' overall—that is, were the forest-reliant also the most income-rich? A difference-of-medians test found no significant difference in *total* market income between terciles of reliance. In fact, the highest levels of reliance appeared to exist among households that were in the mid-range of total income; the 'richest' households overall appeared to be the least reliant.

Table 3.4. Tawahka households by terciles of forest reliance,¹ TABR, 1997-98.

	Households by terciles of reliance on extraction			<u>Significance²</u>
	<u>Low</u>	<u>Middle</u>	<u>Upper</u>	
No. households	23	22	23	
Share of market income from forest (%)				
mean	7	23	57	***
Market income from extractivism (L)				
mean	511.5	2815	8278	***
range	40-1090	1255-4554	4800-2900	
Total market income (L)				
mean	21,667	13,400	11,933	not sig.
range	3,330-95,500	145-30,810	1040-31,620	
Specialization indices				
Mean no. sectors (of 7)	4.36	4.81	4.19	not sig.
Spec'n coefficient	0.51	0.35	0.48	***

¹ "Reliance" refers to the share of extractive income in overall market income.

² Using Kruskal-Wallis test for difference of medians; *P≤0.05; **P≤0.005; ***P≤0.0005.

Source: Household survey, 1998.

Specialization

So far, my analysis shows some Tawahka households to have been significantly more reliant on the forest than others; is it also possible to isolate extractive ‘specialists’ (see Coomes and Burt 2000)? To be considered ‘specialists’ in commercial extraction, such households would not only have derived a large share of their income from the forest, but engaged in few other sectors besides.

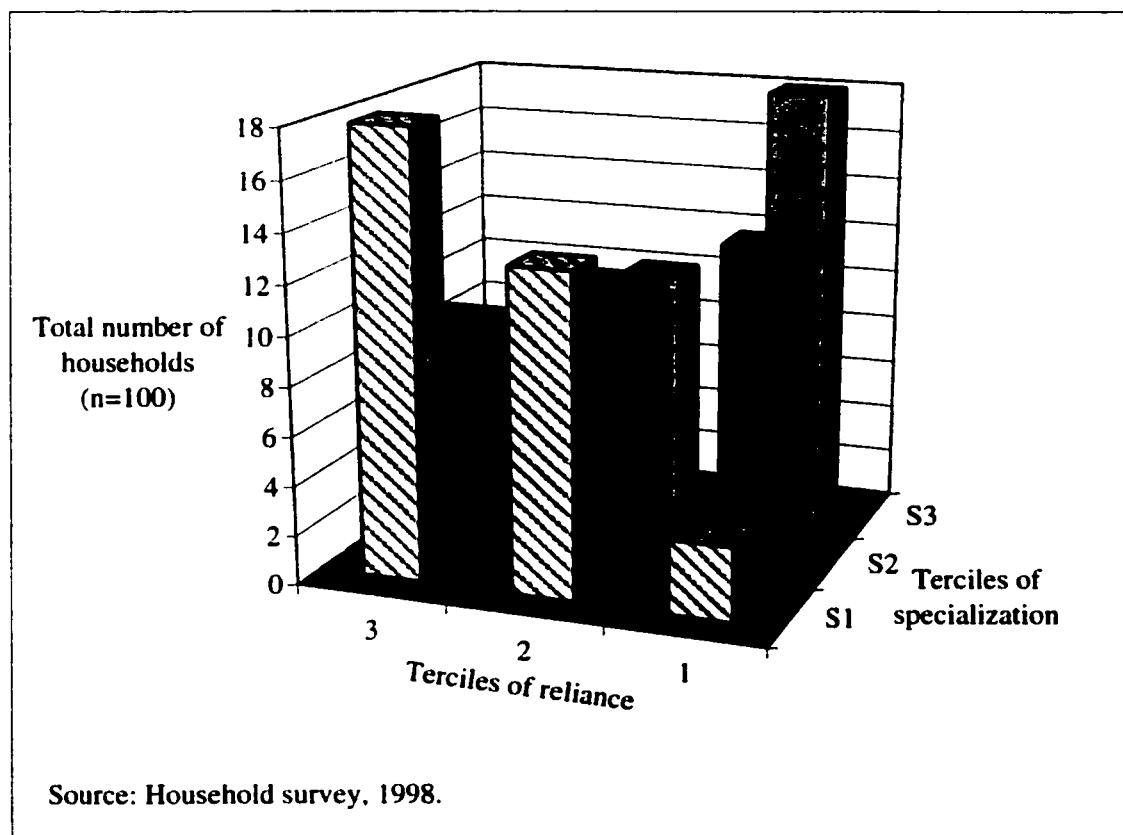
Data in Table 3.4 show significantly higher specialization indices among the *least* forest-reliant households. Fig. 3.6 plots households by terciles of reliance and terciles of specialization coefficients, and identifies five households—5% of the sample (n=100)—that were in both the upper terciles of reliance and specialization. But the largest groupings of households were found among the most specialized but least reliant (18%) and the most reliant but least specialized (19%). These data suggest that ‘forest specialists’ are rare and analytically difficult to isolate: households tended to be either specialists in other sectors *or* among the forest-reliant, but not both. Indeed, the five aforementioned ‘specialist’ households appeared to share little in common: they were both small and large; headed by a widow and by a widower; and headed by both young and old men. Furthermore, a difference-of-medians test found that the five ‘specialist’ households earned no more or less from commercial extraction than all other extractors.

3.3 Multi-year Income Data (1994-97)

Methodology

Comparison of income data over time meant reconciling differences in data compiled by HIID in 1995 and those that I compiled separately in 1996 and 1998. The data sets were not a perfect match. First, only three complete production years could be isolated: 1994, 1995, and 1997. Second, only some income sub-sectors were comparably measured across surveys. They included: gold panning, canoe sale, cattle and pig sale, rice, bean, and cacao sales, and store income (wage labour data were *not* reconcilable). Each type of sale was assigned to one of six income-generating sectors (mining, extraction, livestock, business, agroforestry, or annual cash-cropping; note that the

Fig. 3.6 Tawahka households by terciles of reliance and specialization in commercial extraction, TABR, 1997-98.



sectoral breakdown is slightly different from that of the single-year data). Income was not adjusted to account for inflation given that the analysis compares relative, rather than absolute, measures across years.

In addition, the multi-year data were complete for only 67 of the TABR's households, or about 66% of the households originally surveyed in 1995. Of these, this section's analysis will focus only on 49 households from Krausirpi, the largest Tawahka village, in order to control for the influence of village-level variables on market income variation over the four-year period. These Krausirpi households can be further divided between the 57% whose demographic composition remained constant throughout the period, and the 43% who had undergone substantial demographic change between 1994 and 1997 (beyond natural increase through births; see Chapter One). This distinction allows the chapter's analysis to control for the effects of Tawahka household fluidity on the variation in market income portfolios over time.¹³

Findings

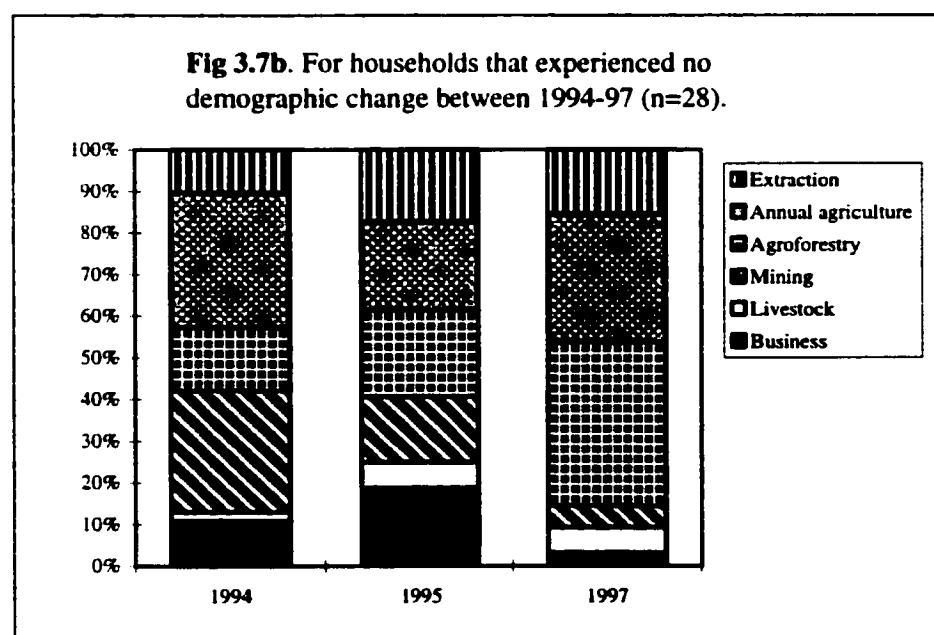
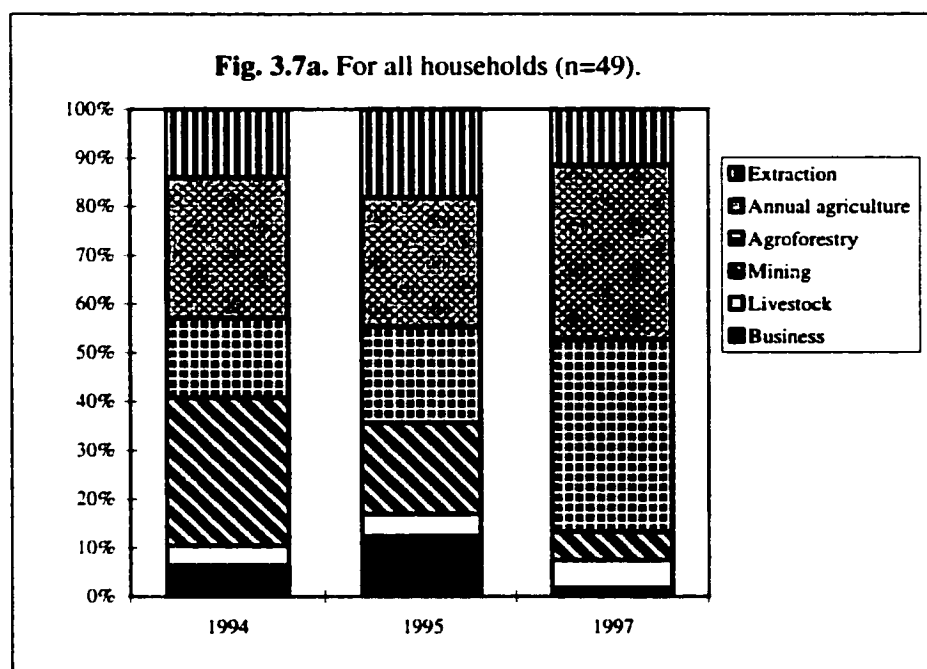
Here data on forest use are compared across three years (1994, 1995, and 1997) of a four-year span. I use data from a subset of 49 Krausirpi households, or 69% of all the households in that community in 1997. References to 'total' market income in fact refer to the sum of market income from the six sources for which I was able to isolate data over the three years.

Market Income Structure

Figure 3.7a compares the structure of market incomes for the pooled sample of 49 households in 1994, 1996, and 1997. The data show that extraction's share (i.e., from the sale of dugout canoes) remained fairly constant over the four-year span (at about 14%), as did income from annual agriculture and livestock. But the share of income from mining and business both declined over the period, by 22% and 4% respectively. In contrast, the share of market income contributed by cacao more than

¹³ For example, a household that in 1994 comprised two families had fissioned by 1997 into two households. The 'original' household thus lost two productive members, including a son-in-law, who took his small store with him. Obviously, the productive mix of the original household would have thus diminished due to *demographic* rather than economic factors.

Fig. 3.7. Inter-annual comparison of income structure for Krausirpi subsample, 1994-97.



Source: Household survey, 1998; HIID data, 1995.

doubled, from 15% to 38%.

To what degree could demographic changes have influenced this changing activity mix? Because 43% of the households included in the sample experienced significant demographic change over the study period, I checked for the influence of household variation on the changes in market income composition by removing these 'changed' households from the sample. Figure 3.7b shows the result: the composition of market income by source was essentially unaffected. In other words, household dynamism does not appear to influence market income composition at the community level. Indeed, this finding supports field observation suggesting that a households' income-earning portfolio may be better predicated on *kin*-level rather than household-level factors of production, an issue that will be revisited in the next chapter.

Market Income Distribution

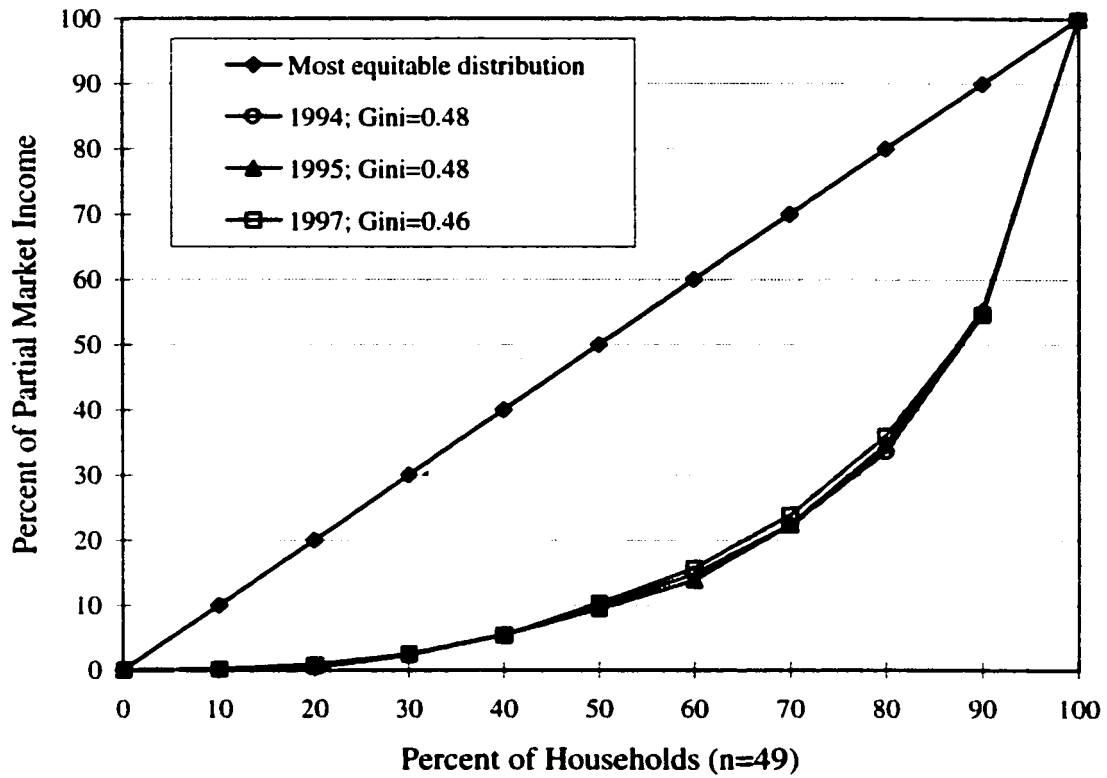
How market incomes were distributed in each of the study years is illustrated by Lorenz curves in Figure 3.8. The plots show nearly identical distributions between years. In each year, about half of all households earned 10% of total market income and the top 10% earned about 45% of total income. Corresponding Gini values (steady at ~0.47) confirm the remarkable constancy in market income distribution in Krausirpi over the four-year period.

Participation

In sharp contrast to the constancy of market income distribution, participation rates show high variability. Fig. 3.9 illustrates the changes in participation rates by sector between 1994 and 1997. The figures show net movement out of mining, business, and extraction, and net movement into farm-based market production and livestock sales. The greatest changes were from gold panning (from which 29% of households dropped) and into agriculture, including rice and bean sales (+20%) and cacao sales (+10%).

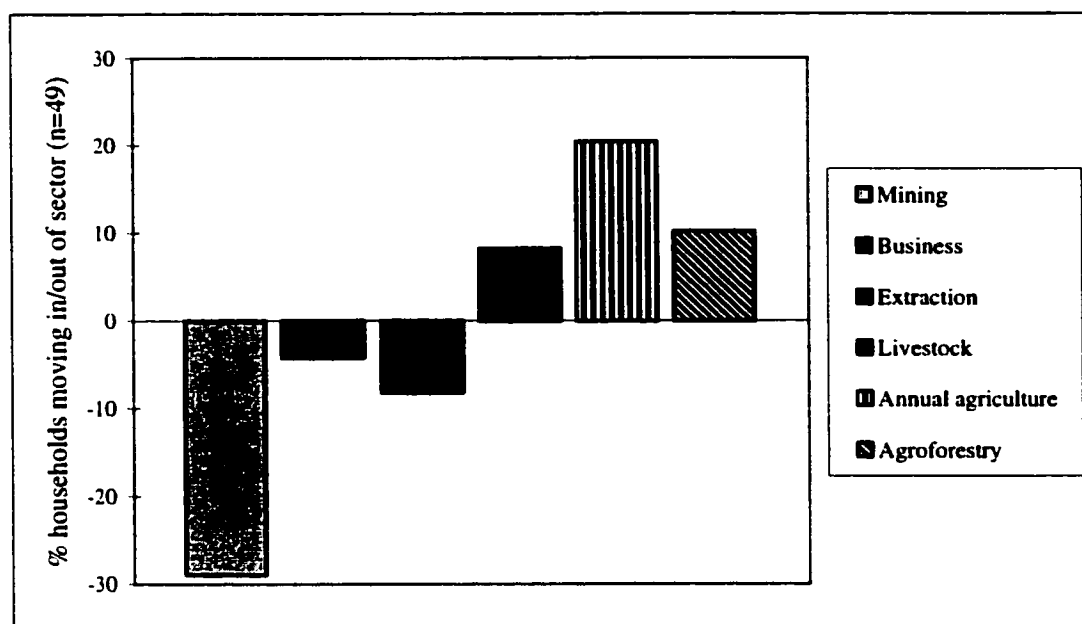
Table 3.5 further disaggregates these net movements by year, to show remarkable inter-annual fluctuation in participation levels. In the case of extraction (i.e., canoe sale), the figures show that there were 12 households participating in 1994. By 1995, 15

Fig. 3.8. Cumulative market income distribution for Tawahka households in Krausirpi, TABR, comparing three years.



Source: Household survey 1998; HIID data, 1995.

Fig. 3.9. Variation in household participation by sector, Krausirpi, TABR, 1994-97.



Source: Household survey, 1998; HIID data, 1995.

Table 3.5. Changes in household participation by sector, Krausirpi (n=49), TABR, 1994-97

Market Income Source	Total number of households moving in/out of sector (n=49)						
	1994-95 (1 yr)			1995-97 (2 yrs)			1994-97
	in	out	net	in	out	net	net change
Extractivism	15	7	8	3	15	-12	-4
Annual agriculture	13	6	7	8	5	3	10
Agroforestry	7	2	5	4	4	0	5
Mining	0	5	-5	0	9	-9	-14
Livestock	4	2	2	7	5	2	4
Business	6	0	6	0	8	-8	-2

Source: Household survey, 1998; HIID data, 1995.

new households had joined the sector as seven left; by 1997, three had entered and 15 left. Overall, a total of 29 households, or 59% of the Krausirpi sample, had participated in extraction over the three sample years, but only one household participated in all three years. Other sectors exhibited similar variation in participation levels (with the exception of mining, which exhibited only attrition over the four-year period).

Sectoral Specialization

Despite fluctuations in the relative income mix over time, comparison of the number of sectors in which households engaged, as well as their specialization indices, yielded little evidence of either a broadening or shrinkage of market income portfolios between 1994 and 1997. The number of sectors in which households participated remained constant at a median value of two. Specialization coefficients were similarly unchanging, ranging from a minimum of 0.61 in 1995 to a maximum of 0.72 in 1997. In sum, Krausirpi households maintained a given portfolio size through time.

The fact that 43% of households had experienced significant demographic change over the study period did not seem to have influenced their portfolio breadth. Difference-of-means tests showed no significant difference between those households that had changed and those that had not, neither with regard to the number of sectors in which they participated nor their specialization coefficients.

These multi-year data indicate that individual Krausirpi households are highly flexible with regard to the composition of their income portfolios over time, but the actual breadth of their activity mix remains fairly static. In other words, households shuffle the content, but not the size, of their production portfolios. This means that households take up very different activities from one year to the next, and in so doing must 'drop' a former activity. Which market activities, then, did some households abandon in order to pursue others? Table 3.6 shows that households that left canoe sale in 1994 went into annual agriculture or cacao sales by 1997; those that left business entered every sector but canoe or gold sale. Conversely, households that entered rice and bean sale in 1997 had left every sector but agroforestry since 1994; those entering agroforestry came from all other sectors; those selling livestock for the first time in 1997 came from every sector but extraction.

Table 3.6. Directions of sectoral movement by households, Krausirpi (n=49), TABR, 1994-97.¹

		Extractivism	Mining	Business	Annual agro.	Agro-forestry	Livestock
I	<i>Households that moved out of...</i>	<i>Moved in to...</i>					
	Extractivism (n=4)	-	0	0	3	2	0
	Mining (n=14)	4	-	0	5	3	2
	Business (n=2)	0	0	-	2	1	1
II	<i>Households that moved in to...</i>	<i>Moved out of...</i>					
	Annual agriculture (n=10)	3	5	2	-	0	2
	Agroforestry (n=5)	2	3	1	2	-	2
	Livestock (n=4)	0	2	1	2	1	-

¹ Totals may exceed sample if households diversified.

Source: Household survey, 1998; HIID data, 1995.

3.4 Discussion

Extraction in the Household Market Income Portfolio

As a people, the Tawahka do not appear to rely heavily on the forest as a source of market income. Instead, data point to a steady, supplementary role for forest product sale in the Tawahka economy as a whole as well as for individual extractor households. For example, in 1997-98, the majority of households incorporated the forest sector into portfolios already holding at least two sectors besides, usually wage labour or farm product sale. The addition of forest-derived income alone did not seem to predict higher overall market income, but once included, accounted for a quarter of households' total market income. No household focused exclusively on commercial extraction as a source of income, and few appeared to have even specialized in the sector. Several households, however, appear to have derived a large share of their market income from forest sources. These most 'reliant' households earned significantly more income from the sector, indicating that for the Tawahka, 'draw' and reliance on the forest resource were positively correlated in the study year.

But what hallmarks these most 'reliant' households? They are in fact hard to pinpoint because they were neither the households earning the most from extraction, nor were they clearly located along the spectrum of *total* market income. In fact, the most income-rich appear to be households that participated in extraction among a variety of other sectors, but did not derive too large a share of their income (i.e., greater than about 25%) from forest sources alone. This result indicates that forest-derived income is not likely to be a 'bootstrap' by which income-poor households can pull themselves up economically. Instead, extractive success appears to entrench market income disparities within Tawahka households, as flagged by the sector's high Gini value.

The fact that Tawahka households engaged in commercial extraction only in addition to other sectors is likely due in part to the fact that extractive activities are rarely seasonally-dependent, and so need not compete for labour during busy agricultural months (Wickramasinghe *et al.* 1993). Involvement in forest product sale may thus help to smooth income during the rainy season, when agricultural production and earnings are low (see Kant 1997). But this additive or supplemental characteristic of commercial

extraction suggests that involvement in the sector is predicated on recent or imminent earnings in other sectors. That is, as an income generating strategy, extraction is either relatively risky or relatively capital-intensive, or both, such that households ensure alternative sources of income to either insure or self-finance before entering the forest.

Furthermore, results show that among the Tawahka, there is no clear evidence to indicate that forest reliance decreases with rising total market income, despite indications elsewhere that within a given forest population, higher incomes are associated with a decrease in forest reliance (e.g., Godoy *et al.* 1995a; Reddy and Chakravarty 1999; see studies reported in Bryon and Arnold 1999; Gunatilake *et al.* (1993) also show an inverse relationship, but between *total* income and reliance). The fact that more income-rich Tawahka remain relatively forest-reliant compared with forest peoples elsewhere may be explained by the high-value, processed nature of many of the forest goods that they marketed (e.g., canoes, lumber). In contrast, other studies have looked at sales of low-risk, low-value forest products such as firewood, from which attrition might be expected as households earn income in more remunerative sectors (see Godoy *et al.* 1995a).

One of the study's most noteworthy findings is that despite relatively steady contributions of forest product income to the Tawahka's overall income structure, individual households moved frequently into and out of the sector; only one household in 49 sold forest products for three years consecutively! Among the Tawahka, such behaviour might be anticipated in a sector with low start-up costs, but commercial canoe production in fact requires relatively large investments (credit, specific tools and skills), and would therefore appear to be a market activity in which specialization over time would pay off (see Chapter Five). That even this sector reports such low inter-annual participation rates should raise a warning flag to studies that infer constancy in production orientation from a single year of data. Among the Krausirpi Tawahka at least, it appears that extractive participation is contingent on factors that vary over time, such as the need for cash, rather than on the more fixed factors that are found to drive extractor specialists in other areas, such as extractive skills, resource availability, and ownership of extractive technology (Barham *et al.* 1999).

These findings offer direction to future analysis design. Rather than focus

exclusively on factors which might generate a long-term forest orientation (such as fixed household attributes), analysis should also incorporate circumstantial determinants that may occasionally push or pull households into extraction.

Income Distribution

How similar are the Tawahka's average 1997-98 market income earnings to that of other forest groups? Godoy and Franks (1995) report US\$88 and US\$110 as the average per capita off-farm income for the Mojeño and Yuracaré of Bolivia, respectively, while Amazonian *ribereño* households reportedly earn average incomes of between US\$326 (Coomes 1996) and US\$1,575 (Takasaki *et al.* 2000a), or about US\$54-262 per capita. At US\$138 per capita, then, the Tawahka's market income in 1997-98 fell midway between these estimates. Comparisons with other groups is hindered by lacking or incomparable data.

What the Tawahka do appear to share with at least some other groups is a highly skewed distribution of market income. Coomes (1996) reports the top 10% of households earning 53% of regional market income; this study finds the figure only slightly lower, at 44%. These findings indicate that even among apparently egalitarian indigenous groups, the ability to capture market income can vary markedly. Furthermore, my analysis of longitudinal market income data from Tawahka households indicates that this skewed income distribution remains remarkably static from year to year, pointing to a fixedness in village-level economic organization in which market income is captured in a predictable pattern (although this does not necessarily mean that individual households hold fixed places in an economic hierarchy).

The Tawahka also exhibit particularly high income skew within extraction, different from the findings of researchers elsewhere, who reported lower inequality in forest derived income (e.g., Kant 1997). But such studies typically report conditions under which few barriers to extraction exist. In the case of the Tawahka, the capital-intensive nature of traditional extraction (for example, canoe-making) probably explains the heightened income inequalities in that sector.

Specialization vs. Diversification

Among the Tawahka, specialization indices demonstrated significant statis across villages and through time. That is, the Tawahka appear to have consistently balanced specialization in one sector with diversification into many sectors. With regard to parity across villages, my results support field observation that despite the apparent isolation of small, upriver communities, the nature of the Patuca River's trade network means that the opportunity to market a variety of goods and services, and the availability of wage work, are spread relatively evenly across villages. Furthermore, constancy in specialization indices over time suggests that in the current economic context, Tawahka households have settled upon an optimal portfolio size for any given year. The portfolio's lower limit may be set by cash needs, and its upper limit controlled by time or labour constraints.

But the constancy of portfolio sizes over time belies considerable turnover in portfolio content—over time, most Krausirpi households have participated in most market sectors. In other words, Tawahka market production portfolios were more *longitudinally* diversified than was reflected in any single year of market activity. Such economic behaviour requires that individual households cross sectoral boundaries frequently, a characteristic unusual in classic peasant contexts (Ellis 1998) but reportedly common among some Amazonian forest peasants (Southgate 1998:37). Indications, then, of labour elasticity among the Tawahka reinforce the Tawahka's own claims that over the past decade, no one market activity has provided sufficiently high returns to overdetermine participation, as during a 'boom' period. In fact, Tawahka assert that they are more often driven to/from different activities by a variety of factors, of which profit is only one. For example, attrition from gold sale between 1994 and 1997 was not marked by any decline in gold prices; rather, Krausirpi households moved from gold panning as deposits became scarcer and inter-ethnic problems made distant gold camps dangerous.

Ultimately, the Tawahka's flexible approach to market involvement may reflect adaptation to market uncertainties and environmental risks. The history of cacao cash-cropping provides an excellent example. As 1994-97 data show, Krausirpi households turned increasingly to cacao sale (leaving gold panning and other sectors) such that by

1997-98 this single product alone accounted for almost 75% of market earnings from farm production. During this period, households were wooed into cacao cultivation not by rising prices, but by stable prices and reliable buyers; they were also encouraged by assistance from a regional NGO, which promoted cacao cultivation as a sustainable source of cash income (see also House 1997). Such was interest in the crop that growers talked of a cacao 'era,' or incipient boom. Then, in late October 1998, floodwaters associated with Hurricane Mitch destroyed 80-90% of cacao trees (Cruz *et al.* 1999). The event no doubt served to reinforce the abiding wisdom of a broad market income portfolio.

Wage Labour

The primacy of wage work in Tawahka market income structure over 1997-98 (accounting for 41% of total market income) was an unexpected finding of the study, because the Tawahka lack access to even a semi-urban labour market, and because Tawahka youth exhibit low rates of labour migration, especially compared with their Miskito neighbours (see Dodds 1998). Isolated, scattered forest populations typically have only weak internal labour markets, which is presumably why the contribution of wage work in forest peasant income portfolios is negligible or absent (e.g., Coomes 1996; Takasaki *et al.* 2000b).

How, then, do the Tawahka sustain such high levels of wage work? In answering this question, it is helpful to know that 48% of the total wage income earned by Tawahka in 1997-98 came from 'outside' sources including organizations, government, and through trade. Tawahka who earned income from any of these sources also maintained agricultural fields in their home communities, which they paid others to clear, plant, and tend while their own labour was tied up in non-farm activities. In other words, households earning 'foreign' wages appear to replenish the local cash supply and fuel the local wage market, because of a constraint on labour. One of the effective outcomes of this situation is a redistribution of exogenous cash and goods from the income-rich to the income-poor. Such redistribution may represent an adaptation by which indigenous peoples modify traditional labour exchange systems to increased levels of market involvement.

Methodological Directions

The chapter's findings also suggest methodological directions for future studies of forest peasant economies. First, the income that a household earns from commercial extraction should be perceived as an indicator of the magnitude of the forest's *input* into a household's economy, rather than as a measure of *output*, or draw, on the forest. This is because households take a diversity of products, which may or may not represent faunal or floral destruction; even *within* a given good, homogeneity of price and quality should not be assumed. For example, while canoe makers earned an average of 5,505 Lempiras from the sale of 44 canoes, the craft they sold were of various sizes and species, ranging in price from 80 Lempiras to over 10,000, despite the fact that each represented the death of a healthy forest canopy tree.

Second, results demonstrate that different income-based indices of forest use can tell very different stories, depending on the time horizon, analytical scale, and where the datum line is drawn. For example, TABR-level data on the Tawahka show that in 1997-98, about 18% of Tawahka households' mean income came from extraction and almost a third (27%) was derived from the forestry sector. Evidence from multi-year analysis further suggests that the share contributed by the forest sector remained steady for some time. But data on household participation levels show that a quarter of all households eschewed extraction and the secondary forest sector altogether. In other words, in 1997-98, a full 25% of Tawahka households received absolutely no direct financial benefit from the forest around them. Of those households that did, most maintained a footing in several other forms of income generation besides. In fact, only five households were so reliant on the forest for their market income that they might be considered ill-positioned to have earned income in 1997-98 without that sector. This sounds a cautionary note to studies that might infer long-term extractive specialization from high reliance rates alone. Furthermore, longitudinal data indicate that only a small fraction of households can be expected to remain involved in extraction from one year to the next, at least within environmental and economic contexts such as those that prevailed in Tawahka communities in the late 1990s. In sum, whether a population can be termed "forest dependent" is highly sensitive to the measure used.

CHAPTER FOUR

Household-Level Determinants of Commercial Forest Extraction among the Tawahka of Honduras, 1997-98

4.1 Introduction

A defining characteristic of peasant households is their livelihood reliance on land, through crop cultivation and raising livestock (Ellis 1992; Upton 1996). Not all peasants, however, derive their income exclusively from farm-based sources. Important supplemental income often comes from non-farm and off-farm¹ sources such as through labour markets, but non-agricultural activities can be highly heterogeneous (Reardon *et al.* 1992; Schelhas 1996b; Reardon 1997; Lanjouw 1999). Such off/non-farm 'diversification' has been argued to be a stable and vital component of peasant livelihood strategies (Ellis 1992; Murphy *et al.* 1997; Ellis 1998), and has become a recommended policy approach for improving the livelihood security and living standards of peasants worldwide (Reardon 1997; Ellis 1998; Lanjouw 1999).

For peasants living near or within biodiverse tropical forests, the off/non-farm component of their production has been at the heart of recent attempts to involve local peoples in "community-based" conservation efforts² due to the perceived links between nonagricultural activities and biodiversity conservation, in two respects. First, increased involvement in non-farm pursuits is considered a means to lessen forest peoples' focus on land-based production, perhaps lowering forest conversion rates (Barracrough and Ghimire 1995:107).³ Thus the promotion of production

¹ Use of these terms follows Ellis (1998), who defines "off-farm" as employment in the greater agricultural sector, and "non-farm" as activity in any other, non-agricultural sector (e.g., mining).

² Another major target area for community-based conservation and development initiatives is agricultural intensification (see Jepma 1995; Toniolo and Uhl 1995; Schelhas 1996b).

³ Seen in another way, the lack of jobs in semi-urban labour markets has been shown to drive flight to agriculture at the forest frontier (Jepma 1995:137).

diversification has been suggested as a policy approach for frontier zones (e.g., Murphy *et al.* 1997; Southgate 1998). Second, local peoples' sale of forest products and ecotourism services have long been hoped to encourage "joint forest management," towards ultimately providing returns sufficient to dissuade households from clearing forest (Kant 1997). Initiatives grounded in this view have already been implemented throughout the neotropics, particularly among established *mestizo* and indigenous communities with histories of forest product marketing (Jepma 1995).

Unfortunately, such community-based conservation initiatives have logged more failures than successes to date (Southgate 1998; Agrawal and Gibson 1999; Leach *et al.* 1999). A recurrent explanation for the disappointing results is that we in fact understand little of the complexity of human-forest interaction, especially the microdynamics of forest peasant production: "a better understanding of the intended beneficiaries' constraints and goals could have avoided a great many costly mistakes" (Barraclough and Ghimire 1995:165). Most notably, community or regional-level initiatives fail to recognize what researchers increasingly report: remarkable heterogeneity of production portfolios within and between communities (e.g., Wilk 1989:24; Wickramasinghe *et al.* 1996; Barham *et al.* 1999; Lanjouw 1999). Differences in inter-household activity mixes are especially noted in regions, and at times, when no one economic activity is 'overdetermined' (Coomes and Barham 1997). Without knowing how or why households choose to engage differently in off-farm sectors—commercial extraction among them—projects that promote particular activities risk failure (Barham *et al.* 1995; Coomes 1996; Hedge *et al.* 1996).

The Tawahka Amerindians of eastern Honduras are a typical group of forest peasants among whom production portfolios vary markedly: Tawahka households engage in a range of non/off-farm activities, from home enterprise to gold panning. Of particular interest is the uneven participation in commercial extraction shown to exist within and between communities, and across years (see Chapter Three). Why do some households sell forest products while their neighbours do not? The purpose of this chapter is to tease out the household-level determinants of commercial extraction among the Tawahka. To do so, I use econometric analysis of quantitative data from

household surveys conducted in 1998. I focus at the household level, where I expect community-level determinants of sector choice (such as prices or rates of return) to become manifest in individual households' production decisions.⁴ Community fixed effects are nevertheless accommodated within the analysis.

Other studies have dealt with both community and household-level determinants of resource use among forest-dwelling peasants worldwide.⁵ Collectively, the studies respond to the "urgent demand" for a better understanding of the basic microeconomic dynamics of forest households (Barracough and Ghimire 1995:165; see also Barham *et al.* 1995; Coomes and Barham 1997).⁶ This chapter seeks to complement the insights of these works with a Central American example while adding to the literature in four specific ways:

- by highlighting the explanatory power of household wealth (following Takasaki *et al.* 2000b), so avoiding the circularity of using income measures to explain income production strategies;⁷
- by interpreting wealth broadly, so that the different effects of social, human, and physical capital on production choice can be discerned;
- by specifically examining commercial extraction as a coping strategy following income shocks;
- finally, by positioning the analysis in a framework of household dynamism in response to factors that can either push households into commercial extraction, or discourage engagement. This approach is distinct from studies that perceive *any* market involvement by forest societies as evidence of their unidirectional incorporation into the world economy (e.g., Smith 1996; Godoy *et al.* 1997a; Henrich 1997; Korovkin 1997).

⁴ Practical issues were also weighed, given the difficulty in comparing rates of return across income sectors. This is because the parameters required, especially the value of labour and product prices, can change markedly over the course of the year in remote, autarkic settings such as the TABR (Barham *et al.* 1995; Lanjouw 1999).

⁵ Recent examples include Gunatilake *et al.* (1993), de Beer and McDermot (1996), Wickramasinghe *et al.* (1996), Kant (1997), Murphy *et al.* (1997), Dodds (1998), Takasaki (1997), and Takasaki *et al.* (2000b).

⁶ "Policies, programmes and projects intended to check deforestation and its negative social impacts have to be based on a full appreciation of the dynamics of local peoples' livelihood systems" (Barracough and Ghimire 1995:107).

Within the structure of the thesis, this chapter is intended to elucidate the household-level determinants of the varied market income patterns outlined in Chapter Three. The quantitative analysis used also provides a counterpoint to the more qualitative and product-specific examination of the determinants of forest product sale outlined in Chapter Six.

The chapter is structured as follows. Section 4.2 reviews the tenets of peasant economics that inform the inquiry—particularly, emergent theory regarding production diversification by peasants—with an eye to placing forest peasant extraction within a broader conceptual framework applicable to other areas. Section 4.3 describes the study site particulars and the choice of explanatory variables in the Tawahka context. Section 4.4 outlines the econometric approach used to isolate the main determinants of household involvement in extraction. Section 4.5 then discusses the findings and their implications for forest management throughout the neotropics.

4.2 Conceptual Approach

What, then, determines whether some households engage in extraction, and others not? Here I draw from peasant theory as articulated by agricultural economists and economic anthropologists, as well as recent case studies of peasant diversification, to identify general household-level determinants of income diversification. I then use insights from empirical studies of other tropical forest peasants to tailor the general farm economic model to forest peasants in particular. Adjustments are necessary because factors of production can be weighted differently in lowland rainforest environments compared with more classic peasant contexts.⁸ Finally, I draw from work among other *indigenous* forest peasants for insight into how groups such as the Tawahka might differ from classic peasants, particularly in their social and labour organization. In this respect, the Tawahka's own comments regarding off/non-farm

⁷ See, for example, Kant (1997) and Murphy *et al.* (1997).

⁸ For example, land may be relatively abundant, especially in tropical lowlands. Also, the biotic, edaphic, and riparian heterogeneity of neotropical rainforest zones can increase production costs and compound environmental and epidemiological risks (Loker 1993; Netting 1993; Toniolo and Uhl 1995).

opportunities prove useful in directing inquiry and in providing an important ‘reality check’ on the analysis (Tawahka insights are referenced by informants’ initials). For example, I draw from the Tawahka’s responses to a number of hypothetical questions regarding cash needs, investments, and plans regarding future extraction (Appendices VII, X, and XI), which offer insights into Tawahka perceptions of the relative place of forest products in cash-earning and investment decisions.

Determinants of Peasant Diversification

Much of the literature in agricultural economics conceives of the peasant household as a single decision-making unit whose goal is long-term welfare maximization (Ellis 1992; Upton 1996; Ellis 1998). Although any household comprises actors with perhaps very different needs and priorities, this study assumes, following Wilk (1989:43), that mutual interest leads to considerable coordination and informal task-sharing among household members. Household members are therefore expected to pool resources to meet communal current and future needs under a variety of environmental, social, and economic constraints (see Pichón 1996). Choices regarding labour allocation to different activities therefore maximize household ‘utility’—that is, balance economic efficiency (i.e., participation in the most high-return activity at a given time) with long-term livelihood security (i.e., participation in the lowest-risk activities; see Upton 1996). By this logic, diversification is not necessarily a wise or productive strategy for households; instead, *specialization*—especially where credit and insurance markets are well-functioning—may best maximize household utility.

Where income diversification *is* a strategy that households employ, the agricultural economics and economic anthropology literature has tended to be preoccupied with farmers’ activity choices *within* the agricultural sector (see Chapter One). Only recently has a body of work emerged to tackle why peasant households diversify into an array of non-farm activities, such as wage labour or business (see Ellis 1998). Results so far indicate that households voluntarily incorporate off/non-farm activities into their productive mix (often as a long-term strategy), or are pushed to do so involuntarily (usually as a short-term strategy), for a variety of reasons. Below I

categorize the main motivations for diversification, drawing particularly from the work of Reardon (1997) and Ellis (1998). Although the categories are presented as analytically distinct, the motives for diversification are often confounded in practice.

Motivations for Production Diversification by Peasants

- To increase income security in the event of calamity in other sectors. Where crop and other insurance markets are thin or absent, a household with a diversified production portfolio is effectively insuring itself against failure in any one sector. This risk-aversion strategy is especially important in risky physical environments (Reardon *et al.* 1992), including the tropical lowlands.
- As a coping strategy *following* failures in the farm sector. A household that loses its subsistence production to pests, for example, may be driven to engage in off-farm pursuits for survival. This *ex-post* insurance function of diversification is particularly important after unexpected income shocks (e.g., flooding); and is likely to spur involvement in what might otherwise be low-productivity activities (Godoy *et al.* 1998a; Lanjouw 1999).
- To smooth income fluctuations given the seasonality inherent in agricultural production (see Kant *et al.* 1996; Upton 1996; Murphy *et al.* 1997; Godoy and Wong 1999; Lanjouw 1999). Non-farm activities that are asynchronous with farm-based activities are particularly important in helping households through 'lean' seasons.
- To self-finance. In the absence or weakness of credit markets, the cash income derived from non-agricultural pursuits may be an important source of investment capital; diversification can therefore be a strategy for accumulation (see also Lanjouw 1999).
- To take advantage of greater returns in off-farm sectors. Markets for farm produce vary seasonally and annually; peasants may incorporate other, more profitable activities into their productive portfolio simply in response to low returns from the agricultural sector.

The degree to which any of these factors is influential in peasant activity choice varies by location, depending on the availability of credit or insurance markets, NGO assistance, or particularly high environmental risks (e.g., floodplains, desert margins). But even within a given area, household production portfolios vary greatly in size and content, because a household's desire and ability to diversify, for any of the above

reasons, is conditioned by its own resources, in the form of land, labour, and various forms of capital (see Zimmerman and Carter 1996; Lanjouw 1999). These relative endowments mediate the choice and degree of involvement in off/non-farm sectors, often in opposing ways. For example, household wealth held in liquidable assets can either encourage diversification by providing capital and collateral necessary to insure and/or finance off/non-farm activities (Barham *et al.* 1995; Godoy *et al.* 1996a; Barham *et al.* 1999; Takasaki *et al.* 2000a), or household wealth can itself be used to self-insure or self-finance, rendering off/non-farm diversification unnecessary (Reardon *et al.* 1992; Murphy *et al.* 1997). Thus some Tawahka households claim to engage in commercial extraction to earn 'start-up' capital for some other activity, while others frequently mention the sale or pawn of household assets—rather than commercial extraction—as an important response to medical emergencies (see Appendix X). As one Tawahka claimed: "If an emergency arises, I can always depend on a cow, a rifle" (NP, April 1998, Krausirpi, *transl.*).

Wealth held in social or kinship networks is thought categorically to be "important for facilitating and sustaining diverse income portfolios" (Ellis 1998:4). Indeed, social capital,⁹ especially when manifest as shared labour, access to credit, and so on, can lessen the capital and labour constraints on voluntary diversification as an *ex ante* risk-reduction strategy. Helms (1971:130-131) describes, for example, how the traditionally reciprocal labour arrangements of the Nicaraguan Miskito became particularly important in the face of *impending* crop loss as much as during sudden illness. On the other hand, a secure social net might discourage diversification as a coping mechanism because transfers from other households can redress income shortfalls that occur asynchronously across households (Hames 1990; Kaplan *et al.* 1990; Reardon *et al.* 1992; Peterson 1993), thus lessening the need for income diversification to do so. In fact, among the Tawahka, the option to borrow money from

⁹ I define social capital following Astone *et al.* (1999), as the tangible and non-tangible resources that accrue to an individual based on their social ties. Social capital is characterized by inalienability (cannot be exchanged or given away to others), depreciability (must be maintained over time), and fungibility with respect to particular activities (social ties may be useful in some contexts but not others). Finally, "social capital consists of relationships that are themselves actually or potentially productive: social capital facilitates the achievement of certain ends" (Astone *et al.* 1999:3).

others constitutes the singlemost frequent response to (hypothetical) emergency needs (Appendix X).

Indeed, some researchers have shown that although social capital may engender *community-level* diversification, the thick webs of reciprocity that appear to be typical of indigenous societies may actually render the social safety net a facilitator of household-level *specialization* (Johnson 1972; Hames 1990). Cultural variations in social organization, then, become an important mediating factor in understanding diversification scenarios.

Land, a distinct form of wealth, is a key measure of economic security in peasant contexts. Households with more land enjoy both greater overall production income and are relatively less likely than the land-poor to suffer the effects of location-specific agricultural risks such as pests or floods (Godoy and Wong 1999; EC; JM). The land-poor are therefore depicted as particularly reliant on diversification as a risk-minimization and coping strategy, because they may have few subsistence income buffers in the face of hard times (Netting 1989:225; Ellis 1998; Lanjouw 1999).

But there are several scenarios in which the insurance function of land may weaken, such that even the land-wealthy may be driven to seek off/non-farm sources of income. For example, landscape-level calamities such as widespread drought or hurricanes can hurt the land-rich as much as the land-poor. Also, given weak or non-existent land markets, land (and land-based assets such as trees) are effectively illiquid; in the face of income shock such as family illnesses, even the land-wealthy may move off-farm for quick returns.

Human capital—in the form of specific skills, formal education, and language ability—is similarly ambiguous in predicting off/non-farm diversification. Education has been found to facilitate livelihood diversification (Hedge *et al.* 1996; Murphy *et al.* 1997; Ellis 1998), and is particularly important in increasing income options for women (Lanjouw 1999). Vocational training, for example, equips farmers with skills marketable off-farm. But basic education, in the form of literacy, numeracy, and fluency in the national language, also serves to improve a farmer's ability to work his/her own land more effectively, and therefore can lessen the need for other income

sources (Pichón 1997); this effect has been illustrated in the case of the Tawahka (Godoy *et al.* 1998b).

Determinants of Commercial Extraction

Given, then, the conditions and constraints involved in a household's choice to diversify in general, what factors influence involvement in forest-based commercial extraction in particular? Forest peasants are known to use diversification as their primary risk mitigation strategy (Pattanayak and Sills 1999), and to be highly selective in their off/non-farm choices, both across households and over time (e.g., Schelhas 1996a). Indeed, despite fairly uniform familiarity with forest extraction for *subsistence*, extraction *for sale* should by no means be considered a 'default' sector in which all forest peasants participate. Based on the emergent literature related to forest peasants, and on my own field observation, the following list categorizes the general attributes of the commercial extractive sector that farmers weigh when comparing forest-based activities to other economic options.

Attributes of Commercial Forest Extraction

- Open access: the forest resource is typically perceived by locals as 'free'—i.e., requiring little or no investment prior to harvest (Pattanayak and Sills 1999).
- Short production interval: whereas some income-generating sectors can offer only delayed returns, returns from commercial extraction can be rapid (Godoy *et al.* 1998a).
- Aseasonality: many forests products are available year-round,¹⁰ or their production is asynchronous with agricultural activities. Such aseasoonality means that extraction can be timed to coincide with lulls in the agricultural calendar, helping to smooth inter-annual income fluxes (Kant 1997; Pimental *et al.* 1997; de Beer and McDermot 1996; Wickramasinghe *et al.* 1996; Ellis 1998).
- Low covariate risk: the forest resource functions on its own, meaning that, barring landscape-level catastrophes such as hurricanes, disasters affecting

¹⁰ This is especially so for bark, wood, thatch, bamboo, etc. But Kant *et al.* (1996) point out that some forest products, such as honey and fruits, are highly seasonal, and perishable.

other income sectors (e.g., drought, pest) are unlikely to affect extraction. Nor does engagement in (low-level) extraction in and of itself negatively prejudice earnings in other sectors.

- Cultural familiarity: unlike some market sectors, many forest peasantries have a history of involvement in commercial extraction. Familiarity with both forest-based harvest and marketing lowers the risks of extraction relative to 'newer' sectors.
- Distance/danger: finally, much commercial extraction involves distant work, often requiring multi-day travel from the comforts and security of home. The real and perceived dangers of the wild forest often compare poorly against the security of farm or village (see Browder 1996; de Beer and McDermott 1996; Byron and Arnold 1999).

Households then weigh the attributes of the forest as a source of income against their own motives for diversification. For example, the aseasonality of extraction may render it a particularly suitable activity for smoothing income over the year. The sector's short production interval may also provide a rapid way to earn cash in the face of sudden need, facilitating its *ex-post* insurance function.

As with diversification in general, households' willingness and ability to participate in the extractive sector is conditioned by their own relative endowments. In this regard, researchers have found it useful to distinguish mere involvement in extraction from *reliance* on the sector (e.g., Coomes and Burt 2000). For example, previous research has emphasized the land-poor's reliance on forest resources: although their actual earnings from the sector be relatively low, such earnings may nevertheless provide the only source of supplemental income, and so be particularly vital for survival (Kant 1997).

4.3 Evidence from the Tawahka Reserve

How can these generalized and often ambiguous clues regarding householders' motives for involvement in commercial extraction be adapted to isolate determinant factors among the Tawahka? This section applies econometric methods to data collected from 116 Tawahka households (88% of the Tawahka population) in 1997-

98.¹¹ The analysis pivots on identifying what, in the makeup or experience of extractor households (62%) distinguishes them from the 38% that did not engage in the sector in 1997-98.

The Study Site

Because the determinants of diversification are highly context-dependent (Ellis 1998), I recap here the economic conditions that prevailed among the Tawahka during the study period (see also Chapter Two). State involvement in the economy, through so-called meso-level policies, was effectively nil. Government presence was felt only through the spectre of future restrictions on, and sporadic taxing of, forest exports. Credit was available from shopkeepers and itinerant traders; interest was rarely charged. The economy was only partially monetized; savings were rarely held in cash. Agricultural extension was provided by NGOs for cash crops, including cacao, rice, and beans. Land markets were virtually nonexistent. Market infrastructure was primitive and informal: goods were bought and sold through a loose network of river traders. Price information—albeit thin and incomplete—appeared to be well-shared within and between villages, facilitated by the Tawahka's tight-knit settlement pattern. Remittances were of minor significance because few Tawahka had relatives living in distant urban areas.

In the late 1990s, market incomes in the TABR were highly diversified, and their distribution skewed, both within and across Tawahka villages (Chapter Three). Wage opportunities were particularly abundant, in contrast to many remote forest societies. In many types of wage work but most notably farm work, women typically earned less than men. In theory, all Tawahka had equal access to the forest resources of the TABR; in fact, access to certain forests depended on village ascription. In 1997-98, commercial extraction accounted for 18% of the total market income earned by sample households, with 62% of households participating in the sector.

The range of forest goods sold by the Tawahka was large (see Chapter Three).

¹¹ See Chapter Three for a description of the survey methodology. All data analyses were run using Intercooled STATA 4.0 (c.1995) statistical software.

Low-value goods such as firewood required few inputs other than time to gather from surrounding secondary growth; the extraction of dugout canoes, by contrast, required start-up capital, specific tools, and specific knowledge (see Chapter Five). This product-level heterogeneity challenges the ability of a given set of variables to explain commercial extraction overall. But there are several reasons why the following analysis does not break down the analysis by forest product. The first is pragmatic: low participation rates in any one product sector resulted in unsuitably small sample sizes. Second, a focus on particular local goods may obscure the commonalties with other forest peasant production elsewhere in the neotropics. Third, field observation suggested that harvest of *any* forest product for sale indicated a household with a mind to forest extraction, and it is this chapter's purpose to identify determinants of such an orientation.

Variable Choice

The two dependent variables and 29 independent variables used in the analysis are described and summarized in Table 4.1 and Table 4.2, respectively. The two dependent variables measure whether a household participated in commercial extraction or not in 1997-98 (the binomial variable PART), and the share of total market income derived from the sector in the same year (the continuous variable FSHARE). Independent variables are grouped into eight categories, and the rationale for their inclusion in the analysis is described below.

Household Demographics

RESDUR indicates a household's 'age,' as measured by the number of years that the household resided in the village, or, if residence has been static, ages the household by the date of the oldest child of the head couple. In the context of this study, then, age cannot be used to gauge a household's stage in the life cycle (see Deere and de Janvry 1981), although the two are closely related. The average Tawahka household has lived 14.5 years in its current location, although the range is great (1-45 years). A related but distinct variable is the age of the head of the household

Table 4.1 Variables used in analysis of household market involvement, TABR, 1997-98.

Variable name	Variable description
<i>Dependent variables</i>	
PART	Participation in commercial extractivism 1997-98: 0=no; 1=yes
FSHARE	Share of market income from commercial extraction (%), 1997-98: "reliance"
<i>Demography</i>	
RESDUR	Yrs household has resided in village, or yrs since couple's first child
HAGE	Age of male or female head of household
FWORK	No. female workers (15-64 years) in household
MWORK	No. male workers (15-64 years) in household
DEPEND	Total 'dependents': 0-14 years, >65 yrs
SINGLE	Household headed by single woman: 0=no; 1=yes
<i>Human & Social Capital</i>	
FGROWN	Female head's total no. adult children within village
BROTHER	Male/female head's total no. adult brothers within village
HEDU	Total years formal education, male/female head
HSTUDY97	Heads studying outside TABR in 1997: 0=none; 1=one; 2=both
SPANISH	Male/female head's fluency: 1=poor; 2=proficient; 3=mother tongue
ESKILL	Oldest male learned canoe making prior to age 20: 0=no; 1=yes
BSKILL	Business experience by past/present store ownership: 0=no; 1=yes
<i>Land-based & Physical Capital</i>	
VEGA98MZ	Total land holdings in floodplain (ha)
CAC98MZ	Total area planted in cacao (ha)
QHOUSE	Sum of quality rating for all structures comprising household
COWT96	Total no. cattle owned, all ages, in 1996
ADZE	Total no. adzes owned, essential for canoe-carving
<i>Shocks & Cash Needs</i>	
OILL97	Cumulative total days lost to illness by household members (excl. heads)
FHLOST	Total days lost to illness by female head, due to own or other's illness
DEATHS	No. deaths in household 1996-98
KSTUDY97	Total household members studying outside TABR 1997 (excl. heads)
<i>Income & Alternatives</i>	
BPROD97	Total bean harvest 1997 (lb)
NSECTOR	Total no. sectors engaged (1-7), 1997-98
<i>Village</i>	
KRS	Resident of Krausirpi: 0=no; 1=yes
KRT	Resident of Krautara: 0=no; 1=yes
YAP	Resident of Yapuwas: 0=no; 1=yes
KAM	Resident of Kamakasna/Parawasito: 0=no; 1=yes
PAR	Resident of Parawas: 0=no; 1=yes

Table 4.2 Summary statistics of explanatory variables.

Variable [binomial]	Obs ¹	Pooled sample			PART ² (max. n=110)		
		Mean	Std. dev.	Range	PART=0 (max. n=42)	PART=1 (max. n=68)	t-test ³
RES DUR	114	14.49	10.04	(1-45)	12.65	15.41	
HAGE	115	39.25	12.7	(21-78)	37.8	38.9	
FWORK	115	1.68	1.02	(0-5)	1.46	1.78	
MWORK	115	1.67	1.1	(0-6)	1.3	1.87	***
DEPEND	115	4.6	2.4	(0-11)	4.2	5.03	*
[SINGLE]	115	0.17	0.38	(0-1)	0.21	0.16	
FGROWN	114	1	1.8	(0-8)	1.12	0.89	
BROTHER	115	1.5	1.5	(0-5)	1.3	1.6	
HEDU	115	2.99	2.73	(0-12)	3	3.2	
HSTUDY97	115	0.12	0.38	(0-2)	0.17	0.1	
SPANISH	115	1.9	0.6	(1-3)	2.1	1.7	***
[ESKILL]	115	0.63	0.49	(0-1)	0.52	0.7	*
[BSKILL]	115	0.2	0.4	(0-1)	0.09	0.25	**
VEGA98MZ	112	6.45	8.03	(0-50)	6.38	6.7	
CAC98MZ	114	0.62	0.86	(0-4.12)	0.63	0.63	
QHOUSE	114	2.2	2	(0-9)	2.4	2	
ADZE	115	0.23	0.44	(0-2)	0.07	0.31	***
COW96	115	0.97	2.27	(0-15)	1.45	0.66	*
OILL97	113	8.81	30.8	(0-300)	11.2	7.15	
FHLOST	113	12.8	38.23	(0-365)	20	8.45	
DEATHS	112	0.11	0.31	(0-1)	0.14	0.09	
KSTUDY97	115	0.23	0.55	(0-3)	0.21	0.23	
BPROD97	115	787.2	776.14	(0-4500)	678.5	846	
NSECTOR	107	3.66	1.5	(1-7)	2.44	4.42	***
[KRS]	115	0.63	0.49	(0-1)	0.51	0.72	**
[KRT]	115	0.11	0.32	(0-1)	0.09	0.13	
[YAP]	115	0.1	0.31	(0-1)	0.16	0.07	
[KAM]	115	0.09	0.28	(0-1)	0.16	0.01	(**)
[PAR]	115	0.06	0.24	(0-1)	0.05	0.06	

¹ Numbers vary due to differing sample sizes (i.e., between male/female) and missing data.

² Part=1 if household participated in commercial extractivism in 1997-98.

³ Comparison of means, or (medians).

*, **, ***: $P \leq 0.10$, $P \leq 0.05$, $P \leq 0.01$.

Source: Household survey, 1998.

(HAGE).¹² Although correlated to residence duration (the Pearson correlation coefficient is 0.76, and significant), the variables are differentiated by immigrant households, and by the fact that among the Tawahka, it is not uncommon for men to have second or third marriages to much younger women, which results in young households but old male heads.

Labour

I measure labour availability through the number of male (MWORK) and female (FWORK) adult workers. Children under 15 and the elderly (persons over 64 years) are included in DEPEND, which quantifies the economic burden on working adults. Although I recognize that children and the elderly can contribute significantly to household labour, I considered, but rejected, a weighted measure of overall household labour 'strength' (see Deere and de Janvry 1982) or household 'size' (see Hedge *et al.* 1996). Instead, labour is differentiated to improve comparability with other studies, and because a combined variable would have obscured gender differences, which can be strongly influential in shaping household activity choice (e.g., Murphy *et al.* 1997; Ellis 1998; see Chapter One). For the same reason, the dummy variable SINGLE is included to denote the 17% of Tawahka households headed by single women. SINGLE is expected to be negatively associated with participation in extraction, and to discourage reliance. Forest-based activities are generally considered a male domain among the Tawahka today if not traditionally (see Martínez 1980:5-6); several female respondents mentioned their single status as reason alone for not being involved in extraction.

Land & Land-based Assets

Tawahka households control an average of 6.45 ha of lowland, or land in *vega* (active or fallowed), ranging from 0-50 ha. Unlike upland landholdings (excluded from

¹² "Household head" refers to the male head in the case of households headed by a couple or widower, and to the female head in households headed by single women or widows.

analysis),¹³ floodplain plots were limiting in the TABR, and in the late 1990s supported perennial agroforestry, for which they were coveted. Of this *vega* land, an average of 0.62 ha, or about 1%, was held in cacao in 1998. As an important cash crop with little subsistence value, large cacao holdings may better hallmark households with an orientation to commercial agriculture than land holdings alone.

Physical Capital

Initial analysis suggests that Tawahka households vary greatly in the value and composition of their wealth portfolios. In this study I use QHOUSE, a variable derived from a scale of house quality,¹⁴ as a proxy for a financial estimate of household physical wealth. I chose house quality over more liquid forms of wealth (e.g., firearms, buckets, radios) to avoid problems of endogeneity, and because Tawahka themselves refer to neighbours' houses as indicative of overall asset wealth (see Chapter Two). As a second form of wealth, I use COW96, or the total head of cattle held by the household in the year prior to the survey (range: 0-15). Like homes, cattle provide an important investment sink (see Appendix VII), but unlike homes are highly liquid.

Ownership of extractive technology has been shown in other studies to strongly predict involvement in extraction (e.g., Takasaki *et al.* 2000a,b). I use adze ownership (ADZE) as an indicator of wealth held in extractive technology because adzes are essential for woodworking—particularly dugout canoe construction—and because, being homemade, they avert endogeneity issues present for purchased tools such as rifles and chainsaws. The predictive power of extractive technology in the Tawahka context, however, may be dampened by the propensity for households to frequently lend or rent tools (AR; CS), such that *access* to technology may be more evenly spread than ownership indicates.

¹³ Upland landholdings are excluded because the variety of land tenure arrangements among Tawahka villages (see Chapter Two) render data incompatible.

¹⁴ The house quality scale incorporated attributes such as house size, type of roofing (metal or thatch), and type of exterior walls (bamboo or boards), summed for each dwelling comprising the household.

Human and Social Capital

To proxy for households' human capital, I use four variables, each expected to distinctly affect involvement in commercial extraction. Years of formal education of the household head is measured by HEDU, and is qualified by another variable, HSTUDY97, to account for household heads who spent much of 1997 studying outside the TABR. A variable for the *overall* education level of the household was also considered, because in other studies such a variable has been shown to have explanatory power regarding off-farm activity choice (e.g., Hedge *et al.* 1996; Lanjouw 1999). But such a variable was rejected due to high collinearity with other education variables.

I use three other measures of households' wealth in human capital. BSKILL is a dummy variable for whether or not a household member owned a store during the study period or had done so in the past. Entrepreneurial experience affords households an important advantage in any commercial endeavor (through improved access to credit, buyers, and price information), including extraction. Another variable, ESKILL, flags households in which the oldest male participated in a canoe-making expedition prior to age 20, as an indicator of early experience in one area of commercial extraction. This variable accommodates the fact that some Tawahka informants claimed to eschew commercial extraction due to ignorance of the production process. Finally, SPANISH measures the household head's competence in the national language. Other studies have shown that this ability can influence indigenous peoples' access to 'outside' information, and to broaden their range of economic opportunities (Hugh-Jones 1992; Godoy 1994; Brandon 1996). In the case of the Tawahka, however, fluency in Spanish is more likely to resound as a cultural variable by identifying households headed by non-indigenous *ladino* men (but in which the female heads are Tawahka).

I use two measures of social capital. The first—the number of adult brothers of the male/female household head (BROTHER)—is expected to influence sector choice by affecting access to extra-household labour. I considered inclusion of this variable the best means to accommodate the finding that the Tawahka population's youth

results in adult-poor households (see Chapter Two), a situation which may drive their members to seek help elsewhere. Also, field observation suggested that much commercial extraction occurred in kin groups that are not well predicted by household ascription (see also Chapter Three). The second variable measures the number of grown children, male and female, of the female head (FGROWN), and was included based on field observation that adults are most likely to help—in the form of transfers of food, money, and labour—their mother's household when she experiences economic setbacks.

Income Measures

I include households' total bean production in 1997 (BPROD97) as a measure of income. This variable proxies for a household's total income, but should not be considered a wealth measure or welfare indicator. Beans are nevertheless a crop with important market value. Because the 1997 bean harvest occurred just prior to the time frame of this study, Tawahka farmers' economic decisions for the study period rested very much on the amount of surplus bean production they could sell. Earnings from bean sales can finance other activities and 'buffer' associated risks; a poor harvest, in contrast, drives farmers to turn to low-risk means to generate income, such as wage labour. Another measure of income options available to the household is the households' overall level of diversification during the study period (NSEC, or the total number of sectors in which household engaged in 1997-98; see Chapter Three).

Shocks and Cash Needs

We have seen that peasant households often respond to unforeseen income 'shocks' (events that negatively affect income streams, such as floods, crop shortfalls, illness, etc.) by diversifying their production portfolio. The income 'shocks' used here were chosen because they occur idiosyncratically across households, because they are common enough to be captured in one year of data, and because informants cited them as circumstances that generate a cash need. The variables include deaths between 1996-98 (which incur funeral costs and, by custom, prevent family members from

working for about a week), and two measures of morbidity: the total number of days 'lost' by the female household head to her own illness or to the care of sick family members (FHLOST) in 1997-98, and the cumulative number of days lost to illness of household members other than the male or female head (OILL97) in the same period. For both morbidity measures, the number of days lost to illness is closely tied to the severity of illness and the need for costly travel and treatment.¹⁵ Illness is known to place significant constraints on peasant household production (Luerssen 1993), especially in rainforest environments where epidemiological risks are high (Pichón 1997; Godoy 1997b). I do not use a morbidity measure for male household heads due to endogeneity problems. That is, although the sickness of the male household head may prove negatively related to participation in extraction, this outcome may be due to his sickness-induced *inability* to produce marketable forest products, rather than indicate that forest-derived earnings are not an important means to cover medical expenses. Indeed, several Tawahka men cited illness as a reason to stay out of 'hard' forest work.

Crop losses that occurred *during* the study period, a variable that has been used to measure income shock in other studies, was discarded here due to problems of endogeneity. But the comparably non-urgent cash need of educational expenses was included in the analysis (STUDY97), because Tawahka emphasize school fees as an important incentive for some forms of commercial extraction.

Village "Dummies"

The importance of location (in the Tawahka case, village ascription) has been stressed by several researchers as a key determinant of household production decisions, because of potential price and wage differences across villages, differential access to product and factor markets, different environmental endowments, and different levels

¹⁵ Based on my own field observation from 1994-96 and February-May 1998, adult Tawahka suffered most commonly from headaches, fevers, and joint pain (often associated with malaria), colds, respiratory tract infections, arthritis, and weakness arising from intestinal parasites and anemia. Localized abscesses (boils) and machete or axe cuts were the most common way for adult labour to be completely compromised. Tuberculosis, blindness, and cancers were rare but present. Among children, fevers, colds, and diarrhea (usually from intestinal infection) were the most common illnesses.

of marketing and transport infrastructure (Reardon *et al.* 1992; Upton 1996; Wickramasinghe *et al.* 1996; Kant 1997; Godoy *et al.* 1998a; Barham *et al.* 1999; Lanjouw 1999; Takasaki *et al.* 2000a). In the TABR, the primacy and economies of scale of Krausirpi, for example, predict a perhaps larger set of economic opportunities for the 60% of households living there. Village differences are discussed in Chapter Two, and are accommodated in this analysis by dummy variables for each Tawahka community to control for unobserved village fixed effects. Because regression analyses do not allow all villages to be included, Parawas was most likely to be dropped given its small size (n=6).

4.4 Determinants of Extraction: Models and Findings

Probit Model

I initially examined the association between involvement in commercial extraction and all explanatory variables through t-tests to compare means (or medians) between households that participated in extraction and those that did not (see Table 4.2). The tests were useful in flagging non-linear and possibly problematic variables but could not accommodate the interplay expected between variables.

I therefore developed a Probit regression model to link the probability of having engaged in commercial extraction in 1997-98 to each explanatory variable, while holding other variables at their means. The Probit model was chosen over other maximum likelihood models to improve parity with other socioeconomic studies, where this model is preferred (e.g., Godoy *et al.* 1998a; Lanjouw 1999; Takasaki *et al.* 2000b). But I also ran Logit and logistic regressions as a check on the Probit; results were not significantly different.¹⁶ Confidence in the final model was confirmed by its

¹⁶ All displayed pseudo-R² values greater than 0.65 and significant at the 1% level. Tests on the coefficients revealed similar significance. Two goodness-of-fit tests (Pearson and Hosmer-Lemeshow) were run on the logistic regression but were not supported by the statistical software for either the Probit or Logit models. The tests gave strong reason to believe the model is well-fitted. For a discussion of the relative attributes of the maximum likelihood models, see Aldrich and Nelson (1986), and Menard (1995).

high pseudo- R^2 value of 0.64, significant at the 1% level. Assumptions required for a Probit were respected.¹⁷

The Probit regression is presented in Table 4.3, and is read as follows. The dependent variable, PART, takes the value of one if the household participated in commercial extraction in 1997-98, and zero otherwise. The probability ratio (column two) then predicts the probability of PART=1 for a one-unit change in any given explanatory variable, holding all other values at their means.

The model shows that households' demographic characteristics—most notably, in-house labour availability—failed to have the predictive strength that the initial t-tests suggested. Only the age of the head of the household was strongly, and negatively, predictive: with every decade increase in the head's age, the chance of participation in commercial extraction decreases by 40%, then rises, but not significantly.¹⁸ This result confirms field observation that although age increases Tawahka men's familiarity with forest resources and their sale, younger men more readily seize opportunities to extract tradable forest goods. This finding also supports contentions of other researchers that young households in the early phases of farm-based accumulation are the most likely to supplement their incomes with off/non-farm activities (e.g., Ellis 1998).

Households' economic burden in the form of dependents also proved weakly predictive, indicating that every additional dependent family member *increases* the probability of commercial extraction by almost 9% (up to about seven dependents, after which the probability of participation tapers off). This finding lends support to

¹⁷ Many of the tests that I ran to check the robustness of the Probit model also hold for subsequent models presented in this chapter. Assumptions of linear relationships between dependent and independent variables were checked with bivariate plots. Where a clear pattern of curvilinearity arose, power transformations were used to linearize the relationship. A variety of interaction terms were tested in preliminary models, but rejected if they significantly degraded model fit. Multicollinearity was assessed by regressing each independent variable on the remaining independent variables. None showed an adjusted R^2 greater than 0.60 (indeed, the STATA software with which I ran the models does not allow model estimation to proceed in the presence of high collinearity among variables). Appropriate model specification and the absence of heteroskedacity were assured by examining residual distributions following each model estimation.

¹⁸ A squared term for HAGE was initially included in the model in an attempt to identify an age threshold for participation, but was rejected when the variable proved non-significant and decreased the model's parsimony.

Table 4.3 Tawahka participation in commercial extractivism, 1997-98 (Probit model).

	Participation in extractivism 0=no; 1=yes	
	Coefficient ¹	Prob. ratio ² (binomial)
Intercept	13.36 **	
HAGE	-0.258 ***	-0.04
RES DUR	-0.057	-0.01
(RES DUR) ²	0.008	0.001
MWORK	-0.315	-0.05
FWORK	0.38	0.058
DEPEND	0.588 *	0.089
SINGLE	-1.64 *	(-0.434)
HEDU	0.022	0.003
(HEDU) ²	-0.001	-0.002
SPANISH	-2.767 ***	-0.422
ESKILL	-1.922 *	(-0.244)
BSKILL	4.008 ***	(-0.302)
HSTUDY97	-0.998	-0.152
FGROWN	0.598	0.091
BROTHER	0.416 *	0.063
VEGA98MZ	-0.134 **	-0.02
CAC98MZ	-0.108	-0.016
QHOUSE	-0.685 ***	-0.105
COWS96	-0.126	-0.019
ADZE	4.671 ***	(-0.388)
BPROD97	-0.001	0
KSTUD97	1.179	0.179
OILL97	0.079 **	0.121
FILL97	-0.065 **	-0.009
DEATHS	-1.609 *	(-0.462)
KRS	1.024	(-0.195)
KRT	3.704 **	(-0.166)
YAP	-2.109	(-0.634)
KAM	-3.553 *	(-0.921)
PAR		
Total observations	106	
Observations at 0	40	
Observations >0	66	
df	29	
Critical Chi ²	90.79	
Pseudo R ²	0.642***	

¹ A one-unit increase in *x* increases the probability of PART=1 by this many standard deviations

² Change in the predicted prob. of PART=1 for a one-unit change in the independent variable.

*, **, ***: P < 0.10, P < 0.05, P < 0.01.

Pattanayak and Sills' (1999) hypothesis that a higher dependency ratio helps to explain why some forest peasants in Brazil harvest marketable products more frequently. Gender issues also emerged from the Probit model as predictive of participation in extraction, as expected. Households headed by single mothers or widows are 43% less likely to be involved in the extractive sector than other households. The implication is that single women face a restricted set of income options, all else held constant.

Spanish-language ability, which in the TABR effectively marks cultural ascription, proved strongly predictive of extractor households. Households in which the head speaks Spanish as their mother tongue are 42% less likely to engage in extraction, holding all other variables at their means, than their Tawahka or Miskito-speaking neighbours. Cultural attributes have been invoked elsewhere as important mediating factors in household production choice and resulting resource use (Bedoya 1995; Schelhas 1996b). In the case of the Tawahka, the inverse relationship between participation in commercial extraction and Spanish-language ability is most likely attributable not to the differential ability of Tawahka versus *ladino* men to *produce* forest goods, but to rather to *sell* them: the minority of households headed by non-indigenous men are effectively shut out of what, on the Patuca, is primarily an indigenous-run forest product trade network in which Miskitu is the *lingua franca* (see Chapter Six).

The same logic likely explains why residence in Kamakasna, where nine out of 12 household heads are *ladino* men, reduces the probability of commercial extractive involvement by 92%, despite relatively greater proximity to marketable forest resources. A 'demonstration effect' is likely at work here, too, whereby even Kamakasna households headed by Tawahka men may have been discouraged from extraction by their neighbours' lack of interest in forest-based labour exchange. In Krautara, by contrast, a community of similar size but of exclusively Tawahka/Miskito lineage, any one extractor can draw from a labour pool of like-minded neighbours, thus increasing the probability of households there engaging in extraction.

None of the variables measuring formal education was significant in predicting involvement in commercial extraction. This result is surprising because other studies

have shown that education is a significant predictor of other forms of resource use among the Tawahka (Godoy *et al.* 1998b), and because the Tawahka themselves assert that education provides a way for farmers to “trade the machete for the pencil” (AS), i.e., move into off-farm and out-of-forest activities (see Chapter Two). The result may be due to the fact that the range in education among household heads is not yet large enough for clear patterns to emerge (educational spreads are more marked *intergenerationally* than *intragenerationally*). Also, the sample captures only one of the three ‘elite’ Tawahka households among which education has been central to their upward mobility and subsequent residence in the Honduran capital.

Other measures of human capital proved more predictive. For example, prior extractive experience was found to *decrease* by 24% a household’s chance of extractive involvement, all else held equal.¹⁹ This counterintuitive result may point to commercial extraction as a ‘stepping-stone’ for young, relatively inexperienced households, before they move into alternative forms of income generation. The result reinforces older Tawahka men’s claims that the attractiveness of the extractive sector fades with improved experience of the costs—particularly, the physical dangers—involved.

In contrast, prior experience in business increased by 30% the likelihood that a household be involved in commercial extraction. Indeed, the knowledge gained in prior shopkeeping ventures is likely to render *any* form of off-form commercial activity more attractive, for reasons discussed earlier.

Social capital held in brothers also appears to influence extractive involvement: for every additional adult brother that household heads ‘hold,’ the chance of engaging in commercial extraction increases by 6%. The finding supports field observation that the extra male labour held in brothers can significantly lower the cost of extractive endeavors through shared labour arrangements. In other words, labour organization appears more kin-based than household-based, which perhaps explains why *in-house* labour measures had little predictive power.

¹⁹ This finding contrasts with that of Takasaki *et al.* (2000a,b), who found household involvement in some forms of extraction strongly linked to specific extractive skill.

The four variables that measured household land and physical wealth were negatively associated with extractive involvement, but only lowland landholdings and house quality significantly so.²⁰ Results show that with every extra quarter-hectare of land, households are 8% less likely to sell forest products. Similarly, as a household's house quality increases, their chance of being involved in extraction decreases.

An unanticipated result of the Probit model was the failure of cattle ownership to negatively predict extractive involvement. The result is unexpected because studies from other Latin American rainforest societies depict cattle as a form of wealth that can be easily liquidated in times of need, reducing the need for income diversification to do so (e.g., Schelhas 1996b; Godoy *et al.* 1998a). But although Tawahka list cattle as their first choice as an income sink (see Appendix VII), a similar willingness to liquidate, pawn, or put up cattle as collateral, should not be assumed (see also Dercon 1992).²¹ The finding resounds with studies from India (Kant 1997) and sub-Saharan Africa (Reardon *et al.* 1995) that show cattle holdings to be a problematic wealth indicator.

Ownership of extractive technology (an adze) increased by 34% the chance of selling forest products, confirming the "asset dependency of activity choice" (Takasaki *et al.* 2000). A positive relationship is intuitive given that extractive activities are facilitated by ownership of the appropriate tools. But the strength of the relationship is surprising given two characteristics noted in Tawahka households. First, ownership of relatively low-value tools such as adzes is expected to best predict *past* extractive involvement, since Tawahka tend to keep such tools around for years: ownership *per se* does not imply current use.²² Second, tool-sharing, especially within kin groups, appeared to be common during the study period. Thus the importance of adze

²⁰ I was surprised to find that cacao holdings did not significantly predict a decreased likelihood of extractive involvement. Field observation, and the Tawahka's own claims, suggested that the relationship between cacao and extractive involvement would be strongly negative, because the high rates of praedial larceny among the Tawahka mean that households must invest considerable labour to literally guard their cacao orchards, raising the opportunity cost of off-farm activities. Tawahka growers also pointed to the year-round demands of cacao (pruning, harvesting) which kept them continuously on-farm.

²¹ Helms (1971:148) claims that Miskito villagers were particularly reluctant to slaughter cattle for meat during relatively poor, or 'bust' periods, when cash was scarce and the likelihood of recouping the animal's cost in cash was therefore low.

²² For example, many households still hold on to the 'iron spurs' used during the *tunu* and *chicle* extraction eras, some of which have sat idle for two decades.

ownership in predicting extractive involvement may be less due to the services that the tool itself provides but because ownership proxies for a household's general extractive orientation.

All three variables representing unforeseen income shocks proved significant, but in different ways. As expected, an increase in the days lost by non-head household members (usually children or the elderly) to illness appears to stimulate extractive involvement by other family members: for every day lost, the chance of involvement increased by 12%. In this respect, the aseasonal nature of forest extraction may render it particularly attractive: Tawahka report that they are most often ill in the rainy season, when agricultural opportunities are few. In contrast, deaths in the household, as well as the number of days the *female* household head had lost to illness, significantly *decreased* the chances of extractive involvement. Both calamities strongly effect the productive capabilities of households by constraining adult labour. Rather than turn to a specific activity to cover the associated costs, such conditions likely drive households to solicit transfers from kin. These transfers are likely to be repaid slowly, and would not be captured by a one-year survey.

Other measures of cash need, including the number of children studying away, did not appear significant, even though Tawahka respondents claimed school fees to be an important incentive for extractive engagement. But school charges can be anticipated months in advance, thus obscuring a tight relationship within a one-year data sample.

In sum, the Probit model indicates that households selling forest products in 1997-98 were more likely to have a young, Tawahka/Miskito-speaking head, live in Krautara, and be supporting a large family. They tended to be inexperienced at commercial extraction, but to have some knowledge of business, and more likely to have adult brothers in the community. Extractor households were more likely to own an adze, but also to live in a relatively low-quality home and hold little prime *vega* land. Finally, extractor households were more likely to have experienced a lengthy period of illness among one or more household members other than the male or female head.

In contrast, households *least* likely to have sold forest products in 1998 tended to be headed by older individuals, be headed by an hispanophone, and be headed by a single woman. Non-extractor households were more likely to have less access to extra-household labour in the form of brothers, and tended to have experienced prolonged illness of the female head, and a death in the family at some point in the prior two years. Households that did not extract tended to have had experience in the extractive sector but less experience in business, and to own more *vega* holdings and nicer homes. They were also significantly less likely to own extractive technology.

Tobit Model

Given the above determinants of *participation* in commercial extraction, then, what drives a household to become *reliant* on the sector—that is, derive a greater share of their market income from that sector alone, compared with their neighbours? To examine the determinants of the variation in market reliance on the forest, I ran two models (Table 4.4); both use variables identified in the initial Probit model to improve inter-test comparability. I made some changes, however, to maximize model fit based on the Probit results and on experimental regressions. Squared terms were added for variables that appeared to exhibit a non-linear relationship to reliance. One variable (NSEC, or the number of activity sectors in which households participated), which was excluded from the Probit specification because of endogeneity, was added, as was one interaction term (BROTHERS*SINGLE).

The first model estimated was a Tobit, to isolate determinants of reliance for the pooled sample of all households (n=105). For this sample, reliance on forest extraction ranged from 0-93% (median: 6.8%; mean: 17.3%). A censored regression model such as the Tobit was required to accommodate the 40 observations truncated at zero, i.e., the cases where households did not participate in extraction (see Long 1997). A plot of residuals suggests the model is robust to heteroskedacity. The model is significant at the 1% level but has a low pseudo-R² of 0.12, suggesting that much of the variance in Tawahka's reliance on the extractive sector remains unexplained.

Table 4.4 Share of market income from commercial extractivism, TABR 1997-98
(Tobit and OLS models).

	Tobit	OLS
	Coeff.	High reliance Coeff.
Intercept	84.85 **	75.76
HAGE	-3.52 **	1.04
(HAGE)^2	0.03	-0.02
RESDUR	2.67 *	-0.71
(RESDUR)^2	-0.07 **	
MWORK	5.49 *	14.63 **
FWORK	-4.55	-11.87
DEPEND	1.37	9.40 ***
SINGLE	3.21	-8.40
HEDU	-1.18	-14.22 **
(HEDU)^2	0.06	2.10 **
SPANISH	-11.88 *	-12.36
BROTHER	-1.80	0.60
(BROTHER)*(SINGLE)	5.14	3.27
ESKILL	4.68	4.35
BSKILL	18.45 ***	-9.85
VEGA98MZ	2.37 **	2.45 *
(VEGA98MZ)^2	-0.04	
QHOUSE	-3.80 **	1.69
ADZE	34.38 ***	20.01 *
BPROD97	-0.01 **	-0.03 **
OILL97	0.09	0.01
NSECTOR	8.12 ***	-2.23
KRS	-18.29	-5.34
KRT	-27.11 *	-73.44
YAP	-24.13	-4.30
KAM	-65.77 ***	
PAR		
Total observations	106	33
Observations at 0	40	
Observations > 0	66	33
df	27	3.59
Chi ²	85.2	P(F)≤0.01
Pseudo R ²	0.12***	0.65**

*, **, ***: $P \leq 0.10$, $P \leq 0.05$, $P \leq 0.01$.

Results show that reliance on extraction decreases significantly as the household head reaches middle age (but becomes insignificant past middle age), thus corroborating the findings of the Probit model by indicating that both participation in extraction and greater reliance on the sector are most likely to occur among young households. Residence duration also displays a non-linear relationship to reliance: initially, reliance increases by 3% for every additional year of village residency, up to a threshold of about 12 years, after which reliance decreases significantly. This result suggests that all else held equal, reliance initially increases with increased knowledge of local resources and tighter commercial contacts. In-house labour in the form of male workers (15-64 years) also proved significant: every additional male worker increased by 5% households' reliance on extraction. Unlike the Probit model, the number of brothers held does not appear significant. In other words, access to *extra*-household labour appeared to influence participation in commercial extraction, but access to *in*-house labour determined the degree of reliance.

Measures of human and social capital hold different explanatory power with regard to reliance. Neither formal education nor prior extractive experience appeared significant—surprising findings given the predictive strength of these measures in other studies. But Spanish language ability emerges, as in the Probit model, as a significant negative predictor of reliance, suggesting that cultural ascription influenced both what activities households chose to engage in and the degree to which they engaged.

That entrepreneurial skill holds strong predictive power on reliance nuances the similar Probit result. Obviously, trade skills favour any form of market engagement. But that trade skills should so strongly predict *reliance* on commercial extraction also suggests that entrepreneurship is a particularly important skill in favouring extraction over other non/off-farm sectors. This result may be due to the nature of extraction as a commercial activity on the Patuca in the 1990s: an essentially individualistic activity in which participants must market forest products through personal connections, and negotiate credit and prices on their own. Commercial extraction therefore requires more commercial savvy than, say, the sale of beans or cacao, which can be done

through village stores, or engagement in the labour market, in which wage rates are pre-established.

A surprising finding of the Tobit is that an increase in the amount of land a household held in fertile lowlands appears to initially drive reliance on commercial extraction by 2.4% per hectare up to a threshold of about 20 ha, after which the relationship becomes non-significant. In other words, households appear to have focused increasingly on extraction as they initially accumulated in agriculture, perhaps because a secure subsistence base buffers the risks of specialization in commercial extraction. But although land may provide an *ex-ante* insurance strategy to mitigate the risks of extraction, the extractive sector appears to help households weather crop shortfalls: for every 10 lb. (4.5 kg) fewer beans harvested by March 1997, the share of market income from forest product sale increased by 10% over the subsequent 12 months (i.e., poor performance in the agricultural sector is balanced by stronger reliance on the forest sector). An income shock in the form of a poor bean harvest, then, appears to drive households to shift their relative allocation of labour to favour commercial extraction. In contrast, income shocks in the form of illness are not significantly related to a change in reliance on extraction, probably because illness affects the quality of household labour, reducing members' ability to earn *any* market income.

As households relied increasingly on extraction, the quality of their houses decreased, significantly. The finding corroborates the Probit model results, suggesting that more asset-wealthy households are both less likely to engage in extraction initially, and then, only at low levels of reliance, all else held equal. But for households that held extractive wealth in the form of an adze, the share of market income contributed by forest product sale increased by 34.3%, confirming that both participation in the extractive sector and reliance on extractive income are predicted by ownership of the appropriate technology.

With regard to residence in Kamakasna, the Tobit finding reinforces the result of the Probit model: residence in Kamakasna, compared with the 'control' village, Parawas, lessened by 66% the share of total income from extraction, just as it reduced

the likelihood of participation in commercial extraction at all. But residence in Krautara, although found to increase the likelihood of selling a forest product, in fact negatively predicts reliance on forest product sale. In other words, Krautara-dwellers, when compared with villagers from Parawas, are quick to sell forest products, but slow to have commercial extraction dominate their income portfolios.

The most striking finding to emerge from the Tobit model is the strong positive relationship between the number of sectors in which households engaged (to a maximum of seven), and their reliance on commercial extraction. The result is counter-intuitive, because 'reliance' evokes specialization, the opposite of diversification (see Chapter Three). The fact that Tawahka households appeared to rely increasingly on the forest for their market income *as* they broadened their production portfolio indicates that for households *capable* of participating in a range of activities, commercial extraction emerges as one of their *primary* sources of market income. Because findings outlined in Chapter Three suggest that the most forest-reliant are among the middle strata of the Tawahka population with regard to overall market income, I interpret the Tobit finding as evidence that earnings from extraction sustain households who are as yet in the early stages of portfolio refinement. That is, the 'subsidy from nature' provides the bulk of earnings for households who sample from a wide array of income sources but have not yet had the land, labour, capital, or luck to draw more heavily from any one. This interpretation may also explain why forest reliance appears to decrease with the age and asset wealth of the household. Although a diverse portfolio focused on commercial extraction is a strategy that places households among the "middle class" of income earners, their skewed, forest-reliant portfolios still deny them a place among the most income-rich, who are characterized by low reliance on the forest (see Chapter Three).

OLS Model

In order to more closely examine the household dynamics behind reliance on commercial extraction, I then ran an ordinary least squares (OLS) regression to predict the determinants of reliance for a subsample of 'high-reliance' households: that is, the

33 households who, among those participating in extraction in 1997-98 (n=65), had earned more than the median value (21%) of their market income from the extractive sector. Within the subsample, the range of reliance was great: between 22% and 93% (mean: 45%; median: 41%). My decision to isolate the most forest-reliant households was based on the high degree of unexplained variance in the Tobit model, and on the success other researchers have shown in isolating distinct trends *within* high-reliance groups of forest extractors (e.g., Coomes and Burt 2000). Furthermore, findings outlined in Chapter Three suggest that total income earned from extraction (a measure of 'draw' on the forest resource) is positively correlated with reliance. Isolating the common characteristics of the most reliant households therefore has important implications for long-term forest management and conservation.

The resultant OLS model, shown in Table 4.4, appears robust and explains 70% of the observed variance within the high-reliance population, and is significant at the 5% level.²³ In many respects, the OLS results confirm the findings of the Probit and/or Tobit models—significant differences do *not* emerge when the high-reliance population is isolated (an outcome that confirms Chapter Three's finding of relative heterogeneity among the most forest reliant extractors). The number of male workers in the household emerged as strongly predictive of increased reliance within this most-reliant group as within the larger sample.²⁴ Reliance also increased with the number of dependents: by 9.4% for each additional dependent household member. Adze ownership maintained its predictive importance in explaining variations among the most reliant as among the larger sample pool, and poorer bean production again emerged as a significant stimulus to increased reliance. As in the Tobit model, larger lowland holdings positively predicts greater reliance on the commercial extraction

²³ Ramsey RESET tests showed only weak evidence of omitted variable bias; Cook-Weisberg tests for heteroskedasticity showed little reason to doubt the constant variance assumption for the model.

²⁴ That labour should emerge as a significant predictor of reliance but not participation reflects the problematic predictive nature of in-house labour in activity choice. Wickramasinghe *et al.* (1996) found labour availability to be an important predictor of extractivism among Indian households, but Murphy *et al.* (1997) and Takasaki *et al.* (2000a,b) were unable to isolate male labour as a determinant of household income levels or wealth levels in the Ecuadorian and Peruvian Amazon, respectively.

sector, suggesting that, all else held equal, the land-rich are among the most forest-reliant.

The OLS model diverges most significantly from the other models, however, in that education emerges as an important predictive variable. The model shows that reliance initially decreases (as expected) by 16% with every additional year of formal education of the household head. After a threshold of five years, however, reliance appears to *increase* with increased education. This latter trend is due, however, to two 'outlier' households, who combined high reliance with more than ten years of education each. The overall relationship becomes linear when these observations are excluded. Non-significant in other tests, then, formal education finally emerges as a significant predictor of extractive orientation among the most forest-reliant group of households.

In sum, the most forest-reliant Tawahka households in 1997-98 were those with more male workers, more dependents, a relatively uneducated head, greater lowland holdings, ownership of extractive technology, and a poorer bean harvest.

4.5 Discussion and Conclusion

What can we surmise, then, about the role of commercial extraction in Tawahka livelihoods, and in forest peasant economies in general? Below I discuss the model results with respect to three interwoven strands of inquiry within the literature on forest peasant economies. As a reference, simplified results of the three regression models are summarized in Table 4.5.

Diversification as a Risk-Reduction Strategy and the Role of Wealth

Theory predicts that *any* form of non-agricultural diversification acts in part to mitigate the riskiness of farm-based income specialization, especially in economic environments where credit and insurance markets are thin or absent. In this respect, the low covariance between commercial extraction and agriculture make for an obvious

Table 4.5 Summary of significant model results for determinants of commercial extractivism, TABR, 1997-98.

	Probit Sold forest products? (n=103)	Tobit Level of reliance? (n=106)	OLS High reliance (n=33)
Demography			
Age of household head in years	-	-	
Residence duration in years		+	
(Residence duration in years) ²		-	
No. male workers		+	+
No. female workers			
No. dependents	+		+
Headed by single woman (0=no; 1=yes)	-		
Human & Social Capital			
Yrs formal education, hhld head			-
(Yrs formal education, hhld head) ²	n.a.		+
Spanish capability of head	-	-	
Extractive skill (0=none; 1=some)	-		
Entrepreneurial skill (0=none; 1=some)	+	+	
No. brothers of head	+		
(Brother*Single)	n.a.		
Land-based & Physical Capital			
Lowland landholdings in ha	-	+	+
(Lowland landholdings in ha) ²	n.a.	-	
House quality code (0-9)	-	-	
No. adzes owned	+	+	+
Shocks & Cash Needs			
No. children studying away 1997		n.a.	n.a.
No. days hhld members lost to illness	+		+
No. days female head lost to illness	-	n.a.	n.a.
No. deaths, 1996-98	-	n.a.	n.a.
Income & Alternatives			
Total bean production 1997 (lb)		-	-
No. sectors in which household engaged	n.a.	+	
Village			
Dummy for Krausirpi			
Dummy for Krautara	+	-	
Dummy for Yapuwas			
Dummy for Kamakasna	-	-	
Dummy for Parawas	n.a.	n.a.	n.a.

portfolio partnership; indeed, Tawahka households pair agricultural and forest-based commercial activities more often than any other two sectors (see Chapter Three).

But households have other means by which to self-insure: accumulation of land is one means by which to dilute damages *within* the farm sector; wealth held in physical assets can also be liquidated in times of need. Results of the Probit model appear to bear this out. Among the Tawahka, households most likely to participate in commercial extraction were those lacking *in-house* forms of insurance: they held significantly less land than non-extractors, and had significantly poorer quality homes (a proxy for overall asset wealth). Because young households, and those with more dependents, are also predicted to be likely participants, we may surmise that young households in the early stages of asset accumulation are those most likely to take advantage of the *ex-ante* insurance function that commercial extraction provides.

Among Tawahka households participating in commercial extraction, however, the role of land wealth becomes more nuanced. Results of Tobit and OLS modeling of *reliance* patterns show that although income-dependence on the forest remained positively and significantly correlated to demographic variables (youth of head and number of dependents) and to the household's relative poverty in physical assets, increased reliance was also predicted by *increased* lowland landholdings. This positive result likely arises from the fact that among the Tawahka, land can provide collateral (through pawn) to finance high-risk, high-return extractive activities, and can also provide a subsistence buffer against the risk of failure in such endeavors.

This finding underlines the dual role that land wealth can play with respect to risk reduction in forest peasant contexts. On the one hand, the insurance function of land renders the land-rich more likely to eschew off-farm pursuits such as commercial extraction. On the other hand, relative differences in land wealth *within* the 'diversifying' (i.e., extractor) population appeared to strongly condition the share of income that the sector provided. In sum, then, this study's focus on the determinants of commercial extraction opens a window into the complex role of land wealth in sector choice and resultant income patterns.

Commercial Extraction as a Coping Strategy

In his review of the recent literature on peasant livelihood diversification, Ellis (1998:13-14) states that coping behaviour by peasant households—that is, their unplanned response to crisis—

includes tactics for maintaining consumption such as drawing down on savings, using up food stocks, gifts from relatives, community transfers, sales of livestock, other asset sales, and so on...[and] may also involve searches for new income sources...

The results of this study offer convincing evidence that commercial extraction can be one such “income source,” offering an important recourse to households experiencing calamity, mainly through the provision of goods that can be sold quickly to earn cash. In 1997-98, Tawahka households turned to commercial extraction in response to medical misfortune, and coped with bean crop shortfalls by becoming increasingly reliant for their market income on commercial extraction. Furthermore, results show that for any given length of illness experienced by non-head household members, the households most likely to ‘fall back’ on forest-derived income were those owning extractive technology, having some business savvy, and having access to extra-household family labour. We might infer, then, that households who look to the forest to quickly meet unanticipated needs are those best poised—through prior experience and investments—to do so. Conversely, those households *least* likely to see commercial extraction as a means out of their medical situation are those with more liquid asset wealth, as proxied for by house quality.

But not all forms of unanticipated setback drive commercial extraction. As Godoy *et al.* (1998a:56) point out: “...households typically use a bundle of insurance mechanisms to cope with calamities, of which forest dependence is only one.” For example, the Probit model shows a significant *negative* association between the days that the female household head has lost to illness, and with the number of deaths the household has experienced. In other words, such events appear to *impede* diversification into commercial extraction by constraining adult labour.

Combined, the results of this study offer empirically-based insights into the *ex-post* insurance function of the forest to rural peoples, a topic that has only recently received critical attention and still lacks empirical grounding (see Godoy *et al.* 1998a and work cited therein; Pattanayak and Sills 1999). First, this study provides evidence that the insurance function of the forest *can* prevail by means of commercial extraction, but only in specific circumstances. For example, regression results indicate that for households experiencing illness, *who* in the household becomes ill, and for how long, are particularly important in conditioning whether forest product marketing is used to buffer the sudden need for medical treatment, or whether other sources of capital be drawn from. Researchers should thus seek to distinguish the nature and magnitude of household misfortunes when assessing the role of the forest in paying their costs. Second, data analyzed here also indicate that income shocks are more likely to inspire short-term involvement in commercial extraction (as flagged by participation in the sector), rather than long-term forest orientation marked by reliance on the sector.

Implications for Conservation and Development

Considering the strong link between Tawahka households' reliance on commercial extraction and their 'draw'²⁵ on forest resources (see Chapter Three), the results of this study can also contribute to the improved tailoring of conservation and development initiatives that seek to involve local peoples in long-term forest resource management.

First, the results of the regression models show the relationship between landholdings and participation in commercial extraction to be complex and multi-directional. Indeed, among Tawahka extractors the most forest-reliant households—and therefore, those earning the most from forest resources—were also the most land-rich. This result echoes other findings showing that land and other forms of household wealth can condition forest peasant resource use in different ways (e.g., Coomes and

²⁵ Note that in this study, 'draw' refers only to the total income drawn from the forest, and does not equate to a measure of biomass harvested, or *pressure* on the forest resource.

Burt 2000; Takasaki *et al.* 2000a,b). This growing literature challenges standard conceptions of forest reliance as a trait of only landless or marginalized peasants (e.g., Kant 1997). That a clear-cut link between landholdings and forest extraction should prove unsupported—at least among long-settled forest peasantries under conditions of relative land abundance—challenges policymakers to recognize the interconnectedness of asset holdings, land wealth, and activity choice (see also Takasaki *et al.* 2000a,b). Which thread within the fabric of peasant livelihood, then, should be tweaked by conservation or development projects to achieve a desired policy goal (provision of microcredit? land titling? crop insurance?)? The decision should be carefully considered and closely followed. In this regard, the involvement of the community is essential; results of this study show that the claims of local informants are typically borne out by rigorous quantitative analysis.

Second, an important outcome of this study is to depict indigenous peoples as discriminating economic agents, whose decisions about engaging in commercial extraction, or indeed any non/off-farm sector, reflect household proclivities as much as the vagaries of circumstance. The Tawahka case illustrates that ‘career’ forest extractivists do not exist. Rather, households turn to commercial extraction occasionally, in response to particular cash-demanding events that occur at times and in ways that are best met by forest product sale. Furthermore, the most ‘forest-reliant’ households are characterized by their youth, relative inexperience in the extractive sector, and low levels of asset accumulation: they are likely meeting their consumption demands through low-risk, low-cost extraction *as* they accumulate in land and assets towards eventual movement out of the sector. Indeed, Tawahka informants routinely stated that forest extraction is hard, dangerous work. For outsiders to promote such an orientation through artisanal projects, extractive reserve development, or other means, is to assume, incorrectly, that forest extraction is a desirable long-term income option for forest peasant households.

The study also offers some broader methodological and perceptual directions for future studies of forest peasant resource use. First, the study shows that econometric analysis can be fruitfully matched to qualitative findings (in this case,

interview data). Indeed, local peoples' insights into their own economic behaviours are essential to qualify, nuance, and contextualize what can often be 'dry', conflicting, and seemingly abstract statistical results. Second, the study's use of multiple models illustrates the degree to which our perceptions regarding rural households' economic behaviour are very much sensitive to the analytical method and scale used. The strategy also illuminates the complex decision-making matrix behind household production choice. Clearly, commercial extraction, like diversification in general,

...is an infinitely heterogeneous social and economic process, obeying myriad pressures and possibilities in the rural economy. It is differentiated in its causes and effects by location, demography, vulnerability, income level, education, and many other factors (Ellis 1998:29).

This point cannot be made too often. Many policy prescriptions for forest communities are based on one-time, single-model analysis of data drawn from rapid appraisals of rural communities (e.g., Godoy *et al.* 1997a). While such studies are laudable for their efficiency and clarity, the cost of oversimplifying the forest peasant problematic is ultimately paid by local peoples themselves, in terms of time, energy, and hope invested in programmes doomed to fail (see Barraclough and Ghimire 1995).

CHAPTER FIVE

Dugout Canoes in the Mosquitia, Part I: Canoe Manufacture and Use

5.1 Introduction

The economic history of the Mosquitia is typically characterized by outsiders and residents alike as one of repeating cycles of good times and bad.¹ During past good, or 'boom' times, international demand for mahogany, gold, bananas, latex, or other goods resulted in brief invasions of foreign capital and an abundance of cash and imported goods. In contrast, bad, or so-called 'bust' periods are perceived as times of hardship and commercial stagnation when local peoples feel particularly deprived, and apparently must fall back on basic subsistence activities for survival (von Hagen 1940; Parsons 1955; Helms 1971:110-115; Nietschmann 1973:40-44; Helms 1995; CC; LD).

Boom-and-bust scenarios are typical of most lowland rain forest economies, and their history has received recent attention for the often cautionary insights they offer to modern attempts to reconcile the economic development of forest peasant communities with biodiversity conservation.² Of particular interest are explanations for why booms turn to busts, why they leave little 'development' behind, and what lessons they can offer contemporary forest product marketing initiatives (see discussion in Barham and Coomes 1994b; Barham and Coomes 1996). In the Mosquitia context, scholars have critically examined the 'boom' histories of mahogany and *chicle* (e.g., Nietschmann 1973; Offen 1993, 1998); others examine ongoing

¹ The terms 'boom' and 'bust' are not used outright because they are highly relative. What appears a 'boom' in the Mosquitia may go unnoticed in other regions. Indeed, in terms of its geographic scope, long-term effects, and in the sheer scale of foreign investment and government interest and involvement, the Mosquitia's boom-and-bust history pales to that of the Amazon, for example (see Coomes 1995; Korovkin 1997). This is no doubt why Parsons (1955:54) has used the term "incipient booms" to refer to economic patterns in the Mosquitia; Helms (1971:27) refers to "small booms."

² Mainly through revisionist readings of the microdynamics of boom times, particularly with regard to the perceived 'debt peonage' arrangements (e.g., Hugh-Jones 1992; Offen 1993, 1998; Barham and Coomes 1996; McKinley 1996).

'booms' (e.g., Dodds 1997). These studies have offered direction to regional NGOs seeking to promote sustainable development in the region.

But the dominance of the boom-and-bust narrative and the analytical focus on *exportable* forest products has meant that small-scale, indigenous economic systems in the Mosquitia and elsewhere have been largely overlooked. Yet local peoples have long exchanged a host of regionally important goods and services among themselves, often through inter-ethnic trade networks that are largely independent of foreign influence. These 'invisible' trade networks often predate, and subsequently coexist with, more obvious boom and bust cycles, and evidence has emerged that these systems provide forest peoples with an important economic recourse during 'bust' periods (e.g., Helms 1978; Hugh-Jones 1992). In the Mosquitia, for example, food crops, livestock, game meat, salt, honey, medicinal treatments, and pitch pine are just a few of the goods that have been exchanged among local groups during and between economic booms (Young 1842; Roberts 1827; Bell 1989). Evidence of these enduring trade networks challenges the accepted wisdom of wholesale commercial atrophy in 'bust' times, and may offer better clues for the successful economic development of remote forest communities than the cautionary tales of boom/bust histories alone.

The primary purpose of the next two chapters is to examine the history and survival of indigenous commercial networks through a case study of dugout canoe manufacture and trade in the Mosquitia. Central to native lifeways and among the Mosquitia's most enduring trade items, dugout canoes have been traded among ethnic groups in the Mosquitia for at least 250 years. The trade remains vibrant: Tawahka Sumu of the Rio Patuca, for example, made almost 500 canoes between 1990-98, of which almost half were bartered or sold, some to buyers up to 250 km away. The fact that dugout canoes continued to be used and exchanged at the close of the 20th century—when roads have penetrated many neotropical forests—alone merits attention as an example of the varied role of tropical forest products in rural subsistence economies.

In the context of the dissertation, the two chapters form a case study intended to nuance the general insights of previous chapters by focusing a historic lens on one part

of an indigenous people's wealth and production portfolios. Singling out canoes in this simplified, non-comparative context allows detailed examination of the complex social and economic dynamics that can be involved in forest product procurement and use, and the measured decisions involved in sale. Whereas the rest of the thesis assesses reliance on forest goods at a given point in time and relative to other productive options, this case study offers a descriptive, fine-grained counterpoint, towards enriching the overall narrative by specific example.

The canoe case study also provides an overdue economic treatment of New World dugouts. As rain forest trees transformed into productive assets and trade goods, dugouts seem to lend themselves to an economic analysis informed by the conservation/development literature's recent preoccupation with forest product marketing. But canoes have until now received most academic attention from anthropologists interested in everything *but* their economic role in native lifeways. Studies have instead focused on form, their role in pre-Columbian exchange networks and cultural diffusion, mythology, cultural codification embodied by canoe construction, and the links canoes make between the human and natural worlds (e.g., McKusick 1960; Wilbert 1976,1977; Helms 1978; Kane 1994; Gannier 1996). Elsewhere there is scattered mention of canoes traded amongst ethnic groups (Helms 1971; Nietschmann 1973; Wilbert 1976; Roberts and Shackleton 1983; Hugh-Jones 1992), but we know little of the motives or dynamics behind such activities—especially in modern contexts—and are otherwise ignorant of the economic benefits that forest peoples derive from what is in many areas an essential item of material culture. This case study combines quantitative and qualitative approaches with a geographical perspective towards filling this gap.

The chapters are set up as follows. In Chapter Five, I offer a historically-informed micro-level analysis of canoe production and use in the Mosquitia. Drawing from the historical literature and first-hand observation, I emphasize the canoe's ongoing importance as an essential productive asset and the complex technical details of canoe manufacture. The chapter provides a description-rich backdrop to Chapter Six's more thematically focused analysis, which explores the evolution of canoe

commerce in the Mosquitia from 1700, and explores the trade's modern expression on the Patuca River in Honduras. The latter is examined from the perspective of Tawahka suppliers, and the economic contribution of canoes to Tawahka income and savings strategies is explored. Supportive data come from household surveys and oral history interviews conducted between 1995 and 1998. The chapter also reviews the future of Tawahka canoe manufacture in light of a spreading deforestation frontier, rapid population growth, and an emergent timber market. Finally, the Conclusion at the close of Chapter Six incorporates insights from both chapters in a discussion of the implications of this study to our perception of forest economies in general, and the marketing of forest products in particular.

5.2 Canoe Types and their Uses

Dugout canoes are made from hollowed tree trunks, and range from crude one-person craft to elaborately carved vessels holding up to 100 people. They are found in the material culture of peoples world-wide, from Polynesia to Africa. In the New World, dugout use defined pre-Columbian native lifeways in both North and South America, from the Nootka of British Columbia and Seminole of Florida to natives of Tierra del Fuego (Roberts and Shackleton 1983); in the Caribbean, they were essential to trade and cultural diffusion (McKusick 1960; Gannier 1996). The choice of dugouts over other forms of water craft is generally predicted by the coincidence of large trees of buoyant wood and aquatic environments demanding of particularly sturdy craft. Today, the continued use of dugout canoes is most notable among subsistence and fishing societies of the Caribbean islands and littoral, as well as in forested river basins of the Orinoco, Amazon, and Central America.

In the Mosquitia region of Honduras, dugout canoes remain essential craft to native populations in both maritime and riverine environments. Peerless for travel in the highly variable depths of rapids and coral shoals alike, dugouts are rugged workaday boats that are used by lobster divers, river traders, development and church organizations, and are owned by most native households. Among the Tawahka, who

own an average of one dugout per household, canoes shape modern subsistence activities. For example, 40% of agricultural fields are riparian and typically accessed by water; harvests from such areas can only be brought in by canoe. Canoes are used to reach hunting, fishing, and other resource-extraction areas. They are used daily to haul water and firewood, and to fish. For a society with no pack-animal tradition and no modern memory of tumpeline use, canoes are essential in the transport of goods and people. As von Hagen noted of the Miskito of the lower Patuca: "The canoe is the most important item in the economy of this people" (1940:255). All travel and commerce on the mid-Patuca is conducted by canoe. And, until recently, Tawahka were buried in their canoes (IS).³

But the canoe's persistent importance here—in travel, commerce, cargo transport, and subsistence activities—is also due to the Honduran government's neglect of the Mosquitia's transportation infrastructure. For example, the 17,000 km² Department of Gracias a Dios⁴ boasts only one unpaved road (only 200 km long) for its 50,000 scattered inhabitants (Canales 1997). Most of this road is old logging track last maintained during the era of *contra*-Sandinista conflict; no road reaches within a 100-km radius of Tawahka settlement. The Honduran Mosquitia is serviced, however, by its own airline, and together with a missionary aviation service, some ten landing strips are sporadically serviced. But air travel is prohibitively expensive for most inhabitants and used only in emergencies. Until terrestrial networks are improved, rivers and lagoons will remain the main inland thoroughfares, and dugouts considered the most practical and inexpensive way to navigate them.

Today, two basic types of dugout canoe (Spanish: *canoa* [generic]) are used in the Honduran Mosquitia, which correspond roughly to the region's two main aquatic environments and the ethnic groups that settled them.

³ Throughout the Mosquitia, a person's canoe doubled as their coffin until the 20th century (Roberts 1827:68; Wood 1840:40; Collinson 1869:151; Bell 1989:89; Fluery *et al.* 1938 [1905]:178), but the practice now appears abandoned.

⁴ The political division that denotes much of what is commonly known as "La Mosquitia."

River Dugouts

Long, narrow, flat-bottomed *pitpan* canoes (Spanish: *pipante*; Miskitu: *duri*; Tawahka: *kurrin*)⁵ are used to navigate rivers, and in the Mosquitia are associated with tribes historically confined to the Mosquitia's inland habitats, including most Sumu groups, and the Pech. The *pipante*'s thick hull minimizes damage in rapids and rocky shallows, and from the knocks of flotsam in the rainy season. Typically ten times longer than they are wide, their narrowness makes them highly maneuverable in rapids. Almost square in cross-section, the *pipante*'s shallow draught makes it unsurpassed in shallow water (Fig 5.1). To the unskilled, the same trait renders *pipantes* extremely difficult to handle, especially headed upriver, as the current constantly persuades the canoe to slide off-course. The *pipante*'s squared stern can be stood or sat on when poling upriver or paddling downriver, respectively (Fig. 5.2). In the Mosquitia, paddles are termed *canalete* in Spanish (M: *kwahi*), and poles, *palanca* (M: *kahra*).

Family Canoes

Pipantes have two main forms, depending on size and function. "Family" canoes are relatively small, and accommodate most household needs. During the study period, the average Tawahka family canoe⁶ measured roughly 0.5 m wide ($n=146$; range: 0.3-0.9 m, or 1-3 ft)⁷ and held up to five adults. Though they appear from a distance to be fragile, family canoes can hold entire households and their belongings, as is aptly described in an 1894 observation of a Sumu family on the Río Coco:

Each family travels in their Pitpan, a flat boat, which measures about 30 feet long and 1½ to 2 feet in width. The guides sit up front with a couple of dogs, then follow the chickens as passengers, the middle is taken up by provisions: bananas, dried game, cooking utensils and so forth, in short, the whole

⁵ *Pipante* is used in discussion here since the English word is unfamiliar in the contemporary Honduran Mosquitia. 'Pitpan' is the term used for some time in Belize (see Henderson 1809:78; in contrast, 'dory' is the term used where English is spoken on the Bay Islands). The word appears first used to refer to flat river canoes of the Mosquito Coast by Uring (1928[1726]:157), who distinguishes them from 'Canows' and 'Dories.' Gannier (1996) discusses the origin of several terms for canoe.

⁶ Defined here as any canoe in use by a Tawahka household in 1998, or any held previously for more than one year.

⁷ Canoe size is typically measured at the 'mouth,' or 'beam': the widest spread of the gunwales. Local measurements are in feet (ft), which I convert to decimal metres.



Fig. 5.1 Tawahka elder fishing from her *pipante* near Parawas, Río Patuca, TABR, Honduras, March 1998. Note the squared form of the canoe. Photograph by the author.

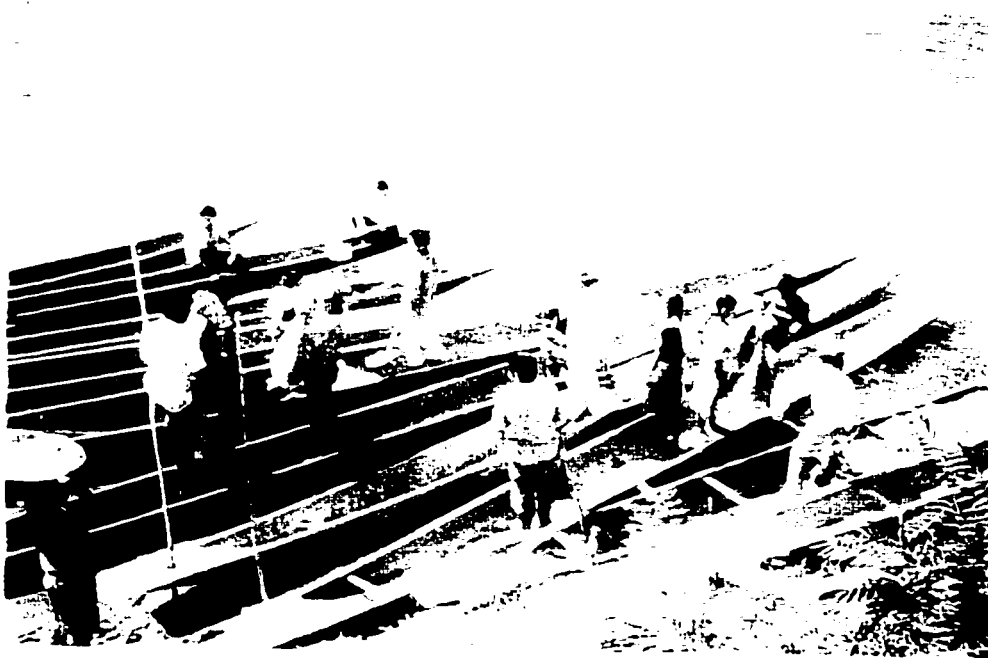


Fig. 5.2 Villagers unloading sand from *pipantes* at Krausirpi, TABR, Honduras, March 1996. Note the use of *palankas* to hold canoes in place. Photograph by the author.

household, living and dead inventory. The family takes up the back. They sit in a long row, first one child after another, then the women, and lastly the head of the family, a man, steering (Martin 1990[1894]:162, *transl.* by N. Lerch).

To have a *pipante* for personal use—i.e., rather than for sale—motivated the majority of canoe construction by Tawahka (66%; $n=162$), who aspire to own at least two *pipantes* per household so that coincident chores can be met. As one man explained:

The best is to have two [*pipantes*]: one for the man and one for the wife... In case, maybe, the man wants to leave his community, to hunt or to go gold panning, and so another *pipante*, smaller, stays in the house for whatever need may arise. With that she can do her activities... (FS, community meeting, Wampusirpi, February 1998; *transl.*).

In 1998, Tawahka households owned an average of 1.2 *pipantes* per household, fewer than the optimum. But the range in ownership was broad: several households owned multiple canoes, while 27% of households owned none at all. How do these latter, canoe-poor households—particularly the 7% who have been consistently without a *pipante* since 1990—cope? To answer this question I draw from the 99 Tawahka informants who responded to questions regarding the lending and borrowing of canoes. Of those informants, 45 claimed to have lent canoes to family and neighbours with an average frequency of 2.8 times/week (by custom, there is no explicit charge for loans). In turn, 33 households admitted to borrowing canoes, and claimed to have done so with more frequency than they were lent (3.7 times/week).⁸ This rough corroboration of canoe loans among coethnics is an excellent example of the sharing of productive assets among indigenous households, which smoothes productive involvement despite skewed asset profiles: not *owning* a *pipante* does not necessarily prejudice a household against the activities requiring *pipante* use (although doing so may carry a high social cost).

⁸ The fact that more households claim to lend canoes than to borrow them is not surprising, due to both cultural and sampling issues. Respondents would rather be perceived as generous than as needy; borrowers likely admitted to borrowing in part because they knew that I was aware of their lack of canoes. It is also worth noting the discrepancies in the reported *relationship* between borrowers and lenders. Canoe lenders claim to lend much more to neighbours than relatives (75% vs. 25%). Canoe borrowers claim the opposite, saying they borrow more from relatives (75%) than neighbours (25%). I interpret these figures as lenders attempting to increase the impression of generosity by claiming to lend to non-kin, whereas borrowers would wish to minimize the impression of dependence on non-kin.

In fact, my own field observation suggests that there is less social stigma associated with being a canoe borrower than being a reluctant lender. Indeed, social pressure to lend 'surplus' canoes has been cited by Tawahka as a deterrent to canoe accumulation (GR).⁹ Because they are moored communally along the river's edge, households with numerous *pipantes* appear ostentatiously wealthy. Should they resist lending their 'idle' boats, *pipante*-rich households risk being labeled 'black-hearted,' 'mean,' or 'proud' (that is, aloof and ungenerous—serious insults). And because canoes are often 'borrowed' without permission anyway, idle boats would effectively be appropriated by the community (GR).

To the socially defined limit that family *pipantes* can be accumulated, then, they represent an important asset in Tawahka wealth portfolios, comparable to livestock or a firearm. Thus beyond their productive function, they also contribute significantly to a household's capital stock which can be liquidated in times of need. For example, almost one-third of *pipantes* that were originally intended for family use were later sold by their owners to meet unanticipated needs ($n=162$). Those households without a canoe, then, face reduced insurance options even if they are able to borrow canoes for productive activities.

The modern importance of canoes in Tawahka wealth portfolios appears little changed from the historic place canoes have held in regional lifeways. Early accounts place canoes among the few significant possessions of the Mosquitia's natives, comparable to a gun or fruit trees (W. 1732:295; Bell 1989:95). The relative importance of canoes compared with other forms of material wealth is clear from the observation of the anonymous 17th century chronicler 'M.W.':

...[the Miskito] are buried in their houses...and have their hatchet, harpoon-lances...buried with them: but if the defunct leaves behind him a gun, some friend preserves that from the earth...His boat or dorea they cut in pieces, and lay over his grave with all the rest of his household goods, if he hath any more (W. 1732:295).

⁹ Rather than hoard wealth in canoes, some Tawahka leave a felled tree in the forest until needed.

Mention of canoes also recurs in historic accounts of disputes between local peoples, further attesting to the canoe's central role in native livelihoods and importance as an asset. Accounts indicate that the surest way to enrage a man was to steal or split his canoe: such acts proved the catalyst for several bloody disputes, often resulting in murder (Wood 1840:41; Coates 1990 [1849]).

Freight Pipantes

Freight *pipantes* are larger than family canoes, with beam between 0.9-1.5 m wide (3-5 ft) and cargo capacities in excess of 1,200 kg or 20+ passengers. Locally termed *batu*,¹⁰ they are the riverine equivalent of trucks, typically used by traders and NGOs to haul cargo (Fig. 5.3); on the Río Coco, Helms (1971:36) reports *batu* themselves functioning as floating stores. Between 1990-1998, the Tawahka made 60 freight *pipantes*, most for export outside the TABR.

Although larger than family *pipantes*, freight *pipantes* are little different in form; indeed, there is little stylistic variation in canoe form within the Mosquitia.¹¹ Nor are modern *pipantes* much different from those depicted historically (Fig. 5.4; see also Wickham 1894:202; Von Hagen 1940), except that modern *batu* do not use a canopy to protect goods and passengers as in the past (Sapper 1901). Furthermore, modern *batu* appear no smaller than historic boats—a relevant finding if maximum canoe widths are used as a measure of available tree diameters (see later). The Mosquitia's *pipantes* also appear similar to those used on rivers elsewhere in Central America, judging from pictorial evidence (Roberts and Shackleton 1983), but are more square in cross-section than those of Venezuelan natives (Wilbert 1976:314). Whether this stylistic similarity is the product of cultural diffusion or adaptive convergence to similar habitats is subject for further study.

How *batu* are propelled, however, has changed over time. The ten to twelve-man *batu* paddle crews that Sapper (1901) saw at the end of the 19th century had been

¹⁰ The term used by both Honduran Miskito and Tawahka for large river or sea canoes. After the French *bateau*. First use of the word in the Mosquitia appears to be Wright (1808:26).

¹¹ I noted *pipantes* used by Miskito on the whitewater of the mid Río Coco have slightly higher gunwales. On the more windswept reaches of the lower Patuca, *pipantes* may also have keeled prows.



Fig. 5.3 Tawahka loading freight *pipante (batu)* with merchandise at Piedra Cara, Upper Río Patuca, Olancho, Honduras, March 1998. Photograph by the author.



Fig. 5.4 "Sumu Indian" fishing from canoe, late 1800s. American Museum of Natural History, *in* Kirchhoff (1948:22), Plate 35. Note square hole cut in prow; compare to Fig. 5.3.

replaced by outboard motors by the 1930s (Keenagh 1935; HM). On the Patuca, outboard motors and Wisconsin inboard 'tuk-tuks' were common by the early 1970s (Adams 1972). In fact, the Tawahka have no communal memory of a time when *batu* were not run by engine.¹² Tuk-tuks are now rare. Outboard motors, however, are becoming increasingly common. Today, no *pipante* with a beam greater than a meter is used without a motor.

The rugged, all-purpose *pipante* has few modern alternatives. Slow, shallow-draught barges were used to load bananas on the lower reaches of the Patuca in the 1930s (von Hagen 1940; CC), but have not been seen since. Today, speedboats are used by some NGOs but are fragile and useless in the dry season, leaving dugouts the only effective means to ply the length of most of the Mosquitia's rivers year-round. Evidence of their ongoing utility became evident in the wake of Hurricane Mitch (October 1998), when dugouts were used to deliver food aid; emergency crews were at a loss to find alternative craft with dugouts' freight capacity.

Maritime Dugouts

The second type of dugout used in the Mosquitia is the sea canoe, or *dory* (S: *cayuco*; M: *duri*; T: *kurrin*). In Honduras, the *cayuco* is used mainly by Miskito and Garífuna peoples in coastal environments, but is described here to contextualize discussion of commercial *cayuco* production by riverine natives, including the Tawahka. Shorter and broader than the *pipante*, *cayucos* are not flat-bottomed but keeled, and are usually not more than one-quarter as broad as they are long. The 17 *cayuco* made by Tawahka since 1990 averaged 1 m (3.17 ft) beam by 8.7 m (28.5 ft) long. On the Patuca River, they are used on windswept distributaries and the lower main channel. Small *cayucos* are paddled; sails are common (Fig. 5.5). As with *pipantes*, the use of motors for larger *cayucos* is now common; minor modification is required to affix an outboard to a *cayuco*.

¹² Among the numerous informants to whom I showed a photograph of a 1910-era paddle crew on the Río Coco, only one septuagenarian remembered witnessing the method as a child.



Fig. 5.5 Miskito sailing *cayuco* at Pearl Lagoon, RAAS, Nicaragua, March 2000. Note fishing spear, paddle, and rolled sail. Photograph by the author.

Historical accounts suggest that *cayuco* form has changed little in the Mosquitia over the past centuries. Often seamen themselves, foreign visitors gave detailed descriptions of the region's *cayucos*, the largest of which had a 2.1 m width and 15.2 m length (Wood 1840:41). The King's canoes appear to have been the most massive, and the most elaborately outfitted:

He [the Miskito king] had a fine boat...being a very large cedar canoe, raised, built up, and decked over so as to afford the shelter of its hold and a very small cabin aft. Carrying two masts with shoulder-of-mutton sails and a large jib, it was a fast sailer, and much admired as a craft fit for a King (Bell 1989:273).

The *cayuco* is the Miskito craft *par excellence*. The English buccaneer Dampier described how, about 1680, "The Moskito men have always a small Canoa for their use to strike Fish, Tortoise, or Manatee, which they keep usually to themselves, and very neat and clean" (1927:33). He was particularly impressed with their canoe-handling skill (1927:17,33), as was the French pirate Raveneau de Lussan:

They are the boldest people in the world for exposing themselves to the peril of the Sea, and undoubtedly the most expert in the art of fishing...being no more concerned than if they were made of the same piece as their boat (de Lussan 1771:325).

High praise from a pirate,¹³ appreciation of Miskito canoe skill is found consistently in the historical record (Uring 1928[1726]:161; Wright 1808:26; Young 1842:76), and is renowned to the present; along Nicaragua's Atlantic Coast, Miskito fishermen continue to spear turtle and fish from *cayucos* (field observation).

Indeed, part of the success of the Miskito's early alliance with the buccaneers—by which they obtained guns, monopolized coastal trade, and came to dominate interior tribes—can be traced to the early usefulness of their canoe-based skills to northern European freebooters. As De Lussan noted of the natives at Gracias a Dios,

¹³ By comparison, there is relatively little mention of the interior Sumu's prowess at river navigation. Today, both groups display remarkable canoe-handling skills. For example, it is not unusual to see a standing, four-year-old Tawahka cross a high, log-strewn river in a tiny canoe, using only a pole. Tipping is unheard of. The ineptitude of foreigners at dugout handling is an ongoing source of hilarity.

Being very dextrous at their javelins [thrown from *cayucos*], they are useful to the pirates in victualling their ships, by the fishery of tortoises and manitas...for one of these Indians is alone able to victual a vessel of 100 men (1771:214).

For this reason, most pirate ships plying the Caribbean kept on board a couple of Miskito "strickers." The Miskito's canoes and navigational skills also helped the pirates to stealthily board, or speedily evade, clumsy Spanish ships all along the coral-strewn Central American coast (Dampier 1927; Roberts and Shackleton 1982:28).

Despite the *cayuco*'s irrevocable association with the Miskito, the craft probably predates their existence as a distinct people in the Mosquitia: the earliest mention of *cayucos* along the Mosquito Coast comes 131 years after Columbus first traced the shore, when a British trade party reaching Cape Gracias a Dios in 1633 was met by Sumu in keeled dugouts (Floyd 1967). The canoes did not elicit further comment,¹⁴ but the observation is important for confirming canoe use by natives of the Mosquitia before ethnic admixture of the native population with foreigners produced the 'contact culture' of 'Sambo' and 'Tawira' which eventually merged into a common 'Miskito' identity (see Offen 1999). Thus we may interpret the Miskito's canoe skills as a local, probably Sumu legacy, rather than the product of foreign, including coastal African, influence.

Unlike *pipantes*, *cayucos* have several modern alternatives. At Sandy Bay, Nicaragua, fishermen and turtlemen abandoned the use of the traditional dugout-based sailing craft about 1980 in favour of faster, planked 'catboats' (field observation). Other fishermen prefer aluminum and fiberglass 'speed' boats, which are lighter, larger, and faster than dugouts, and are preferred for cargo transport and lobster trapping. Commercial lobster companies prefer to rent their divers light-weight fiberglass canoes, which are more easily stacked on board when new lobstering areas are sought (field observation; see Fig. 5.6).

¹⁴ Columbus had been much impressed by native dugouts at Cuba, where he described elaborately decorated canoes holding up to 150 men in specially designed boathouses. It was Columbus who adopted the Carib word into Spanish, *canoa*, to describe the dugouts he saw (Sauer 1966:58,60). The first mention of an Isthmian dugout comes from Columbus' 1502 voyage, in reference to the capture of a Mayan trade canoe off Honduras' Bay Islands.

Despite their importance in commercial activities, however, fiberglass, aluminum, and planked boats are too expensive for most Miskito households to maintain for everyday demands, for which the *cayuco* remains essential:

The man goes to his [agricultural] work in one *cayuco*. The women go to their work in another *cayuco*. Their children go to fish or to school in their *cayucos*...(coastal Miskito at BRP meeting, February 1998, Wampusirpi, *transl.*).

This passage illustrates the central role that *cayucos* continue to play in every aspect of modern Miskito life, echoing Nietschmann's observation that "[t]he importance of the *dori* for Miskito livelihood cannot be overemphasized" (1973:155).

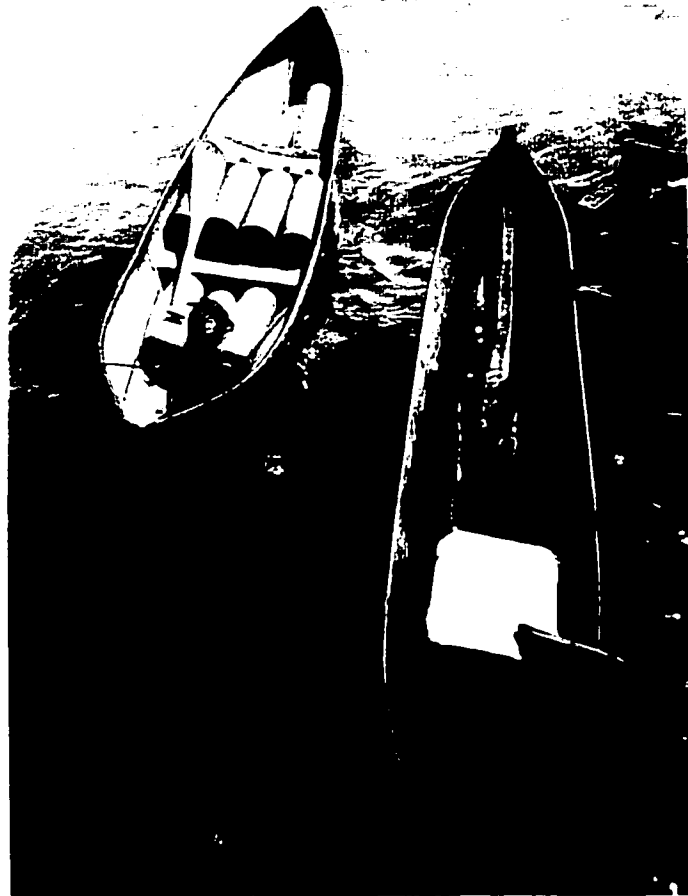


Fig. 5.6 Lobster divers' *cayucos*—fiberglass (*left*) and traditional wooden dugout (*right*)—at Miskito Keys, RAAN, Nicaragua, March 2000. Canisters are for scuba diving. Photograph by the author.

5.3 Canoe Makers

In the Mosquitia, the traditional makers of all types of canoe are the ‘interior’ tribes: Sumu, Rama, and Pech. Their reputation as the Mosquitia’s canoe suppliers is of long standing (e.g., Roberts 1827:112; Young 1842:87; Bell 1989:130; Palmer 1945:45). It is noteworthy that Sumu and other groups were—and continue to be—renowned for their reliable *provisioning* of canoes from the forest, rather than for any particular *artistic* merit of their canoes. Early reports of the Mosquitia’s canoes make no mention of decoration, and we can assume that native canoe art here never produced the remarkably carved craft reported by Columbus among the Caribs (Sauer 1966).

Interestingly, there is no mention in the historic record of Miskito harvesting ‘canoe’ trees or otherwise constructing their own dugouts, despite the primacy of canoes to their maritime lifeways. This contrasts with other circum-Caribbean tribes, where canoe use and construction tended to be thoroughly integrated (e.g., Wilbert 1977). Particularly revealing is that the pirate de Lussan (1771) describes making his *own* canoe while travelling along the Caribbean shore between Costa Rica to Gracias a Dios, even though accompanied by Miskito. The English merchant seaman Uring (1928[1726]:143) even offered the English/Miskito residents of Cabo Cameron, Honduras, his *own* canoe.

There are two apparent reasons for this ethnic disjunct between canoe producers and consumers. The first is biogeographic. Pre-Columbian inhabitants of what is now the Mosquitia migrated seasonally between riverine and coastal habitats to exploit different resources (Helms 1978; Offen 1999). On the coast they obtained sea turtle, manatee, salt, fish, and shells; on the savanna, game, thatch, pitch pine and cordage, and in the broad-leaved interior a host of rain forest products, presumably including the hardwoods required for canoes. With the ascent of the ‘contact culture’ of Miskito, the Mosquitia’s ‘pure’ natives were pushed inland, initially to avoid capture by Miskito slavers, and later due to depredations from their rapacious co-indigenes (Henderson 1809:78; Zuñiga 1938[1879]:217). By the early 1700s these

groups had become “interior” natives, settling securely upriver of rapids, or in hilly territory (Uring 1928[1726]:156-157), features coincident in the Mosquitia with the fairly sharp biogeographic transition from pine/palm savanna to rain forest (Parsons 1955). In other words, interior groups came to enjoy a near-monopoly over resources found only in rain forests. By contrast, the Miskito’s traditional extractive sphere rarely more than abutted extensive broad-leaved habitat (see Fig. 1.3).¹⁵

Anthropogenic factors reinforced this pattern. Trees appropriate for canoes—particularly mahogany—*could* be relatively abundant within Miskito territory, especially in gallery forests along well-drained floodplains, within otherwise pine-dominated landscapes. But these most accessible trees were targeted from the early 1800s by logging companies to whom the Miskito were more than willing to grant generous concessions (Naylor 1967; Oertzen *et al.* 1990; Tucker 1992). Many stands had been logged out by the mid-1850s, although mahogany logging continued at a commercial scale on several of the Mosquitia’s rivers into the 1950s (von Hagen 1940; Parsons 1955; Nietschmann 1973). The resultant coincidence of cultural homelands with precious hardwood stands meant that the Miskito, rather than making lengthy extractive trips inland, relied on interior groups to furnish them with boats (see next section).

Today, this pattern is largely intact. On the Patuca, for example, the largest upriver Miskito community (Wampusirpi) coincides with the most inland penetration of savanna vegetation (see Fig. 1.3; Herlihy and Leake 1993). In contrast, the Tawahka homeland lies fully within the upland, broad-leaved forests of the Colon and Patuca mountain ranges. Within the TABR, forests over the metasedimentary rocks north of the Patuca provide particularly ideal microhabitat for cedar and mahogany, which grow to larger diameters and at greater densities than elsewhere in the Mosquitia (CC; IM; AS; IS; Young 1842:80,97; von Hagen 1940). Canoe carvers claim, for example, that within the richest forests of the Río Aner one can find ten to twelve mahogany trees per hectare, where in most broad-leaved forests there are fewer than 1-2/ha (AS; IS). In addition, these stands have largely been spared the extensive

¹⁵ With the noted exception, in Honduras, of the Sico/Paulaya and Plátano river basins.

high-grading for cedar and mahogany that the Patuca's main channel has experienced intermittently since the 1840s (Honduras 1938; Naylor 1967:63).¹⁶ Thus Tawahka territory includes, or is adjacent to, some of the richest stands of 'canoe' trees in the Patuca basin.

Proximity to the finest hardwood stands is not the only reason that Tawahka and other 'interior' groups have traditionally made the Mosquitia's canoes, especially as we know that the Miskito originally would have had some access to 'canoe' trees. The division of labour along ethnic lines also reflects the "ethnic hierarchy" in which Miskito are dominant and Sumu and other groups subordinate (see Oertzen *et al.* 1990:28-29; Offen 1993). In fact, the Miskito are traditionally disdainful of, and eschew, any activity associated with the inferior "straight-hairs." They have historically preferred wage work, even of a type hardly distinguishable from non-wage primary extraction, such as mahogany cutting. Today, although many Miskito are capable of making their own canoes, they prefer to buy them from inland groups. Cultural pride may seem an untenable reason for a canoe-oriented people to shun canoe manufacture, but the Miskito's position as the region's dominant group has historically meant that they could *afford* this attitude (see next section).

Tawahka Canoe Carvers

Today, to be a Tawahka Sumu is to be a canoe maker (IS), and Tawahka communities have produced an average of 56 canoes/year since 1990, or one every two years per household. Canoe-making is considered among the essential skills that fathers pass on and young men should have grasped, if not mastered, by the time of their first family (usually about age 17-18; LD; IM; ES2). Indeed, 76.5% of Tawahka households reportedly included a male who had learned canoe-making skills in his teens (n=81). Men who grow up fatherless typically apprentice to relatives or neighbours by joining canoe-carving expeditions in exchange for help making their own boats. Basic canoe-making know-how is thus spread fairly evenly across the adult

¹⁶ But even in places where the Upper Patuca was logged, especially during the 1930s, sawyers targeted only specific size classes: trees smaller than 1.5 m (30") diameter, and those larger than 1.8 m (60"), were left standing (HM).

male population. Nevertheless, some households are constrained in their ability to make canoes. For example, 18.3% of households interviewed in 1998 (n=109) claimed to have no plans to make canoes because of labour constraints, such as: being headed by single women, having an old or sick male head, or a male head who was away studying and/or had not yet learned how.

According to Tawahka carvers, there is little technical difference between making a family *pipante* or a large freight canoe: the axework is essentially the same, and any young man is qualified to be part of a *batu* construction team. But there are only a few Tawahka men renowned as *pipanteros*, sought out by Miskito and others to make very large canoes. There are several attributes that set these ten-odd men apart as great carvers. First, they claim to 'understand' the trees. Much of canoe building is anticipating which of the often diseased forest emergents will make good canoes. Experience and a generally keen understanding of the forest allow carvers to predict before cutting which trees are most likely to split, be rotted, or twist over time. Second, they must be leaders. In a relatively politically egalitarian society such as the Tawahka's, with no recent tradition of headmen or political hierarchy, the ability to organize and direct a group of carvers as the *encargado* (S.) or *kaptén* (M.) of a canoe-carving expedition is an unusual skill developed over time (often through prior experience as team leader during prior extractive periods such as the *tunu* boom: AS). In this regard, *pipanteros* often benefit from extended family labour pools: sons and brothers are easier to boss than more distant relatives. Third, *pipanteros* must negotiate contracts with non-Tawahka buyers and, as *ladino* colonists increasingly invade the Tawahka's best 'canoe' forests, *pipanteros* must bargain with them for access to trees. Thus most *pipanteros* are comfortable in Spanish and familiar with non-native socioeconomic organization, often through prior work experience outside their communities.

Tawahka are not exclusive with their canoe-making skills. For example, they will often accept carving assistance from neighbouring Miskito or *ladino* subsistence farmers eager to learn the craft (FG; IM; IS). Several Miskito with whom I spoke claimed that either they or their fathers had learned their canoe-making skills watching

Tawahka carvers (JB; LD), but claim to never to have matched Tawahka skills. As one Tawahka carver claimed:

We, the Tawahka, *we* are the people who make *pipantes*, *cayucos*. The people from downriver are the ones who come here to buy, or to learn (IS, Krausirpi, May 1998, *transl.*).

5.4 Canoe Manufacture

Dugout canoe manufacture is the transformation of an upright, rooted, forest emergent with vital ecological functions into a hollowed, aquatically mobile part of human material culture. The transformation is an intriguing link between culture and nature, and can be a richly spiritual activity, embodying and conveying culturally encoded information regarding cultural origins and human relationships to the natural world (see Wilbert 1976,1977; Kane 1994; Stille 1999). The interweaving of such aspects into Tawahka canoe-making is suggested by the recurrent mention of canoe construction in Tawahka creation myths, and by the sharing of terminology between canoes and human body parts. While making a canoe, Tawahka commonly refer to the tree as a living “she,” and liken its ‘opening up’ into a canoe with sexual intercourse. These aspects deserve further treatment but are set aside here in favour of the following description, which emphasizes the constraints faced by carvers, and the technical process of canoe manufacture. The discussion is based on household survey data from 1998, and from first-hand observation of Tawahka carvers in 1996 and 1998. Throughout, I compare the Tawahka’s modern construction methods with those described in historical accounts of the Mosquitia and with contemporary accounts from other groups of the Caribbean littoral. For example, in technical sophistication and labour organization, Tawahka canoe-making appears remarkably similar to that documented by Wilbert (1976) among the Warao of the Orinoco delta in the 1950s.

Tree Selection

Trees appropriate for canoe manufacture are selected on the basis of interlinked criteria: species; size/health; distance to tree location; and site accessibility. These

criteria are weighed by the carver according to the canoe's intended purpose, the carver's own time constraints, and by the carver's access to labour, tools, and capital.

Species Choice

Traditionally in the Mosquitia, mahogany and cedar species are the trees used for dugouts (Young 1842:11; Bell 1989:266; Dampier 1927:29).¹⁷ Mahogany is a denser wood appreciated for its durability. Cedar's attractive lightness is balanced by its greater susceptibility to splitting; both are prone to invasion by boring marine mollusks (Dampier 1927:29; Bell 1989:266). Tawahka manufacturers maintain this historic species preference. As Fig. 5.7 shows, almost 75% of all canoes made between 1990-98 were of mahogany (41%) or one of two cedar species (30.4%). In addition, almost all freight canoes (93% of *pipantes* or *cayucos* over 1 m wide) were made from these 'top three' species.

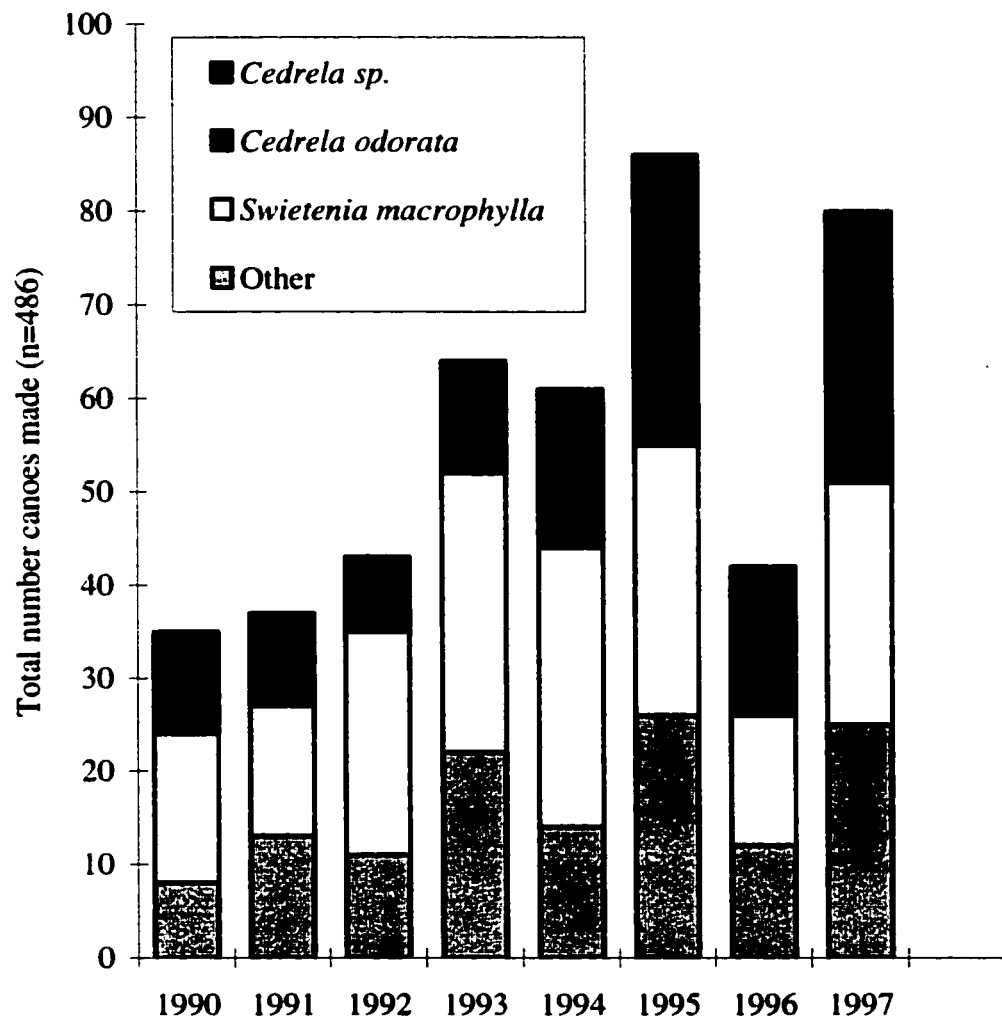
Older Tawahka assert that in the past, *all* canoes were made from these species. By 1998, however, the diversity of species used had grown to at least 14 (Table 5.1).¹⁸ Informants claim that this widened species breadth resulted from the increasing local scarcity of the highest-quality hardwoods, combined with changed Tawahka attitudes regarding canoe standards. Apparently, much of the former stigma associated with using 'inferior' trees was lost during the era in which Nicaraguan refugees lived on the Patuca River (1980-early 1990s). By necessity, the refugees made canoes of less-than-optimal species, and the sight of such canoes became common (JB; LD). In part as a result, 14% of the canoes made by the Tawahka between 1990-98 were constructed from species that they consider to be of relatively low quality.

Table 5.1 lists the 14+ 'canoe tree' species by quality, following a species ranking by a 'focus group' of six Tawahka carvers. The group's assessment was based on each wood's suitability in terms of weight, cargo capacity, durability, and proneness to splitting. The group's ranking is confirmed in part by the average lifespan of family

¹⁷ Primary sources rarely differentiate between the four species that share *cedro*, or cedar, in their common name (see Table 5.1). None is coniferous; they are called cedar because the wood's smell is reminiscent of North American cedar.

¹⁸ None of which are shared with the species used in northern South America by the Warao of Venezuela (Wilbert 1976:307).

Fig. 5.7 Canoes made by species, TABR, Honduras, 1990-97.



Source: Household surveys 1995, 1996, 1998.

Table 5.1. Tree species exploited for dugout canoes by Tawahka households, 1990 - mid 1998.

Rank ¹	Species	Tawahka	Local Spanish	Harvested 1990-98			Average lifespan ²
				no.	% total	no./yr	
1	<i>Cedrela</i> sp.	suhun	cedro	118	24.3	14.0	3.89
1	<i>Cedrela odorata</i> ^{**}	suhunyal	cedro real	30	6.2	3.6	5
2	<i>Swietenia macrophylla</i> [*]	yulu	caoba	200	41.2	23.8	4.68
3	<i>Calophyllum brasiliense</i> ^{**}	karasa	Santa Maria	7	1.4	0.8	3
3	<i>Parkia</i> [#] <i>pendula</i> / <i>Albizia pedicellaris</i>	tuburus/ pihini	guanacaste/blanco	8	1.6	1.0	2
4	<i>Cedrela</i> sp.	pan kalkal	cedro espino, lagarto	18	3.7	2.1	6
5	<i>Carapa guianensis</i> [*] (?)	saba	cedro macho	13	2.7	1.5	3
5	<i>Simarouba</i> sp.	kisa	negrito	1	0.2	0.1	n.d.
6	<i>Vochysia</i> [#] <i>hondurensis</i>	yamari	San Juan	25	5.1	3.0	2.16
8	<i>Ceiba pentandra</i> ^{**}	pan ya	ceiba	3	0.6	0.4	n.d.
8	<i>Virola koschnyi</i> [*] / <i>cebifera</i>	bahanak	sangre, cebo	8	1.6	1.0	0.75
8	<i>Schizolobium parahybum</i>	suka	tambor	52	10.7	6.2	1
8	<i>Hernandia didymantha</i>	panulang	?	2	0.4	0.2	n.d.
8	<i>Ficus insipida</i>	ani	higuero	1	0.2	0.1	n.d.
				486	100	57.9	

¹ Ranking based on interview with six canoe makers, 13 February 1996. Shared number denotes shared rank.

² Based on subsample (n=78). Duration=no. years used before ruined (av.=2.85 yrs; med.=2 yrs; range: 0-14)

[#] Species or genera used for dugout canoes by the Guaymi of Panama (Gordon 1982).

^{*} Species used for dugout canoes by the Garifuna of Nicaragua (Coe and Anderson 1996).

Source: Household surveys 1995, 1996, 1998; focus group interview, Krausirpi, 1996.

pipantes, which decreases with rank. For example, lowest-ranked *tambor* canoes tend to last on average only one year ($n=52$); *tambor* canoes must thus be harvested at almost five times the frequency of a mahogany *pipante*, which, by contrast, is likely to last 4.68 years.

Size

Tawahka-made canoes vary in size from 0.66-1.52 m beam, but 83% were less than 1 m wide. I found no significant difference in canoe size by species, which suggests that species choice alone does not prejudice ensuing canoe diameter. Comparison of standing tree diameters (dbh) with resultant canoe size suggests a canoe's maximum width represents about 73% of the original tree's diameter ($n=5$).¹⁹ We may therefore say that Tawahka target trees averaging 90.5 cm dbh, or up to 203 cm and no smaller than 40.64 cm dbh.

Distance to Extraction Site

I used "time-distance" to measure the *effective* distance to 'canoe' trees because the Tawahka harvest trees from forests reached by boat along sinuous river channels, and by foot over rugged terrain. On average, canoe makers needed 11.2 hours to reach a harvestable canoe tree: 10.4 hours by boat and 0.96 on foot ($n=328$). But the *median* time required—only 2.85 hours—is more revealing. In fact, 41.5% of canoes made between 1990-98 came from trees harvested within two hours of the extractor's village.

Proximity to the resource is an important consideration for canoe carvers because it reduces the costs of canoe manufacture, especially with regard to time. In fact, carvers cited "closeness," or the need to make a canoe quickly, as the reason behind their selection of 43% of canoe trees ($n=150$).

Combined, species, size, and distance explain much of the Tawahka's canoe extraction patterns. For example, there is almost a seven-fold increase in median hours

¹⁹ Because the Tawahka do not use fire, hot water, or crosspoles to widen the beam of their craft (unlike other groups; see Wilbert 1977; Nietschmann 1979), canoe width provides a reliable indicator of the original tree diameter.

required to reach a 0.6-1 m (2-3 ft) canoe tree compared with a 1-1.2 m (3-4 ft) canoe tree. Also, distances vary with tree quality, which helps to explain why Tawahka are harvesting lower-quality species although they are not bigger *per se*; they *are* closer. In other words, if a Tawahka wishes to make a family-size *pipante*, he must travel an average of 15.5 hours to reach one of the three top-ranked species, compared with only 1.8 hours for any other species; the difference is statistically significant ($n=328$; unequal t-test: $t=-11.68$; $P\leq 0.001$). Indeed, when canoe width and species quality are combined, they explain 37% of the variation in time required to reach a 'canoe' tree ($n=328$; adjusted $R^2=0.37$; $P\leq 0.001$).

Access to Trees

Canoe tree selection is also determined by the relative accessibility of forest resources to carvers, which can differ markedly between households but challenges quantification. In theory, households' access to trees should vary only minimally, because the Tawahka assert that any standing rainforest tree may be used by any Tawahka, on a first come, first-serve basis; ownership is conveyed by felling. Even trees in a plot staked out for future agricultural pursuits by one household might be harvested by another household; felled trees are occasionally sold to coethnics. In practice, however, access to trees varies with home village, experience of forest extraction, kin affiliation, language skills, and other forms of human and social capital. For example, many Tawahka spot harvestable trees during forest clearing for agriculture, or during routine hunting or fishing forays, which in turn exploit areas corresponding to communally recognized village extraction 'limits' (see Herlihy and Leake 1993). When I asked Tawahka why they chose a particular location from which to extract a tree, respondents claimed that some 10% of trees ($n=150$) were chosen because the cutter simply "saw the tree, and thought it would make a good canoe." In other words, being out in the forest pursuing one activity appears to inspire further forest use. This finding adds nuance to the fact that 41.5% of all canoes made were harvested within two hours of the extractor's village. Does this figure accurately

reflect the shortest distance to the best tree, or in fact measure the effective limits of an ascribed extractive zone?

Village ascription is significant in determining extraction areas because the forests around Tawahka villages are differently endowed with 'canoe' trees, due in part to village size (and attendant agricultural fields), previous harvest intensities, and natural factors. Thus a carver living in Krausirpi, the largest village, can expect to travel 25 hours to reach a mahogany tree suitable for a 0.6 m (2 ft) canoe (median: 25 hours; $n=46$), while his coethnic in any other village need only travel 3.85 hours (median: 1.75; $n=21$); the difference is statistically significant ($t=-9.10$; $P\leq 0.001$).

But the constraints on canoe supply faced by villagers in Krausirpi can be mitigated by kin or other personal ties, which serve to introduce them to the resources of other villages. For example, residents of Krausirpi may gain access to another village's resources by travelling to make a canoe with brothers-in-law, or by exchanging labour with others making canoes elsewhere, thus explaining the 7% of canoes ($n=106$) carved by Tawahka while helping relatives in other villages.

Unlike family canoes, large canoes are rarely harvested locally, and must come from distant forests often lying beyond the official limits of the TABR. For example, all canoes over 1.2 m (4 ft) wide, and 42% of those over 1 m (3 ft), were extracted from forests over three days' travel from the carvers' home village; Tawahka acknowledge that some 18% of their canoes are harvested from sites outside their reserve ($n=106$). In fact, 60% of carvers interviewed on the topic ($n=35$) consider forests that lie predominantly outside TABR boundaries—but well within the Tawahka's traditional zone of extractive activity; see Herlihy (1993)—to hold the greatest densities of 'canoe' trees. Such rich forests lie largely within the headwaters of the Río Wampú. Indeed, as Fig. 5.8 shows, over 40% of the mahogany trees harvested for canoes between 1990-98 came from the rich forests of the Río Wampú, most of which lie beyond the TABR boundary.

Access to these distant forests favours older Tawahka, in part because they benefit from site-specific knowledge gained during prior eras of extraction-based 'booms.' But as these forests are increasingly penetrated by illegal *ladino*

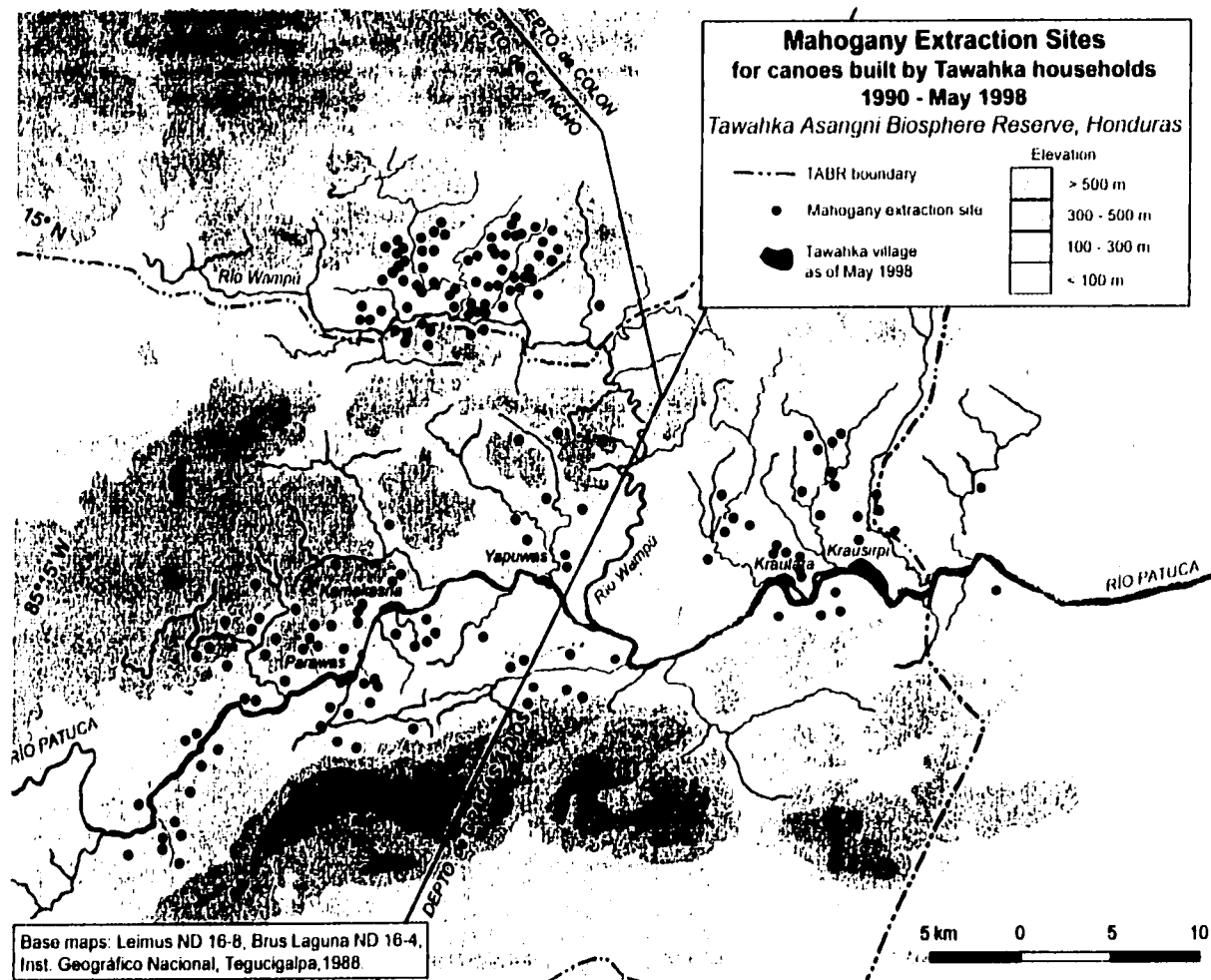


Fig. 5.8 Mahogany extraction sites, TABR, 1990-98.
Source: Household survey data 1995, 1996, 1998.

colonization, access to the trees there also requires good working knowledge of Spanish, and diplomacy facilitated by familiarity with *ladino* culture. For example, between 1996-7, *ladinos* in the 'canoe forests' of the Río Wampú issued death threats to keep Tawahka out of the basin in response to rumours of Tawahka-inspired plans for the colonists' forced relocation. Nevertheless, certain *pipanteros* drew on personal friendships and business partnerships to continue extracting trees from the contested area, aided by their willingness to pay nominal sums for trees slated to be burned.

Tawahka lacking these negotiation skills, then, are effectively denied access to these rich forests. Indeed, of the 21 carvers who claimed that the best 'canoe' forests are found up the Río Wampú, only 38% considered harvesting there; the remaining 62% cited the prohibitive distance (28.5%), but an additional one-third claimed "problems"—*ladino* presence, need for permits, and tree fees—as the main reason to stay away.

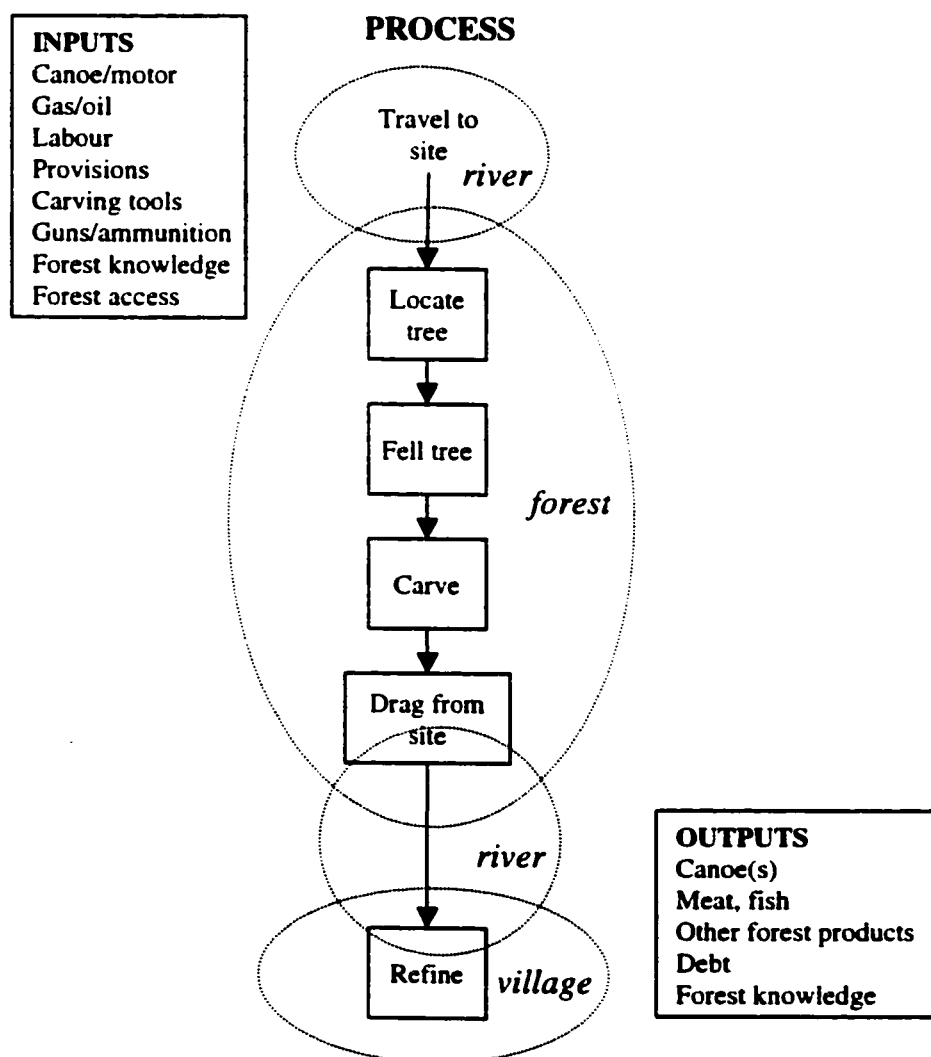
Canoe Construction

The bulk of canoe manufacture is done in the forest at the tree site. If the site is close to the carver's village and the tree is small, the carver may work on the canoe sporadically over weeks. If the canoe is to be large, however, a team of carvers typically sets up camp along a nearby stream and commutes an hour or more to the tree daily, for up to three weeks (see Cubas 1997; McSweeney 1999). Elder Tawahka often accompany such canoe-making groups, usually to hunt so that the carvers may eat meat, and occasionally to offer advice. Boys and occasionally women also join canoe-making expeditions to mind the camp and cook. The canoe making process is described below, and summarized in Fig. 5.9.

Felling

No matter the size, location, or species, a tree suitable for canoe manufacture must be relatively straight, and rot-free. Carvers inspect trees for any sign of damp, termite trails, or smell that would indicate softened heartwood. Once determined to be healthy, felling of the tree begins. Depending on tree size and species, a *tapesco* or

Fig. 5.9 Stages in dugout canoe manufacture, TABR, Honduras.



cutting platform is built to elevate cutters above buttress height. Vines and debris are cleared away with machetes. The cut angle is initiated with care: the tree must fall where it be least likely to split, i.e., on understory vegetation more than rock; where it may be easily worked, i.e., as horizontal as possible; and right-side-up: if the tree is oval in cross-section, the 'flattest' should fall upright. To engineer such a fall takes a skilled *pipantero*, particularly with large trees that are more often weakened by rot and age (Fig. 5.10).



Fig. 5.10 Tawahka felling mahogany tree with axe, Río Wampú, TABR, Honduras, May 1998. Note cutting platform. Photograph by the author.

The time required to fell a tree is highly technology-dependent. Field observation indicates that with long-handled axes, a mahogany with a 1.8-m diameter (above buttress height) can be felled in about 26 man-hours.²⁰ By using a chainsaw—which the Tawahka occasionally rent for the purpose—however, cutting times can be reduced to less than an hour. Once felled, the tree may reveal previously undetected rot, or may crack. If the rot is concentrated at the base of the tree, construction usually proceeds; cracks, however, bode badly for the future canoe's water-worthiness. Indeed, Tawahka canoe teams occasionally fell two or three trees before a sound one is brought down. In the most frustrating cases, trees split well into the process of carving and must be abandoned.

Tawahka carvers often fell trees months prior to when they intend to begin carving. This practice assures tree proprietorship well before the owner is ready to work on the tree, and also provides a way for Tawahka to store 'canoes' inauspiciously, awaiting a time of need before carving and selling (see earlier).

Carving

The next step in canoe construction is the removal of the tree's crown from the horizontal trunk, in order to reduce the stress on the section that is to become a canoe, and therefore to minimize the chance of the canoe splitting halfway through work. The technique also allows a trunk that has fallen imperfectly to be levered into a better carving position. For large trees, cutting platforms are built along the two sides of the newly disconnected trunk. The future canoe's length and basic dimensions are then marked by 'striking a line' with an inked string, and carving begins. When axes are used, the amount of wood 'wasted' in woodchips at this stage can be considerable; if a chainsaw is used, blocks of wood can be removed to make chairs, paddles, and other items. As carvers reach the trunk's maximum diameter, the wood is split off using

²⁰ Based on clocked felling of one mahogany tree. Mahogany is known for the hardness of its wood, but even so, the measured felling time is notably greater than the 2.4 hours that Denevan (1992:155) cites as the time required to fell a rain forest tree "of moderate hardness" with a steel axe. Tree diameter, however, appears a more crucial determinant of felling times than wood hardness.

wooden pegs wedged along the grain. The resultant slabs, or *tablas*, are up to 2 m square, and are typically brought home for use or sale as tabletops.

The canoe's sides are then roughly formed, following lines drawn on the debarked tree by the *encargado*. In 1998, measuring tapes were still a rarity: more commonly, carving lines were 'struck' and dimensions measured with arms' length estimates. In terms of carving complexity, curved *cayucos* require more thought than the long, straight form of the *pipante*, but are nevertheless considered easier to build because for any given width, they are typically two-thirds to half the length of a *pipante*.²¹ Once the canoe's basic form is blocked out, hollowing of the interior—'excavation'—begins, and must be executed with care such that the heartwood of the trunk runs through the centerline of the canoe. Axes and chainsaws are used for initial excavation, but once curves are to be expressed, axes and long-handled adzes are used. Where curves become more pronounced, short-handled 'scoop' adzes (M., T.: *awil*) are used to chisel away the wood.

With most of the interior wood excavated, the canoe is then levered onto one side, and finally flipped completely over, to finish the rough fashioning of the hull. Because the boat must be eventually dragged out of the forest, as much wood as possible is removed *in situ*, although the canoe's base is left thick in order to minimize damage during transport.

The carving process—the time from felling to removal from the forest—is the most time-consuming stage in canoe manufacture. As with travel times, carving times vary by size and canoe type. For example, a small *pipante* takes almost half as many hours to carve as a medium-sized one; a 1 m-wide *pipante* takes 1.4 times longer to carve on average than a comparably broad *cayuco*. Regression analysis shows that the combination of width and length into a cubic measure of carvable wood mass can alone explain almost 52% of the variation in carving times ($n=72$; $P\leq 0.001$). Interestingly, neither the particular species used nor broad classes of tree quality explained as much of the variance in carving times as carvers' testimonies suggested.

²¹ The difference is significant: when canoe size is "cubed" into a rough measure of wood used (by multiplying width and length), a t-test found that for canoes between 0.9-1.2 m (3-4 ft), *pipantes* use 1.4 times the wood ($P\leq 0.001$).

That is, carvers claimed longer cutting times for the hardest woods such as mahogany, but such differences are not manifest in the time data.²²

Dragging Canoe to Water

Once carved, the canoe must be hauled/pushed from the construction site to the nearest stream, and floated downriver to the carvers' home village for the refining stage. If the canoe is large, the 'dragging' stage (S.: *rastrado*) may occur weeks or months after carving, during which time the boat is left in the forest while the *encargado* rounds up a group of 15+ men to help in the hauling. Once ready, a path up to 5 m wide must be cleared along which the canoe will be dragged. Vines, palms, and saplings are cut, and the latter are laid across the trail to serve as rollers. The canoe is then pushed and pulled out along the path and into the water (Fig. 5.11).

Like carving, dragging effort depends on canoe size, but is also contingent on the distance and type of terrain between the carving site and water deep enough for the canoe to be floated out. *Pipantes* between 0.6-1 m (2-3 ft) required an average of 4.8 people (women often help) to work seven hours to reach water (n=50); a 1-2 m (3-4 ft) *pipante* requires that about 20 people 10.7 hours (n=9).

Ropes are used to control slide if the canoe is to be lowered down a slope. Canoes have been ruined by slipping out of control in such situations and splitting. The *rastrado* is particularly awkward with *cayucos*, which must be balanced on a keel that is prone to plow furrows in the forest floor if rollers are not laid evenly. *Pipantes*, in turn, offer more friction and are more difficult to push up slopes. But a t-test found no significant difference in dragging times between the two canoe types. In the dry season, canoes must be dragged along rocky stream channels that could be raging torrents in other months; some canoe carvers prefer to await the rains.

²² I estimated carving times from the number of days that carvers claimed to have spent, multiplied by the number of carvers. I assumed, based on field observation, an average eight-hour work day (about 6-11 a.m., and 12-3 p.m.). The results may uniformly overestimate carving hours because field observation shows workers tend to spell each other off, rotating tool use.



Fig. 5.11 Dragging finished *pipante* to stream, Kahkatigni, TABR, Honduras, March 1998. Photograph by the author.

Refining and Repair

Once back at the village, the canoe is 'refined' on beaches or riverbanks. Short-handled axes, adzes, and scoop adzes flake away some 2-5 cm more from the hull and interior, and planes are sometimes used to further smooth the hull (Fig. 5.12). If the canoe is a large *pipante*, the squared stern is truncated and fitted with an engine mount. The gunwales are then built up with 15-cm strakes securely edge-joined with wooden pegs and reinforced with glue (Tawahka used gasoline-melted Styrofoam as adhesive). The canoe may then be painted. Sometimes, prows are reinforced by nailing boards across the grain to reduce splitting.



Fig. 5.12 Refining a cedar *pipante* at Krausirpi, TABR, Honduras, March 1998. Note the adze and scoop adze. Photograph by the author.

Only *pipantes* are outfitted by Tawahka carvers. *Cayucos*, by contrast, are exported downriver 'as is,' partly because the final buyer's specifications are unknown, and partly because modifications required to make a canoe seaworthy are generally beyond the Tawahka realm of experience.²³ In fact, interior groups have traditionally sold unfinished *cayucos*, which Miskito middlemen then "refined" and "fitted" (Roberts 1827:119-120; Young 1842:11,77); *cayuco* refining is the *only* part of canoe manufacture in which the Miskito have traditionally participated (Fig. 5.13).



Fig. 5.13 Miskito villagers fitting purchased *cayuco* with stempiece, Tasbapauni, RAAS, Nicaragua, March 2000. Photograph by the author.

²³ Such modifications may include: fitting strakes, frames, bowpiece, false keel, stern or counter piece; adding mast and rudder or motor mount; building a drain and seats; and covering with an optional fiberglass seal. Water may also occasionally used to widen gunwales (see contrasting descriptions in Young 1842:11; Bell 1989:266; Nietschmann 1973:155-56, 1979).

A Tawahka family *pipante* lasts for about two years of continuous use (range: 0.5-14 years), and must often be repaired. Overall, durability is dependent on species, but even the highest-quality canoes split in their knocks against rocks and flotsam, and warp and crack through constant wetting and drying and exposure to the sun. Canoes in contact with salt or brackish water fall prey to wood-boring mollusks. At present, most canoe repair by Tawahka combines caulking with old rags and nailing metal strips over splits filled with melted Styrofoam. Mollusk invasion is remedied by overturning and drying the hull, which is then painted with gasoline.

Tools

In 1998, the Tawahka used machetes, axes, adzes, scoop adzes (*awil*) and files—occasionally supplemented by planes and hand drills—to make their canoes. Adzes and *awil* are made by carvers from hoe blades. Historical evidence suggests that this basic toolkit has probably remained unchanged since at least the early 1800s, when traders mentioned such implements in commercial transactions with almost every interior group (e.g., Roberts 1827; Young 1842); one observer even claimed of the natives of the Mosquito Shore that: “...edge tools they have now been so long used to that they could not do without them” (Strangeways 1822:337). In fact, iron tools probably became the primary canoe-making technology only during the 18th century, and would no doubt have drastically reduced the time required to make a canoe (see Denevan 1992). Esquemelin witnessed natives using fire and shells to burn and scrape tree trunks into canoes on Hispaniola in the 1680s (1771:28; see also Gannier 1996); such pre-Columbian canoe construction techniques also seems to have persisted on the Mosquito Coast wherever natives had little opportunity to obtain foreign goods.²⁴ For example, Dampier encountered a craft on the Rama River in 1680, claiming “The Canoe which we found was but meanly made for want of Tools, therefore we conclude these Indians have no Commerce with the Spaniards, nor with other Indians that have” (1927:32).

²⁴ Nietschmann (1979:14) describes, however, how Miskito continued to ‘burn out’ the insides of canoes to more rapidly excavate them.

Axes dominated, then, as the main canoe-making tool of the Mosquitia for over 250 years, although chainsaws are now used throughout the region; ownership of a chainsaw is now considered a necessary part of being a canoe maker among the Miskito of the lower Patuca (LD). Among the Tawahka, however, chainsaws began to be used in canoe construction only in the mid-1990s, and remain a rarity. Nevertheless, they represent a minor revolution in canoe-making technology. Chainsaws reduce the amount of wood 'waste,' meaning that more wood from a felled tree can be salvaged for other uses, including paddles.²⁵ Indeed, one Tawahka carver's use of a chainsaw allowed him to extract two canoes from a single tree (FC). As mahogany and other hardwoods become scarcer, such techniques—and the chainsaws that facilitate them—appear attractive. But excess wood is not necessarily a boon to carvers. Heavy pieces of 'salvaged' wood are extremely difficult to extract from the forest by foot, and are often left because of insufficient labour to extract them considering the thinness of markets for hardwood 'ends' (AS).

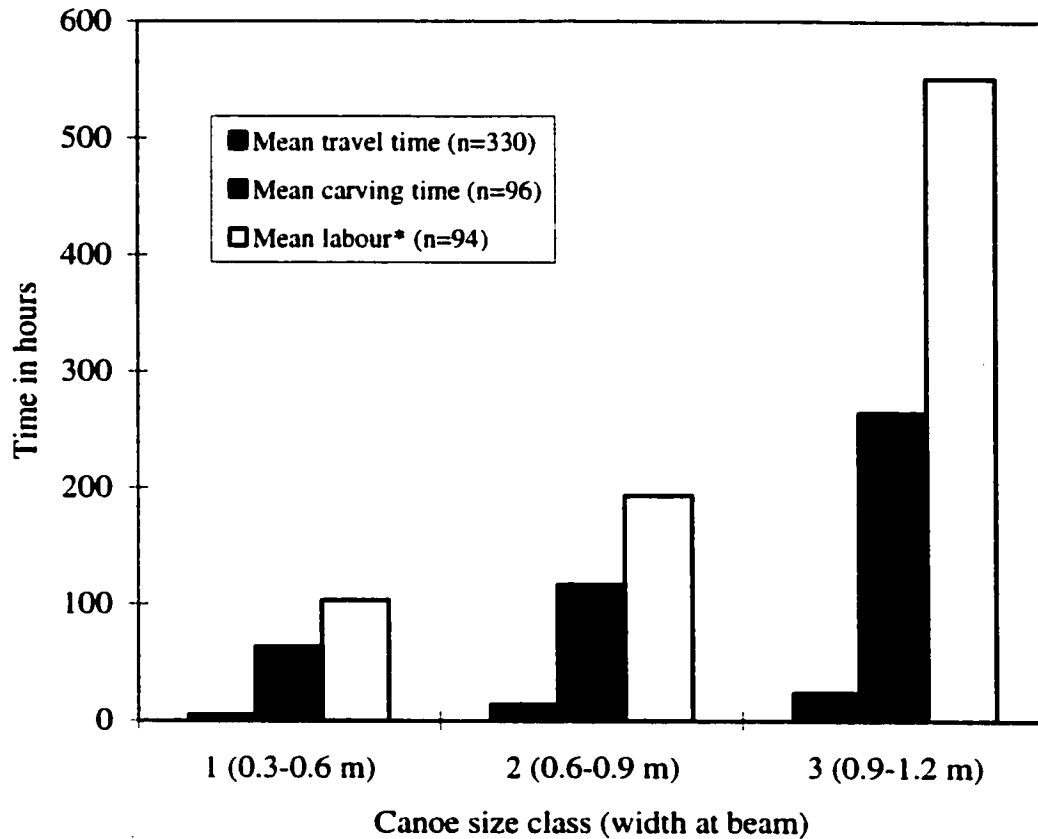
Labour: Time and Arrangements

To gauge the 'man-hours' of labour required to make a canoe, I summed travel (return), carving, and dragging times into a combined 'construction time' for the 94 canoes for which these data were complete. I found total construction time averaged 210 hours (range: 40.7-1373; median: 145.5). These estimates are conservative because they do not include felling time or refinements made in the village, nor do they account for technology. But the estimates are nevertheless comparable to detailed labour measurements clocked from field observation of the entire carving process (n=3).

As Fig. 5.14 illustrates, labour requirements varied directly with canoe size: beam alone explains almost half the variation in construction times (adjusted $R^2=0.458$; $P\leq 0.001$; $n=93$). Canoes between 0.3-0.6 m (1-2 ft) required about half the

²⁵ Chainsaws can be used to fell the tree and to block out the basic canoe form. But chainsaw use does not preclude the use of hand tools, which have no substitute in the excavation of the canoe and the formation of its curves. In this respect, dugout-canoe making—in the Mosquitia as elsewhere—remains "an extraordinary example of... masterly, low-technology engineering" (Stille 1999:56).

Fig. 5.14 Mean travel, carving, and total labour times, by canoe size class, TABR, Honduras (sample sizes vary).



* Includes return travel to tree, carving, and dragging times.

Source: Household interviews, 1998.

labour of a 0.6-0.9 m (2-3 ft) canoe, which required 2.5 times fewer hours than a 0.9-2 m (3-4 ft) canoe. The differences are significant. Interestingly, the higher carving times reported for *pipantes* over *cayucos* is not corroborated by the data on total construction time. For example, the 551 man-hours required to make a 0.9-1.2 m (3-4 ft) wide *pipante* (n=9; median 450) was not significantly different from the 414 man-hours required for a *cayuco* of the same size (n=4; median 402).

Labour arrangements during canoe building reveal the fluidity of Tawahka social and economic organization in different contexts. Here I present data regarding the carving of 37 canoes and the dragging out of 67, which reveal four main types of labour organization. First, 38% of canoes carved, and 27% of those dragged, were done so using *pana-pana*, or reciprocal exchange labour. In such cases, family and neighbours are called upon to help make a canoe in exchange for past or future help, usually in kind. Second, another 30% of canoes were carved, and 42% dragged, with “free” help, in which relatives (and less often neighbours) assisted each other with no reciprocity explicit. Canoes obtained using reciprocal and gift labour are usually small, family canoes: they averaged less than 0.61 m (2 ft) wide and 65% ended up in household use. Tawahka confirm that they are more willing to help out *gratis*, or for help in kind, if a canoe is made with only subsistence use in mind (LD).

A third way to organize labour was to demand cash for help, an arrangement most common when a canoe is being made for sale, or is being made by someone known to have access to cash. The point is explicit: money for money. Not surprisingly, the 28% of canoes carved, and 30% dragged using wage labour were large (median width: 0.91 m), of which the majority (54%) were sold. To carve them, an average of 2.5 laborers was paid about 40L/day (US\$3/day) for 7.7 days of work. To drag them, an average of 20 men was paid 36L/day (US\$2.70/day) for ten hours of work. By custom, food and cigarettes were provided, but each worker supplied his own tools. A fourth way to organize labour was as partners. In four cases (11% of all observations), canoes were carved by *socios*, in which three or four men together made a canoe for sale and split the proceeds. Canoes carved in this way were large (median width 1 m), and 75% of them eventually sold.

Which labour arrangements are used by canoe makers was very much determined by the canoe’s intended role. To a lesser extent, social capital is also important: a carver with more available kin may be able to work out more *pana-pana* arrangements than relative newcomers, who may have fewer social links in a community.

Perks and Problems

Beyond tree selection, time constraints, and labour issues are the non-quantifiable, non-financial costs and benefits that carvers weigh before deciding to undertake canoe construction. One of the main non-material benefits of canoe construction that Tawahka carvers cite is that canoe work, particularly on a scale requiring distant travel, varies the routine of village life and the responsibilities of the agricultural calendar. A primary attraction is the chance to hunt game scarce near villages, particularly the monkeys and white-lipped peccaries found only in hilly primary forest. Many *pipanteros* will postpone expeditions until they can obtain ammunition. Older Tawahka appreciate being in the forest where they can eat meat and fish in the style of their *antepasados*.

Such perks only partially mitigate the physical hardship of canoe construction. Particularly when making large canoes deep in the forest, Tawahka consider canoe-making among the most difficult tasks in the production portfolio (ES2, IS). The risks associated with poisonous snakes, forest spirits, construction accidents, social problems of venturing into *ladino* settlement zones, insufficient food, and lack of medical attention are all contemplated by carvers before deciding to set out. One *pipantero*, reflecting on a long period spent in canoe construction, claims “*Yo sufría mucho, ajuantaba hambre allí en el bosque...*” (AS).²⁶ Indeed, two deaths of prominent *pipanteros* (in 1998 and 1999) were considered work-related. Some Tawahka assert that the supernatural ‘owners’ of the ‘canoe forests’ of the Río Wampú were upset at their destruction, and are punishing the Tawahka (AS; IS).

²⁶ “I suffered a lot, I went hungry out there in the forest...” (AS).

CHAPTER SIX

Dugout Canoes in the Mosquitia, Part II: The Canoe Trade, 1700-1998

6.1 Evolution of the Canoe Trade, 1700-1900

Since the late 1600s, canoe exchange in the Mosquitia has been characterized by river-dwelling interior tribes supplying crude dugouts to the maritime-oriented Miskito of the relatively treeless Caribbean shore.¹ As such, the exchange is historic. Pre-Columbian groups migrated to seasonally exploit the Mosquitia's varied biophysical environments, from broad-leaved rain forest and coastal cayes to sea-grass beds, lagoons, and pine savannas (W. 1732:287-288; Floyd 1967; Offen 1999). Only with the Miskito's violent ascendance as a distinct group did ethnic boundaries increasingly coincide with ecotones (Helms 1983; Offen 1999). By the early 1700s, this territorial division had, along much of the coast, alienated interior groups from maritime resources and left them reliant on Miskito middlemen for European goods traded there (Bell 1989:265; Nietschmann 1973; Helms 1978). In turn, the Miskito depended on interior tribes for distant forest products, particularly the massive hardwoods required to make the item most central to their material culture and maritime success: canoes (Roberts 1827:152; Bell 1862:252).

To obtain canoes and mitigate the potential vulnerability of their reliant position, the Miskito employed various strategies over time that constitute the evolution of today's canoe 'trade.' Early methods included plunder and extortion, but by the late 19th century had become more conventionally commercial. To reconstruct the evolution of the canoe trade, I rely on an array of first-hand accounts, from buccaneers' journals of the 17th century to missionary reports of the early 20th. Not

¹ Not all forest products followed this pattern. On the contrary, there is mention of interior groups bringing forest products *inland*, to trade with Spaniards and 'Creoles' of both Honduras and Nicaragua (e.g., M.W. 1732:286; Coates 1990 [1849]).

surprisingly, mention of canoe transactions is rare in these accounts, because foreign observers had only peripheral interest in the Mosquitia's intertribal trade networks—they were usually attracted by the region's more exportable riches. Indeed, we owe several mentions of canoes in the historic record only to the fact that their beam advertised the Mosquitia's mahogany wealth (e.g., Roberts 1827:119, 266).² Thus there are no data on prices, trade volumes, or buyers of the kind that exist for the Mosquitia's internationally marketed forest products, including mahogany, *chicle*, and rubber (e.g., deKalb 1894; Offen 1998). Neither does record exist of secondary canoe transactions beyond the Mosquitia, rendering documentation of the trade's full geographic extent impossible; nor can I corroborate hints that canoes were among the goods Miskito traded at Jamaica and the Bay Islands (W. 1732). Analysis must therefore focus on the intertribal dynamics of canoe exchange *within* the Mosquitia, during the 200-year period that saw the trade's rapid development. The historic record is too thin to focus on a particular area, but does allow reconstruction of broad patterns of trade over the whole Mosquito Shore.

The primary purpose of the following historic overview is to set the context for subsequent discussion of the canoe trade's modern expression on the Patuca River. But the history of the canoe trade is also relevant for other reasons. First, in comparison to the growing literature on tropical forest product histories, canoe commerce distinguishes itself as a forest peoples' history, drawing attention to one of the innumerable 'invisible' forest goods of no international commercial appeal, which nevertheless continues to have profound economic importance to local populations. Second, the canoe trade's temporal constancy shows that traditional trade networks can survive monetization and capitalist market penetration, contrary to the findings of some Mosquitia scholars (e.g., Nietschmann 1973; Helms 1971). Third, the trade is regional in scope, driven by local supply-and-demand. This means that unlike other forest product commerce, which hinged on the vagaries of international markets, the canoe trade was only tangentially reliant—as it continues to be—on foreign capital and

² A good example are the rich details recorded for canoes sent by Miskito kings to Belize to bait logging investors (Roberts 1827:266).

infrastructure. The canoe trade thus requires analytical treatment distinct from dependency interpretations offered for *export*-oriented production of non-timber forest products (e.g., Offen 1993). Finally, canoe exchange has a longevity that is absent in the boom-and-bust histories of such forest products as rubber, and so may provide clues useful to maintaining today's fledgling forest product marketing initiatives.

Plunder and Tax

The first mention of intertribal exchange on the Mosquito Coast comes from the freebooter M.W.'s account of his 1699 journey up the Río Coco, in which he describes Sumu buying beads from the Miskito, during which "...they civilly intreat one another...But when their fair or mart is over, they hold it allowable to rob and murder each other as much as they can" (W. 1732:290). In fact, the Miskito were at this time at war with interior tribes, killing the men and taking women, boys, and plunder (which probably included canoes) to sell to Jamaican traders (W. 1732: 288,291; Dampier 1927:16).³ Theft and coercion appear to have remained a part of canoe procurement strategies over the next two centuries. For example, Young reports that as late as 1839, Sumu were enslaved as canoe makers by the Miskito (1842:87); about 1905 Palmer (1945:45) noted Miskito stealing Sumu canoes, and the custom, albeit covert, continued into the 1990s on the Patuca River if not elsewhere (field observation).

Canoe plunder, however, was only useful to Miskito sharing the interior tribes' need for river *pipantes*. But the Miskito mainly required sea-going *cayucos*, and, beyond enslavement, developed an ingenious way of pressuring interior groups into producing them. They invoked the tenuous institution of the Miskito King, using a system of scattered chieftaincies to demand canoes and other 'tribute' from tribes inland of the Caribbean littoral, from modern-day Honduras to Panama (the same system was used to extort surplus forest products for the specific intention of foreign trade: Offen 1993). Canoes were reported to have been exacted as tribute from

³ An early Miskito term for all interior groups was *Albawina* (meaning 'from slaves') as reported under various spellings by M.W. (1732:285) and de Lussan (1771:320). Miskito enslavement of Sumu and other "wild Indians" is discussed by Helms (1983).

indigenous peoples at Chiriqui Lagoon (Costa Rica), Prinzapolka, Wawa, and Bluefields (Roberts 1827; Bell 1989[1990]),⁴ where an English trader described the Rama “under subjection to the Mosquito King, to who they pay an annual tax in tortoise-shell, canoes, hammocks, and cotton lines...” (Roberts 1827:125). As late as the mid-1850s, Bell (1989:158) reported “men of the [Sumu] tribe...taking rough canoes to the King as tribute. One of these was a splendid boat, 36 feet long and 7 feet beam...” In some places, taxation appears to have been well-organized, particularly near seats of political power. The Miskito chief at Prinzapolka, for example, charged one shell per season from every turtleboat, and “the same value in dories, hammocks, or coarse cotton cloth...exacted from those canoes employed in any other manner” (Roberts 1827:125). Such goods were traded or used to stock the King’s treasury and furnish his personal wealth: his famously huge dugout sea ‘crafts’ and river *pipantes* (Young 1842:25; Bell 1989:273) were undoubtedly outfitted from the canoe tributes of interior natives.

But the tribute system was abused, and in some places provided little more than a thin disguise for allowing the King’s quartermasters, or indeed any Miskito, to coerce forest goods from interior tribes (Fluery *et al.* 1935[1905]).⁵ Contemporary observers report Miskito falsely claiming goods from Sumu, Rama, and Pech in the name of the King (Roberts 1827:116; Young 1842:81; Bell 1862:250; Schramm 1990[1922]). Bell describes how Miskito mahogany cutters in Sumu territory used a “deceitful piece of special pleading” to demand goods by claiming: “...the King is very sorrowful... because his children up the rivers [Sumus] do not love him...They forget to bring him presents of canoes, indiarubber, deerskins, and chocolate...” (Bell 1989:126). Such depredations were decried by the British diplomat to the Mosquito Shore (Oertzen *et al.* 1990). But the Miskito’s brutal slaving reputation seems to have been sufficient, when combined with intimidation, to ensure compliance (Bell 1862:250).

⁴ Apparently only the Pech Indians of the western Honduran Mosquitia were largely beyond the King’s reach: “[t]he Payas [Pech] are a pretty numerous tribe...They seldom visit the king, and are only nominally subject to him...” (Bell 1862:258-259).

⁵ Newson (1987:282) opines that “during the 18th century, the high officials [King, governor, and many lesser captains] may have been supported by the tribute that was levied from defeated tribes.”

Barter and Trade

By comparison, the *bona fide* tribute system was described by contemporary observers as occasional and benign: "The Indians are not regularly taxed, but they are expected to give contributions every year of canoes, tortoiseshell, or provisions to the King, and the head men see that this is not neglected by the respective communities" (Bell 1862:251). Supportive of this view is the fact that all along the Mosquito Coast, tribute deliveries doubled as opportunities for voluntary canoe barter. In exchange for their boats, interior tribes obtained coastal resources and foreign goods—particularly iron tools—from the Miskito (Roberts 1827:121; Young 1842; Bell 1862:252; Bell 1989:127).⁶ For example, Bell describes how Bawihka Sumu "...go to the coast about once a year to pay their tribute to the King, *and* sell canoes, indiarubber, skins, chocolate, maize, etc., for hardware, cloth, beads, salt, etc..." (1989[1899]:127; emphasis added). Roberts (1827:119) describes Sumu at Prinzapolka bringing canoes to the shore: "In exchange for these rough blocks, ...they receive old axes, adzes, beads, looking-glasses, and other items..." At Pearl Lagoon, canoes were even apparently brought by inland natives to a French-run trading post (Roberts 1827:109). Young describes the Patuca as "a river...in which a *pipante*...can [always] be obtained...for one axe and a machete, or two iron pots..." (1842:80-87).

Reciprocal canoe trade benefited the Miskito as well as Sumu. By encouraging non-extortionate relations, the Miskito could better entice a steady supply of canoes from Sumu to support their own canoe commerce. Roberts (1827) makes clear the commercial motives behind one Miskito village's more benign treatment of the Sumu:

The chiefs here [at Prinzapolka], have found it in their interest to encourage and protect, rather than oppress, the [Sumu] of the interior; and, in consequence, they carry on a small trade in canoes, dories, and pittpans, which these tribes bring down the river roughly formed or blocked out, and they are afterwards neatly finished, and decorated for sale (Roberts 1827:119-120).

⁶ These foreign items would have been first acquired by the Miskito in lucrative exchanges with foreign traders working the western Caribbean. For example, Uring describes how Sambo-Miskito near Black River "are...friendly with the English. They go off to Sea at a certain Time of Year...to take Turtle for the Sake of the Shell; which they send to *Jamaica*, to sell or dispose of to the Traders that come upon that Coast, for Guns, Powder and Shot, Hatchets, Axes, and Iron Pots. Some of their Boys make it their Business to catch Parrots and Monkeys, with which they purchase Beads, Knives, or such other Trifles" (Uring 1928[1726]:154).

This passage provides one of the few explicit mentions of Miskito acting as traders, rather than merely consumers, of canoes received from Sumu at the coast (see also Bell 1989:266).⁷ Because the Miskito, rather than interior groups, did all the value-adding 'refining' of *cayucos*, the canoe trade likely yielded high returns. How far the Miskito subsequently traded these canoes, to whom and for what, is unrecorded. But Miskito canoe traders were likely responding to the rising demand for canoes of a growing coastal population. This view is supported by demographic increase at the time (Helms 1983; Nietschmann 1973:34; Offen 1999), and by evidence of Miskito towns competing for the rough canoes the Sumu provided:

The headman...has great influence with these Indians of the interior. An intelligent native, named Brown, has also been very instrumental in encouraging the country Indians to bring their rough dories and other articles to Prinzapulko for sale; *and they now visit this place in preference to any other on the coast* (Roberts 1827:120-121; emphasis added).

A coastal canoe market would have required a steadier canoe supply than seasonal Sumu visits could have furnished; canoes were not among the articles of "minute trade" that could be left at permanent, pre-appointed trade stops (unlike skins, rubber, honey, etc.; Bell 1989:266). In response, the Miskito appear to have pre-arranged for canoes through contractual arrangements with Sumu. The first mention of a canoe-making *contract* dates from the early 1800s: Miskito middlemen at Prinzapolka advancing a group of Ulwa Sumu tools worth 25% the pre-determined value of "a vessel of the largest dimensions" (Roberts 1827:119).

Changing Factors of Production

Thus as early as the 1820s, contractual agreements and trade enticements coexisted with plunder and tribute as canoe-procuring strategies, but the former's more frequent mention in later accounts suggests they came to dominate canoe exchange as

⁷ There is record of instances where Miskito sold canoes directly to foreigners, and negotiated for canoes between foreigners and Sumu groups (Wood 1840:44; Uring 1928[1726]), but their mention is likely disproportionate to their frequency since such transactions invariably involved the authors of the historical account.

the 19th century wore on (e.g., Bell 1989:266; Martin 1990:162; Wickham 1894:199). The historical record provides clues that indicate that this evolution occurred in response to changing relations of labour, supply, and demand in the Mosquitia.

Among them, the Miskito faced territorial circumscription and economic impoverishment as their ties to Britain unraveled (Floyd 1967). At home, their once-roving populations settled in increasingly permanent missionary villages, and scattered chieftaincies, at least in Nicaragua, were consolidated into a single administrative 'Mosquito Kingdom' after 1860 (Harrison 1990[1896]:425-426; Nietschmann 1973:38-39). Instead of roving far afield for tribute goods, the rapidly growing Miskito population found itself master of a finite territory requiring long-term development of economic infrastructure (Helms 1978; see Offen 1993). By 1895 any form of taxation of interior tribes had been prohibited (Harrison 1990[1895]:414).

Even as the Miskito were forced to look inward for resources, their traditional canoe suppliers, the Sumu and Rama, were becoming scarcer and more distant. Years of enslavement and war had reduced inland native populations. In addition, the upriver encroachment of Miskito settlements, combined with their predatory treatment of natives, had served to drive embittered survivors deep into the interior (Roberts 1827:100,116; Bell 1862:260; Bell 1989:265; Martin 1990; Wickham 1894:199; Helms 1978; Offen 1999). Worth noting here is the fact that the Miskito do not seem to have reacted to this demographic threat to their vital canoe supply by producing canoes themselves: there is no 19th century mention of Miskito making canoes. To the contrary, the British vice-consul claimed near the close of the 19th century that *non-Miskito* Indians of the interior still "make *all* the hollowed-out cedar canoes that are used *everywhere* in the rivers and lagoons of this coast..." (Harrison 1990[1895]:414; emphasis added). Bell (1862:252) even included "rough canoes" among the goods "the Mosquito Indians...cannot produce themselves." This finding is striking because throughout the 1800s the number of Miskito settling in broad-leaved riparian habitats steadily increased (Conzemius 1932:84), meaning that Sumu no longer had a territorial monopoly over forest resources. Second, the Miskito were widely engaged in mahogany operations and other extractive industries during this time, and so would

have been familiar with the location of hardwood stands and axework (Naylor 1967; Tucker 1992). But apparently Miskito's traditional preference for wage work, combined with the association of forest work with the inferior Sumu, made canoe production unattractive (Bell 1989; Palmer 1945; Helms 1983).

Instead, we have seen that the Miskito adapted to the labour scarcity in the canoe trade by improving terms of trade: easing up on the depredations that originally alienated the Sumu, making the trading context friendlier, and perhaps even paying more per canoe.⁸ In response, there is evidence that the remaining Sumu came to specialize in canoe production and woodworking, which would have compensated somewhat for a production portfolio shrunk by territorial circumscription (Bell 1989:130, 266; Carlson 1990[1901]:246; Palmer 1945:45). In addition, forest-based primary production provided an alternative to wage labour with outsiders, allowing Sumu to trade but also maintain their prized autonomy and cultural distance (Harrison 1895; Conzemius 1932:40). The outcome was that the 19th century witnessed an entrenchment of labour relations in the canoe trade according to what Oertzen *et al.* (1990:33) call an "ethnic hierarchy" (see also Offen 1993).

Another variable helpful in explaining the evolving canoe commerce was the increased scarcity, during the 19th century, of 'canoe' hardwoods, at least from the most accessible areas near the coast and along easily navigable rivers (Nietschmann 1973:43; Oertzen *et al.* 1990:34). What at the dawn of the 1800s was an "inexhaustible supply of cedar, mahogany...on the coast, and on the banks of all the rivers in the interior" (Roberts 1827:282) and in 1862 "a supply that will last for centuries" (Bell 1862:262), was described within 80 years as "fast exhaust[ion] of the mahogany forests" (deKalb 1894:260). Already in the mid 19th century Bell records Sumu pleading off canoe tributes by claiming that "large trees, fit for making canoes, were now only to be found in the heart of the bush, where the poor Indians could not drag them out..." (Bell 1989:126). This scarcity was largely due to the expansion of

⁸ There is evidence that that canoe prices rose markedly in the late 19th century. In the 1820s, Young (1842) reported Tawahka Sumu selling "...a dory or pitpan for one axe and a machete, or two iron pots..." By 1894, Grossman (1990[1906]:296) recorded a Sumu/Miskito canoe exchange worth a cow; Carlson (1990[1901]:246) suggests the price had risen to three cows by the turn of the century.

mahogany operations all along the Mosquito Coast, especially in the first half of the 19th century (Oertzen *et al.* 1990; Hodgson 1846; Coates 1849); cedar were often taken also. In 1846, canoe-makers were declared exempt from a British "Act for regulating the cutting of mahogany and other woods" (Oertzen *et al.* 1990:119-120), but given no special treatment besides. Loggers and canoe makers thus competed for the largest, most rot-free trees; the finest grained trees suitable for both industries were found mostly in the hilly interior (Bell 1989:191).

Thus, by the late 1800s, raw materials and labour in the canoe trade had retracted inland. At the same time, the advent of upriver *bodegas* (stores/storehouses also known as 'commissary' stores, or in Miskitu: *kamisari*) mitigated the need for Sumu to make long trips to the coast to exchange canoes (Bell 1989:265). The primary purpose of these stores/storehouses was to provision mahogany cutters, gold panners, and rubber tappers with goods in return for extractive product (DeKalb 1894; Bell 1989:150; Palmer 1945:45; Helms 1971:153). But by balancing the extension of credit with debt repayment, *bodegistas* could also effectively keep a thin, mobile labour force in a system of perpetual production of various exportable products. This debt-merchandise system is common to extractive rainforest economies and has been argued to be an efficient adaptation to capital provisioning over large inaccessible areas and scattered labour pools.⁹ What is less recognized is that the system was also used to move goods intended for *regional* consumption as well. For example, the German missionary Martin describes a Sumu/Miskito transaction at a Río Coco trading store:

A [trading store lender]...likes to arrange his credits in such a way that the end sum of the debt is 16 to 20 dollars, because, depending on the price, this means "Dussa Kumi," i.e., a dug-out cedar trunk, that the Indian can design into a nice canoe. If the Tahwira or Summu Indian has gotten a dog on credit from his Mosquito brother, he will also get an axe, a machete, an iron pot, etc., to round up to the above stated sum (Martin 1990[1894]:162; *transl.*).

⁹ See Barham and Coomes (1996) and Offen (1998); also, the trade network in forest products that de Beer and McDermot (1996:66-69) describe in East Kalimantan is similar in structure to those described for the Mosquitia during resource-export eras.

The Miskito trader could then pass these canoes downriver in payment for debts of his own; the indebtedness of Miskito to coastal trading houses was well known (Oertzen *et al.* 1990; Roberts 1827:121-122). This chain of inter-personal debt and credit no doubt provided an effective way to link the canoe trade's increasingly distant participants and ensure product flow over long and difficult distances, such as along the long and frequently white-water Río Coco. Furthermore, the fundamentally transportable nature of the canoe likely made it particularly useful in the transport of other products, thus overcoming one of the key constraints of trade in areas with restricted transportation infrastructure.

The foregoing interpretation of historical texts provides a rare example of the adaptation of a presumably 'foreign' debt-for-merchandise system to an exclusively regional, inter-tribal trade. Can this be interpreted as the 'corruption' of indigenous economic structure by capitalist resource-mining tactics? Not likely. Rather, the fact that Miskito middlemen used 'commissary' credit—foreign-financed extractive infrastructure—to leverage canoes from Sumu suggests only an adaptation of once-predatory canoe procurement strategies¹⁰ to new financing opportunities.

For Sumu suppliers, it is debatable whether the debt-merchandise system was much different from the delayed barter system by which they had exchanged their canoes for at least a century. The Sumu were famous for their scrupulous financial honesty (Roberts 1827:119,265; Young 1842; Bell 1989:266), a trait matched only by the Miskito's reputation for tenacity in reclaiming debts (Bell 1862:252; Martin 1990).¹¹ The combination apparently made Sumu vulnerable to fraud (Bell 1862; Harrison 1990[1895]:414); missionaries complained of a form of debt peonage

¹⁰ These prior procurement strategies were likely in themselves an adaptation of pre-Columbian exchange systems, according to Helms (1978). She proposes that "...the Miskito simply gained more or less of a monopoly as middlemen over the ancient movement of coastal products to the interior, which in pre-contact times had been handled by the several kinship-linguistic groups inhabiting the various river systems of the territory" (1978:133).

¹¹ In contrast to these reports of financial honesty from the 19th century, evidence from the 20th suggests that the Sumu of both the Río Coco and the Patuca adulterated rubber exports with lesser-quality latex (Parsons 1955) and frequently defaulted on debt by a strategy of acquiring goods on credit, then disappearing (HM; see interviews in Appendices VIII and IX). Although further examination of such strategies is beyond the scope of this discussion, these findings add further evidence to cases built by scholars that elsewhere in the neotropics, the supposed 'peons' of extractive eras in fact had various means of financial recourse (e.g., Hugh-Jones 1992; Barham and Coomes 1996).

(Grossman 1990[1906]:268). But the Sumu could also benefit from the debt relationship. As much as they may have been tied into canoe production, so too they could be assured of some Miskito *kapten* with financial interest in their continued well-being as producers, who would supply them with tools and foodstuffs, thus providing some form of livelihood insurance (see Offen 1999). As Palmer (1945:24) opined: "The system is not wholly good and gives room for abuse by both parties, but everyone understands it and knows with whom he is working."

Indeed, conventional barter arrangements for canoes could be extremely complicated, involving irregular application of interest, delayed payment, and labyrinthine accounting systems that made store-provisioned credit/debt seem relatively hassle-free. The following passage describes a late 19th century canoe transaction on the Río Coco, and is included here as a particularly rich example of the complicated nature of traditional barter (see also Appendix IX):

Once a Miskito Indian came to [Sumu] village L. and had a look at the canoes which were lying along the beach. He especially liked one of them; he went to one of the owners and said: "I will take your boat with me." "You may take it," was the response. With these words the first stage of the trade had been completed. Before the [Miskito] left with the newly acquired canoe, it was agreed upon that as payment he should bring a cow, and when the cow had the first calf, the cow's previous owner should receive a small pitpan [river canoe]. After some time he brought the cow, but because the new [Sumu] owner was not at home, he tied the cow to a coconut palm and left it to its destiny. There it would have died of hunger, if good friends had not led it to the pasture...

After some time one could see the cow with a calf; but since the former [had gone] wild, so the latter...could not be caught. Again some time passed, and the new growing calf appeared by itself, the mother probably having been torn up by a tiger cat. So as not to leave his possession to the same destiny and to get some use out of it, the owner killed the young cow. So for selling his canoe he possessed a dead cow. But even that use was reduced to a good meal of tender meat, since all the loyal neighbours...wanted payment for their effort, and so the body of the cow was just enough to pay off his debts.

But the trade had not been completed. The previous owner had found out that the cow had had a calf, and did not shy away from the six hour travel time to demand the payment for the latter. As we know, the payment should have been in the form of a small boat, but under the circumstances and the mishaps, the new owner was content with a used shotgun (German missionary Martin 1990[1894]:162; *transl.*).

Mention of canoe transactions anywhere in the Mosquitia disappears from the historic record after about 1900. This silence may be due in part to the canoe trade's increasingly hidden, upriver dynamics. Also, foreign observers were distracted by emergent gold, banana, and rubber industries (e.g., Harrison 1895). We know the canoe trade continued, however, through oral histories. Elderly Tawahka and Miskito of the Patuca River, for example, recount their sale of large dugouts to American rubber concerns in the 1940s (CC; HM). But the most convincing proof of the trade's survival is in its enduring importance to some forest peoples today. The next section details the canoe trade's current expression in the Honduran Mosquitia from the perspective of Tawahka producers of the Río Patuca.

6.2 Historic Background to Tawahka Involvement

Like interior natives elsewhere in the Mosquitia, the Tawahka Sumu have been supplying canoes to Miskito Indians for at least 200 years. The historical record depicts them as particularly important in the Honduran portion of the trade. Already in the 1840s, Young (1842:87) found that “[t]he Towkas...are celebrated for making doreys and pitpans...[which] can always be got from [their] village at the head of the Patook River.” In 1879, Zuñiga claimed that the Tawahka “...make all the craft used on the [Honduran] coast” (1938[1879]:219, *transl.*). In 1998, downriver Miskito testified that the Tawahka were still “*los maestros para hacer pipantes*” (JB).

The traditional proximity of the Tawahka homeland to what remain some of the best ‘canoe forests’ in the Patuca basin no doubt granted them leverage in the region’s canoe trade (Zuñiga 1938:225; LD; IS). But evidence also points to the fact that the Tawahka’s particular construction *skills*, rather than resource access alone, accounted for their fame as canoe builders. For example, the Tawahka were enslaved by their neighbouring coindigenes in the late 1830s:

[Miskito headman] General Lowry carried about twenty-five [‘Towcka’ men] away from Patook, and placed them some distance up Black River...for the purpose of making him doreys and pitpans (Young 1842:87).

That the Miskito should have gone to such trouble to acquire canoes from the Tawahka suggests that although significant populations of Pech, Garífuna, and some Miskito were living closer to Black River at the time, the Tawahka were considered to be the Honduran Mosquitia's canoe specialists as early as the 19th century. Indeed, the Tawahka continued to be renowned as canoe-making experts in Miskito communities of the Río Patuca and along the shores near its mouth in the late 1990s (FA; JB; LD). The association of particular ethnic groups with particular products—effectively, ethnic 'specialization'—has been noted among different native tribes elsewhere in the neotropics (see Hugh-Jones 1992).

Although Tawahka were forced to provide canoes under duress as late as the 1940s (Cruz and Benitez 1994), less coercive relationships appear to have characterized the majority of canoe barter between the Tawahka and outsiders throughout the 20th century. Indeed, several Miskito report having befriended Tawahka in the 1950s specifically in order to facilitate the acquisition of canoes (JB; SO). As canoe suppliers, the Tawahka apparently distinguished themselves for reliability and low price (RC; LD): Zuñiga claims the Tawahka greatly undervalued their canoes, "giving" them away for "insignificant" amounts (1938:219, *transl.*), but his is the last mention of Tawahka canoe sale from the 19th century. In the 20th, we know from oral histories that the Tawahka sold canoes to downriver Miskito (FA; JB; RC; IM; ES2), and supplied freight canoes to rubber companies in the 1940s, as they did to companies involved in subsequent extractive economies (*tunu*, gold, and *chicle*), as well as to organizations involved with Nicaraguan refugees throughout the 1980s (CC; LC; RC; ES2; RS).

These periods of economic 'boom' on the Patuca apparently boosted demand for the Tawahka's freight canoes (AS). But when boom turned to bust, canoe sales to the constant, downriver Miskito market, especially at Ahuas, Barra Patuca, and Brus Laguna (see Fig. 1.3), appear to have served the more important function of smoothing market incomes after export-oriented extraction dried up (RS); canoe prices apparently rose slightly during such periods (CC). The following passages are excerpts from oral history interviews conducted with Tawahka men in 1998 (translated from Miskitu or

Spanish). They are included here to illustrate the important role canoes appear to have played in easing these economic transitions:

I began to make *pipantes* [mainly, *batu*] for the reason that when we left *tunu* [commercial extraction], there was no other way to make money (AS).

When the *ulera* [rubber era] ended, we made *pipantes*. *Pipantes* to sell, to buy little necessities. If not, we would have been naked...the *pipante* always helped, for those who knew [how to make]. Those who knew, always brought [downriver, to the coast] to sell. When we need something, we sell *pipantes*. In fact, up to today, that's how we are (ES2).

When the *tunu* and pelt markets 'broke,' the only thing left was to sell *pipantes*, until the *chiclera* [*chicle*-tapping era] arrived (GD).

[After the *tunu* period] we looked for a way to live—we made *pipantes*. I made many. We lived only from this. When our money ran out, we had to get another. I lived for six years from *pipantes*, making three or four a year; we took them [downriver] to sell (RC).

I worked in gold a little, then from there, in the *chiclera* for three years, it was good money...When the *chiclera* stopped—from there I started making *pipantes*—up to today (IS).

In the early 1980s, we always had a *pipante* around to sell to people downriver, if they wanted it. There was no other work. Everyone kept an extra *pipante* for sale at the shore. Had there been a company [providing jobs] at that time, it would not have been so. But because there was no other source of money—(JD).

Today there is little money here. The only way to get it is by selling *cayucos* (NR).

In short, Tawahka households have been able to readily fall back on the regional canoe trade during so-called 'bust' periods, when activity choice is not overdetermined by international markets for export products. The segue from extraction-oriented 'boom' periods into commercial canoe construction appears to have been facilitated by the fact that canoe extraction and 'boom'-time extractive activities shared two important features: a similar geographic scope and seasonality, and similar organization of labour and financing. For example, just after the end of the

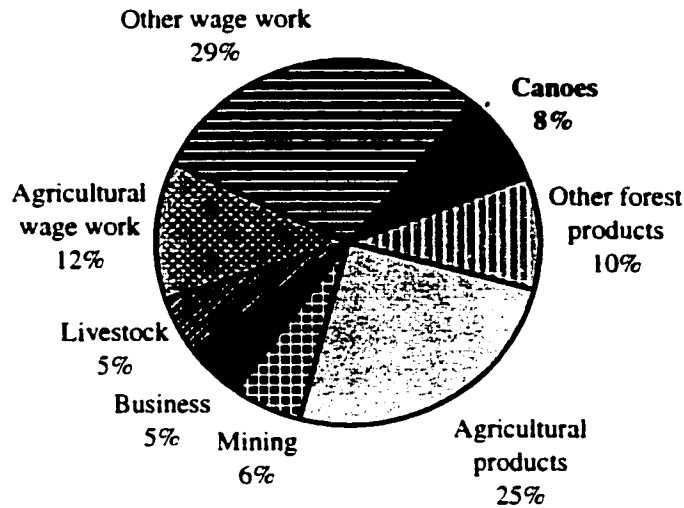
tunu era (early 1980s), Tawahka informants spoke of returning during agricultural off-seasons to the familiar upriver '*tunu*' forests in order to make canoes from stands of mahogany and cedar they had previously spotted there (SO; IS). As during the *tunu* era, they often went in groups of up to ten to twelve men, led by an *encargado*, to make a large canoe but with each man usually benefiting from labour exchange to make a small canoe for himself (JD; LS). To finance such trips, the carvers acquired credit—usually in the form of foodstuffs—from the same downriver *contratistas* who had provisioned them for *tunu* expeditions (IS; LS).

Because the Tawahka maintain that the 1990s were a period of economic 'bust' on the Patuca—due largely to the lack of one dominant industry employing a majority of local peoples—we might expect that the economic importance of canoe sales to have been particularly great during this time. Indeed, in 1997-98, canoe sales represented the bulk of earnings from commercial extractivism (Fig. 6.1). The rest of this chapter tests this supposition through analytical treatment of the role of dugout canoe sale in the Tawahka's market income and wealth portfolios. My intention here is to get beyond the generic examination of 'commercial extractivism' in previous chapters to better understand the microdynamics of trade in a single forest product: from the specifics of marketing to the influence of sale on individual households.¹²

Because the analysis uses data gleaned from surveys of Tawahka households, it cannot quantify the Tawahka's relative contribution to the Patuca basin's overall supply. I therefore rely on anecdotal assurance that the Tawahka were, throughout the 1990s, the main suppliers in what is, in fact, a regional trade in which Miskito and even *ladinos* increasingly participate.

¹² The analysis mixes both quantitative and qualitative approaches: based on field observation, oral history interviews, and household-level data that I collected in three separate surveys. In 1995, I asked 105 households about all canoes produced since 1990; in 1996, I interviewed 81; in 1998, 116. In all, 'canoe' data are complete on 128 Tawahka households. I then compared results for a subset of 26 Tawahka households for whom a fine-grained HIID data on monthly cash income existed.

Fig. 6.1 Mean market income structure of Tawahka households (n=100), TABR, 1997-98.



Source: Household survey, 1998.

6.3 Patterns and Geographic Scope of the Canoe Trade

Between 1990-98, the Tawahka sold or bartered about half (n=238) of the canoes they made (n=487). Sales were spread unevenly over the 8.4 year period. Annual sales grew from 11 in 1990 to a peak of 54 in 1995, declining again to 32 in 1997. These fluctuations do not appear to be determined by production surpluses, nor by demand peaks, because the share of canoes sold to those made remained comparatively stable. In other words, regardless of overall canoe supply, Tawahka sold between one-half to one-third of the canoes they made.

If *pipantes* sold by Tawahka (n=211) are compared with those kept for home use (n=228), sold canoes are found to be almost 15 cm wider; the finding is significant ($t=-7.73$; $P\leq 0.001$). Also, 87% of *pipantes* sold were made of the three highest quality species, compared with only 64% of those kept for home use—Tawahka appear to

have selected the biggest, highest quality trees for canoes intended for sale, or chose their biggest and best household canoes to sell off. Such high-grading suggests a net export of good-quality canoes from the TABR.

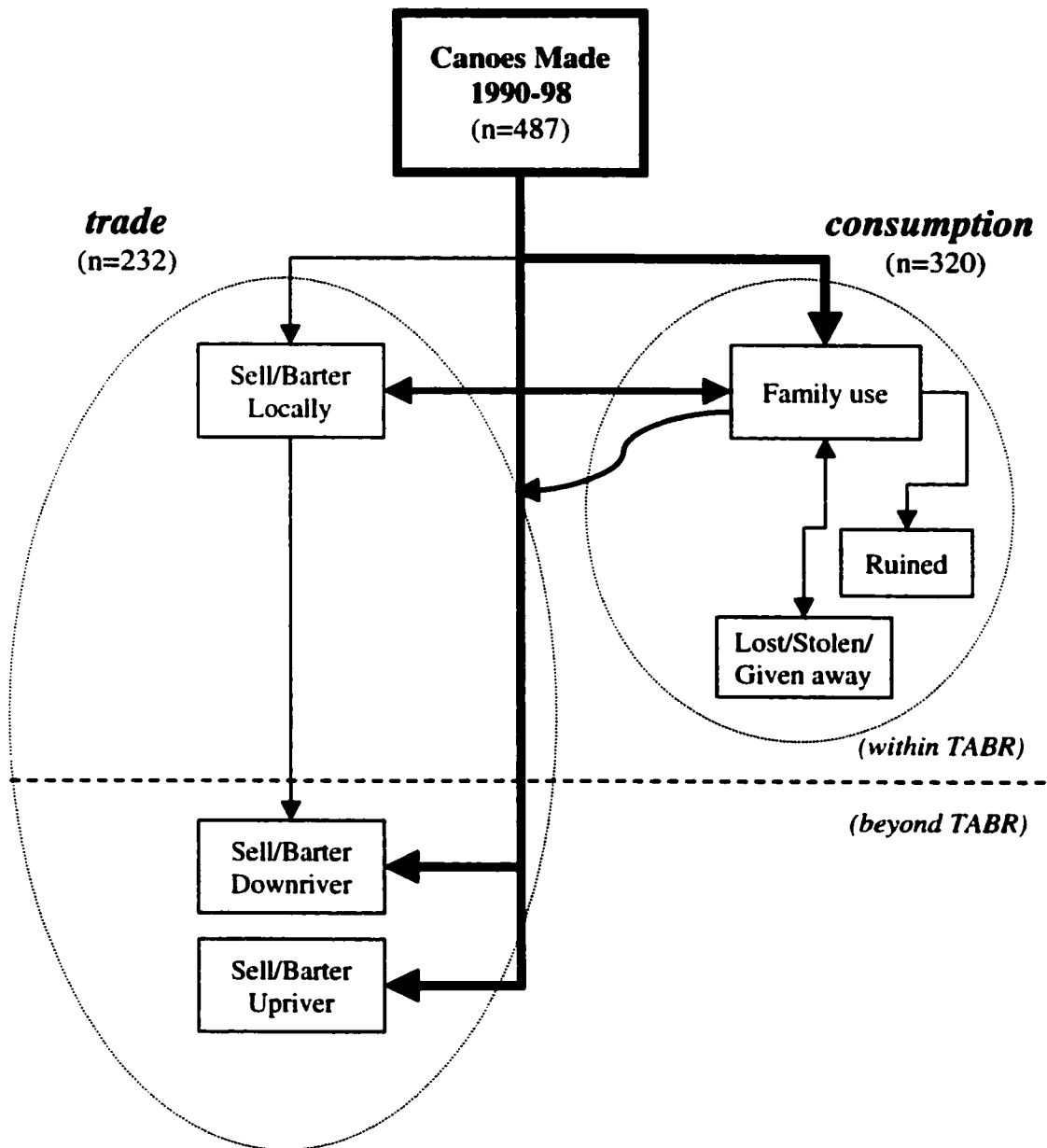
Who buys Tawahka canoes? I collected transaction details for 226 (95%) of the canoes Tawahka sold between 1990-98. The following discussion is arranged by the geographically/ethnically defined 'market' in which the canoes were sold. To facilitate interpretation, Fig. 6.2 illustrates the fate of all Tawahka canoes over the study period, showing the share of canoes sold to those kept for home use; the schema is particularly useful in clarifying how canoes may be consecutively used, sold locally, and resold outside the TABR.

Downriver Markets

The majority of canoes (51%) were sold to Miskito buyers, either at the seller's village or in downriver locations (there are no Miskito settlements upriver of the TABR). An additional 24 canoes were sold at downriver locations to non-Miskito, including family members, traders, *ladinos*, and 'outsiders': the Catholic church, NGOs, and tourism operators. Combined, the 'downriver' sales component of the Tawahka's canoe export accounts for 61.5% of all canoe sales, reinforcing the historic pattern of coast-ward trade, largely to Miskito (see earlier).

Most canoes sold downriver were *pipantes*, of which the majority (81%) were less than 1 m wide, denoting canoes for family use; 20% were freight *pipantes* sold to NGOs and traders. Tawahka informants consider the downriver *pipante* market to have been stable in the 1990s, as it has been for much of the century: Miskito villagers, like the Tawahka with whom they share a common lifestyle, express a constant demand for canoes (AO). This constancy is reflected by the steady 60% or so of total sales that downriver markets have comprised yearly since 1990. The Tawahka sold canoes to Miskito relatively effortlessly, usually by bringing canoes directly to Wampusirpi for quick sale (field observation; IS). Miskito also requested canoes from visiting Tawahka, or asked for canoes when passing Tawahka villages during upriver

Fig. 6.2 Life histories of canoes made by Tawahka households, TABR, 1990-98.



Source: Household surveys, 1995, 1996, 1998.

travel. The casual nature of canoe transaction has characterized canoe exchange between Tawahka and Miskito since at least the 1950s (JB).

Not surprisingly, all unrefined, sea-going *cayucos* produced by the Tawahka (n=14) were exported coastward, representing 10% of total downriver sales since 1990. Only in some cases did Tawahka venture all the way to the coast to sell these canoes. More commonly, *cayucos* were sold to middlemen in downriver Miskito villages. Unlike the constancy of downriver *pipante* markets, coastal demand for *cayucos* is sporadic, both seasonally and over longer periods. For example, demand rises and falls in response to the various lobster, conch, and shrimp seasons on the coast (AH). Similarly, *cayuco* sales peaks correspond to what are considered 'fat' times on the coast. Throughout the mid- to late 1990s, for example, the Mosquito Coast's position as a key cocaine transshipment point (see Nietschmann 1997) resulted in a glut of cash and remarkable buying power among the Miskito there (LD). This situation translated into unprecedented prices for *cayucos* (LD), which in some cases inspired Miskito middlemen to transport Tawahka-made canoes overland, by truck, from Ahuas to Puerto Lempira, a distance of over 120 km (LD).

These Miskito middlemen appear to have eventually sold Tawahka canoes for three to four times the original sale price.¹³ Tawahka who attempted to sell independently of these middlemen found transaction costs high, for various reasons. First, the seasonal timing of coastal demand is difficult for Tawahka producers to gauge far inland, and even those Tawahka with access to radio communication find long-distance price negotiations difficult (JS). Yet there is no way other than through gossip for Tawahka to obtain price information, and they are often dismayed upon arrival at the coast at the low price for which they must relinquish their *cayucos*. Also, the time required to travel to the coast, and the costs of food and lodging there, can be exorbitant (FG). Tawahka most willing to risk such trips are young men, for whom a trip to the coast is considered adventure and reward in itself, largely by providing an

¹³ The chain of middlemen can be long. Tawahka typically sell their canoes in Barra Patuca; from there they are brought to Palacios. Canoes bought from the Tawahka for 10,000 L (≅US\$750) can be sold for 25,000 L (≅US\$1,900) once fitted with strakes and an engine mount, and painted.

opportunity to obtain goods not available upriver, particularly fashionable clothes and electronic equipment.

In addition, Tawahka face some competition in the *cayuco* market, because coastal buyers can choose between canoes exported from some five other river basins, including the Warunta, Plátano, and Sico/Paulaya. The absence of data on these rivers' canoe trades, however, makes assessment of the Tawahka's *relative* advantages/disadvantages in the coastal market difficult. My cursory investigation of *cayuco* prices in 1998 in the coastal towns of Belen and Palacios, however, indicated that Tawahka canoes are relatively expensive. Buyers there explained that sellers from other, shorter rivers have less far to travel to reach the main coastal towns than do the Tawahka, and thus can offer their canoes at lower price.

Upriver Markets

The southward component of the Tawahka's canoe export was comprised of the 18.5% of *pipantes* sold at locations upriver of the TABR, or to inhabitants of those areas (the Patuca River runs roughly south-north: 'upriver' is therefore synonymous with 'southward'). About half of canoes sold upriver went to *ladino* subsistence farmers who increasingly reside along the Patuca and its tributaries (see Appendix VI). The other half went to *ladino* traders (n=19) and outsiders based in upriver locations. Canoes sold in this market averaged 0.85 m (2.8-ft) wide.

The upriver canoe market has only recently opened to the Tawahka, who until the 1970s were the only significant population south of Miskito settlement zones along much of the Patuca (Herlihy 1993); the Tawahka first sold canoes upriver in the late 1980s (RC; AR). Despite some fluctuations since 1990, the upriver market has taken an increasing share of Tawahka canoe sales as *ladino* farmers move ever-closer to the heart of Tawahka settlement. Most settlers moving into the zone are initially unfamiliar with *pipante* use and construction despite their proximity to some of the finest stands of 'canoe' trees in the Mosquitia. More comfortable walking and using pack animals, most *ladinos* adopt canoes only for river crossings and rare episodes of river travel. Reluctant visitors to Tawahka villages, they prefer to buy canoes when

Tawahka venture near their settlements on fishing, hunting, or gold-panning trips. Tawahka also hire *ladinos* as *rastradores* during construction of large canoes; some *ladinos* provide their labour in exchange for canoes or to learn Tawahka canoe-making skills.

Indeed, field observation and Tawahka testimonies suggest that a growing number of *ladino* migrants have learned how to construct canoes. Certainly, the 21 canoes the Tawahka sold upriver before 1998 only represent a fraction of the more than 108 canoes that I saw moored along a 275 km stretch of the Patuca settled by *ladino* colonists (from the most upriver Tawahka community, Parawas, south to the first 'put-in' of the first road, near Palestina on the Upper Patuca; see Appendix VI). Almost 60% of these canoes were large and outfitted with motors.

Local Markets

The third market for Tawahka canoes was local: Tawahka sold 20% of canoes within the TABR, of which about a quarter were sold to family members and the balance to neighbours, usually coethnics. Canoes traded locally are typically small family canoes with a median width of 0.6 m (n=45).

In the late 1990s, the local canoe market was maintained by high canoe turnover due to wear-and-tear, sell-offs, and because canoes were regularly lost. During the rainy season, for example, canoes were often carried away by flash floods.¹⁴ Theft was also common, particularly by downriver Miskito passing Tawahka communities by night. Local markets were relatively new (FV), and expected to grow with increasing economic polarization among Tawahka households (see Chapter Three) as well-off Tawahka merchants and other income-rich households increasingly relied on others to make their canoes; contracting between Tawahka also occurred in 1997 (n=3).

¹⁴ Interestingly, the unprecedented flooding associated with 1998's Hurricane Mitch did not result in many lost canoes, according to Tawahka with whom I spoke in December 1998. Apparently the river's historic rise was steady enough, over several days, for canoes to have been periodically re-secured. By contrast, an average rainy season flood, especially with water levels rising precipitously at night, lifts away many canoes.

6.4 The Nature of Canoe Transactions

Analogous to the history of canoe trade in the Mosquitia, canoe trading among the Tawahka in the 1990s included various forms of exchange. Barter remained common; partial barter/cash transactions dominated. Of 106 canoe transactions for which I collected detailed information, only 72.5% of the average total sale value of the canoe was paid in cash (range: 0-100%); the majority of transactions (53%) included barter. Almost 20% of canoes were exchanged without *any* cash changing hands; a few canoes were pawned. Interestingly, there was no significant difference in price (i.e., eventual value of cash or goods exchanged) between canoes that were bartered and those paid for in cash. Nor does the share of cash in the total transaction help to explain any price variation. This finding contests field observation that cash appears to be at a premium on the Patuca, unless canoes themselves are considered at a premium.

Table 6.1 lists the different goods for which canoes were exchanged—in whole or in part—during the study period, providing some sense of the commodities that Tawahka were willing to give up to obtain canoes, or conversely, what buyers were willing to accept. Among the items exchanged are goods for which canoes have been swapped for centuries. For example, Young (1842) reports Tawahka trading canoes for iron pots and axes in the 1830s; older Tawahka remember canoes traded for axes and shoes in the 1930s (RC). In the 1940s, the traditional barter equivalent of a 0.75-m (2 ½ ft) beam mahogany canoe was one adult cow, and remained so in 1998 (CC; LD); cattle remain the most frequent good for which the Tawahka make a ‘clean’ (i.e., one-to-one) swap for a canoe. Furthermore, the Tawahka trade some of the same goods for canoes that do other groups, suggesting a universal tender for dugouts: Wilbert (1976:332) notes clothing, tools, and hunting dogs traded for canoes in Venezuela; Hugh-Jones (1992) reports that guns are paid for canoes in Venezuela’s Vaupés region.

Tawahka also buy and sell large canoes through contractual agreements, as they have for at least 150 years. Indeed, 10% of Tawahka canoe sales involved contractual

Table 6.1 Goods and services bartered for canoes, in whole or part, TABR, 1990-98.

Barter good or service	No. of transactions (n=48)	Share of all transactions (%)
Cattle	6	12.5
Hunting dog	6	12.5
Store provisions	6	12.5
Debt	5	10.4
Clothing	5	10.4
Rifle/shotgun	4	8.3
Agricultural work	4	8.3
Rice, beans (for food or seed)	3	6.2
Tools	2	4.2
General wage labour	2	4.2
Chickens	2	4.2
Wrist watch	1	2.1
Medicine (herbal)	1	2.1
Soccer ball	1	2.1
	48	100

Source: Household surveys, 1995, 1996, 1998.

agreements, in which the buyer specified size, species, and canoe style before the Tawahka carver set out to make the canoe. In more than half of such cases, credit was offered to cover some of the extraction costs and to decrease the personal capital outlay of the *encargado*. Indeed, many sought-after *pipanteros* claimed they would not make a canoe without capital provided up-front by a contractor (AS; IS). When received as cash, such credit represented an average of 48% of the canoe's eventual sale price (n=12). In contrast, credit advanced in the form of provisions was worth some 40% of the final price (n=4), higher than the 30% share proffered in the 1840s (Roberts 1827). Not surprisingly, contracted canoes were significantly larger than those not contracted, by about 0.3 m (1 ft).

Contracting was convenient for both producer and buyer, for several reasons: a) pre-arranged canoes could be made to order; b) transaction costs and risks were reduced; c) contracted canoes earned an average of 1.6 times the sale price of their non-contracted counterparts (the difference is statistically significant); and d) a contractual arrangement was also more likely to yield cash: 58% of canoes contracted were paid for with cash alone. Tawahka who make *cayucos* benefit particularly from contracts, because they avoid costly trips to the coast, price misinformation, and other costs. Indeed, 22% of contracted canoes were *cayucos*, or twice the share *cayucos* hold in total sales. But contracts were equally common in all markets: as likely to occur among neighbours as among strangers.

In some cases, more than a year elapsed from the time a canoe was contracted to when it was delivered. By custom, no interest is charged on the credit (CM; UM). Tawahka informants explain this tradition by depicting the contractual relationship as one of trust; charging interest would be considered insulting (AS; IS). At the same time, they acknowledge ways in which implicit interest is charged by the buyer: docking a percentage off the pre-determined sale price because of 'flaws,' or withholding the full payment for a time interval comparable to the producer's lag time, or by asking for another canoe right away. Such tactics are rarely begrudged: the debt bond gives each actor the security of future transactions (IS).

6.5 Canoe Prices and Profitability

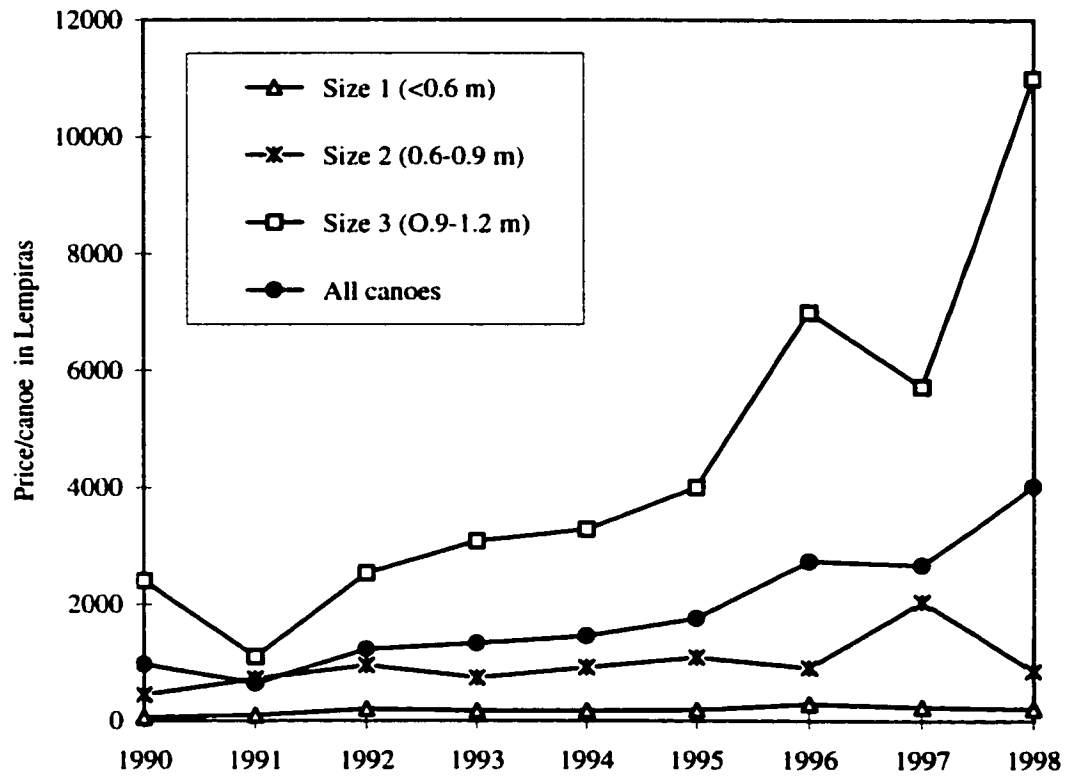
The average price for the 232 canoes sold by Tawahka since 1990 was 1908 Lempiras (roughly US\$144 in 1998¹⁵), or the equivalent of about two months of wage labour in 1998. The very broad range in price per canoe, however (40-16,000 Lempiras, or about US\$3-US\$1,211) reflects the variety of canoes sold as well as inflation and market differences. Fig. 6.3 illustrates price changes over time. Furthermore, field observation indicates that in absence of clear market prices and standards, Tawahka routinely adjust prices, as well as how and when to charge, depending on their assessment of the buyer's ability to pay. In a region where most economic players are personally known—and sometimes related—to each other, many factors may be gauged before a canoe changes hands.

Overall, oral testimonies and experimental quantitative analysis (not shown) suggest that Tawahka from any village can expect to earn a higher price for a newer, larger canoe of a high-quality wood, extracted on contract from a location near to the village, and sold to a stranger from upriver at the carver's village, for either cash or barter, all else being equal. But informants provided ambiguous evidence of the *profitability* of canoe sale as an economic activity. On the one hand, carvers claimed that canoe sale "*no rinde*" i.e., is not profitable. Indeed, 7% of Tawahka households that I interviewed in 1998 (n=109) cited low canoe prices and low profit margins as reason for not making a canoe in 1998/99 (Appendix XI). As one former canoe-maker lamented:

If I make a *pipante*, I can make 16,000L. But what happens is that I won't earn the money. I have to bring labourers, buy flour, coffee, sugar, and if they smoke, I have to buy them cigarettes. I'll waste all the money there. Even if I get my labourers from home [i.e., his sons], and we go way up to the headwaters of [Río] Aner to get out the canoe, I'll have to get 20 more men [to help drag it out], for 50L/day. It doesn't pay. When I make a *pipante*, the labourers win, not me (ES2, April 1998, Krausirpi, *transl.*).

¹⁵ Equivalent prices are approximate because they do not account for inflation. Here, I use an exchange rate of 13.21 L: US\$1, based on the mean of the monthly average dollar selling price in Honduras between March 1997-98, inclusive (Banco Central de Honduras 1999).

Fig. 6.3 Average unadjusted canoe prices by size (n=230); TABR, 1990-1998.



Note: "Size" refers to width of canoe at beam.

Source: Household surveys, 1995, 1996, 1998.

On the other hand, Tawahka continue to accept contracts and to sell canoes (IS), and a popular Miskito song depicts a man returning “rich” from a canoe-making journey.¹⁶ What, then, can canoe price reveal about the profitability of the canoe trade? Here I explore three methodologies towards determining whether price signals render canoe sale an attractive economic option at the community level.

Returns to Labour

First, I calculated returns to the labour expended in canoe making for the 32 canoes for which both labour and sale price data existed (from 1996-98). Returns averaged 78.5L/day (median: 71.6; range: 11-191), representing almost 30 L more than the daily wage earned by hired canoe carvers in that period, and 40 L more than was earned for six to eight hours of wage work in agriculture. These figures suggest that making and selling one’s own canoe represented time more profitably spent than in wage work. Furthermore, the seasonality of agricultural wage work (see Chapter Two) appears to have made commercial canoe production particularly attractive during the ‘off-season,’ as Tawahka were aware: when I told a Tawahka carver that I had calculated his returns to canoe-making at about 60L/day, his reply echoed the perceived opportunity cost of canoe construction given few other activities at that particular time: “It’s not a lot, but if we were at home [i.e., in the village, rather than the forest] we wouldn’t make anything.” (ASb, Kahkatigni, April 1998; *transl.*).

When compared by canoe size, however, returns to labour vary markedly. Experimental regression analysis suggests that rates of return to canoe labour vary directly with canoe size (and are related to little else): canoe width alone explained almost one-half (49.5%) of the variance in returns to canoe labour. This finding is most likely due to economies of scale; the result suggests that Tawahka earned more than twice the agricultural wage by producing freight canoes (>0.9 m beam) but would have been better off working for wages than producing small canoes for sale.

¹⁶ Song entitled “*Arelita Mairin*” as recorded at Kuri, Honduras, by Laura Hobson Herlihy, 1998.

Cost-benefit Analysis

A second approach to assessing the profitability of canoe sale with price data was to use detailed data of two canoe-making expeditions to conduct 'cost-benefit' analyses, although the small sample size ($n=2$) led to inconclusive results. In one case, a carver's investment in a lengthy canoe-making trip yielded him a 30% profit, comparable to net returns from stores, and double the highest interest rate charged in the region. In the other case, a similarly experienced carver combined bad business decisions, a propensity for drink, and bad luck to wind up deeply in debt and planning to make another canoe to help pay off debts incurred while making the previous one.

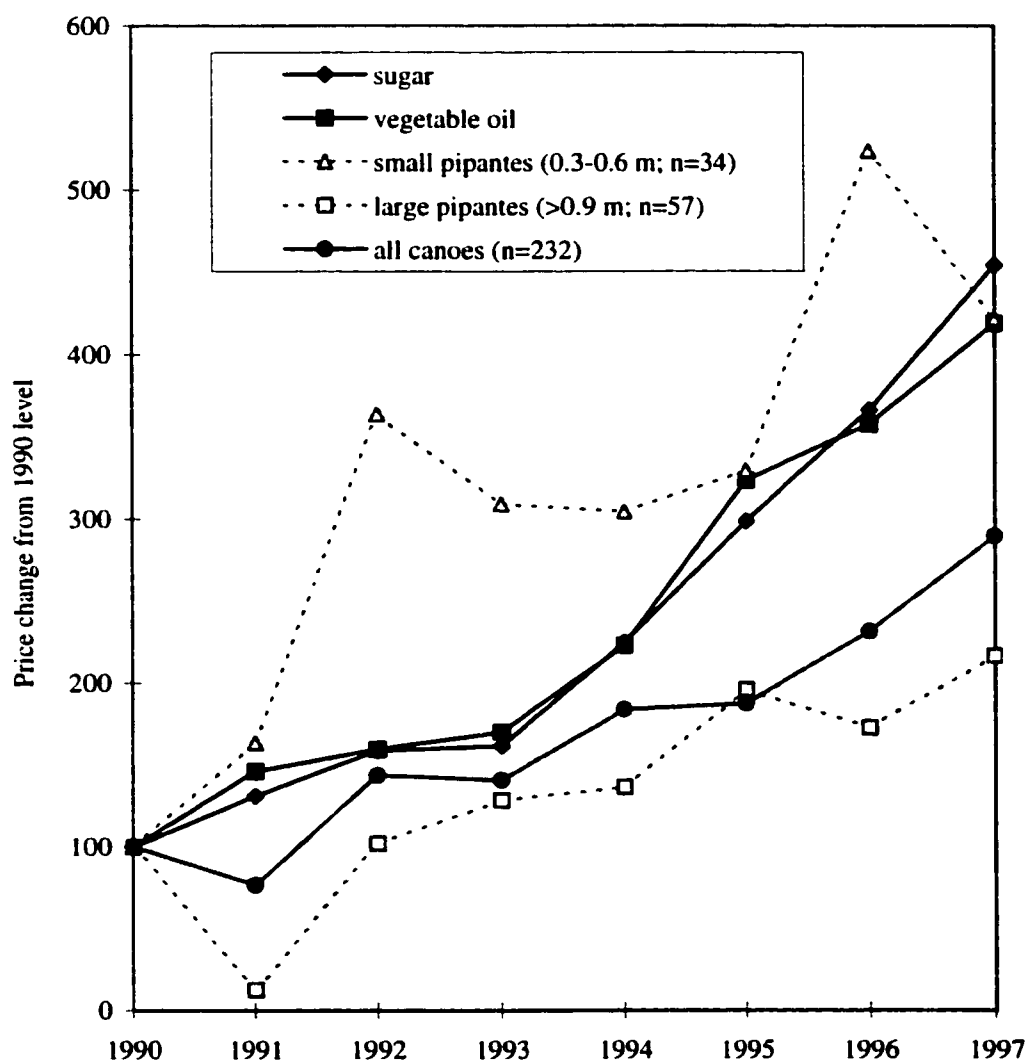
Price Comparisons

A final method for assessing profitability was to compare price indices for canoes with those of basic consumer foodstuffs (sugar and vegetable oil¹⁷) over time. The Tawahka themselves use a similar approach to assessing the profitability of their activity choices, particularly when illustrating how poor they are today compared with in the past (e.g., AOb). Fig. 6.4 graphs the changing ratio of consumer goods to canoe prices during the 1990s. The graph shows that although overall canoe prices rose over the period, they did not keep pace with the steeper increases in essential consumer goods, and indeed the gap between the two classes of commodities widened over time. This suggests that a canoe seller would have had to sell more canoes in 1997 than he did eight years before in order to purchase the same quantity of food.

But the picture changes when price ratios for large canoes and small canoes are separated. The prices for small canoes grew consistently faster than prices for consumer goods until 1997, meaning that sellers could actually sell *fewer* small canoes in 1997 to meet the same food needs than at the beginning of the decade. In contrast, the sale of large canoes illustrates the opposite trend: freight canoe price increases have lagged behind those of consumer goods, most notably in 1996 and 1997.

¹⁷ These are goods that the Tawahka do not produce themselves, nor do they produce comparable alternatives. They are considered essential elements of 'well-being' and are eschewed only under extreme financial constraint.

Fig. 6.4 Price ratios for consumer goods and dugout canoes, Honduras, 1990-97.



Note:

Canoe prices are yearly averages from Tawahka Asangni Reserve (based on household surveys conducted in 1995, 1996, 1998).

Consumer goods prices for Honduras (Banco Central de Honduras 1999).

Price data were incomplete for Tawahka villages but appeared comparable to national figures.

In sum, different measures of canoe profitability suggest different outcomes from sale: returns to labour indicate that canoe sale competes favorably with agricultural wage work, but when 'opened-up,' returns appear to decrease significantly for small canoes but become extremely favorable to large canoe sale. On the other hand, price ratios suggest small canoe sale has, over eight years, offered greater buying power than *batu* sale. These conflicting findings, then, preclude the assertion that community-level price signals alone account for the 230-odd canoes of all sizes that Tawahka households sold between 1990-early 1998. Other factors must therefore be considered to better understand which households turn to canoe sale, when, and why.

6.6 Canoe Sales Among Tawahka Households

The following section explores how cloudy canoe price signals are interpreted by individual Tawahka households, as manifest in their economic decision to participate, or not, in canoe sale. Below I outline patterns of participation in canoe sale and the rationale behind household involvement in the sector.

Patterns of Participation in the Canoe Trade

One response to ambiguous price signals is for a household not to sell. Indeed, of the 93% of Tawahka households that *owned* a canoe between 1990-98, only 56% chose to *sell* a canoe in that time period,¹⁸ confirming field observation of wide variation in economic strategies between and within apparently 'homogenous' households and communities.

Households that did sell a canoe sold an average of 0.4 per year, or 3.2 canoes over the 8.4 years of the study period (range: 1-17). But the majority of canoe-selling households (39%) sold only one canoe in that time period; 70% of sellers sold three or

¹⁸ Among Tawahka villages, participation ranged from 9% to 66%. Village-level differences are not attributable, however, to economic opportunity: the most remote and newest community (Parawas) measured the same level of household participation as the largest, most established community (Krausirpi).

fewer. In fact, 65% of all canoes sold were sold by only 30.5% of the seller population, or 17% of all Tawahka households. These data reveal that there is skewed involvement among participants in the canoe trade, suggestive of production specialization: two households alone were responsible for 29 canoe sales! Because of the lack of data on total income for this time period, however, I was unable to determine if the households that sold more canoes also *relied* more heavily on the extractive sector (as data from Chapters Three and Four suggest).

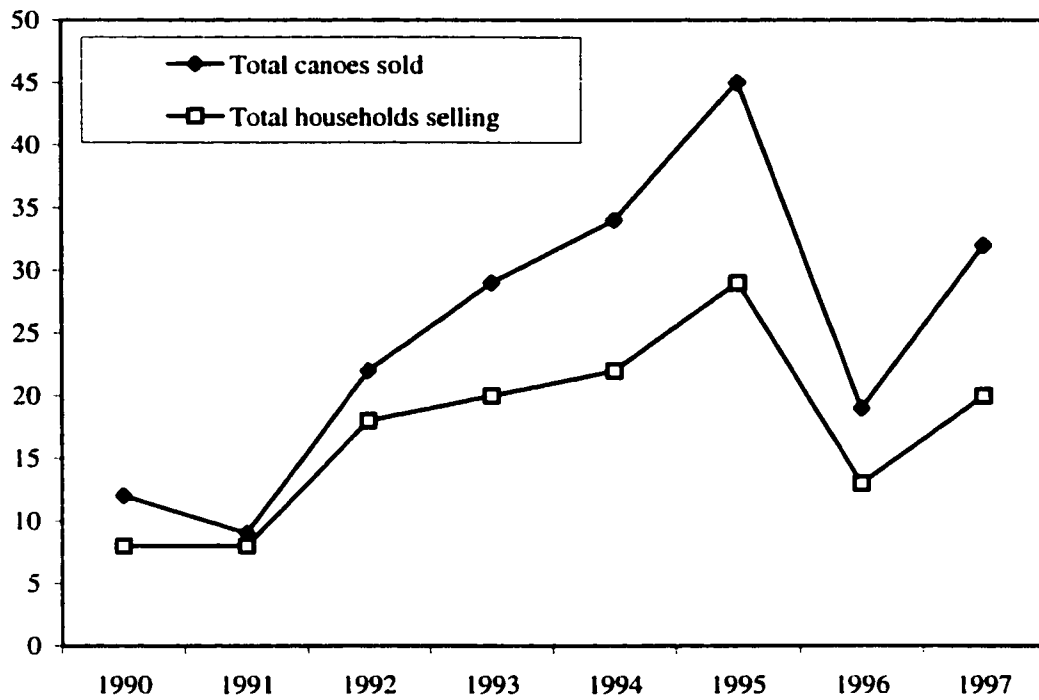
Data do clearly show, however, that household participation in canoe sale was highly variable over time. For example, the number of households participating in sale almost quadrupled between 1990 and 1995, then dropped markedly in 1996. The changing number of total households selling canoes, in all villages, mirrored the trend in total sales. In other words, the 1995 sales peak was not due to a few specialist households producing more canoes, but rather represented a record 29 households entering the trade. In other words, many Tawahka households who participate in canoe sale do so sporadically, and only a few engage regularly (see also Chapter Three).

Why, then, do Tawahka households participate unevenly in canoe sale, and why do canoe sellers sell only sporadically? Because the Tawahka sold a consistent share of all canoes made annually, irrespective of total production, the decision to sell did not appear to respond to demand (Fig. 6.5). Nor did participation in canoe sale appear to have been driven by price changes: over the years in which there was record entry, and attrition, from canoe sales (1994-1997), I found no significant difference in average canoe price.

Household-level Determinants of Canoe Sale

Here I explore the power of household-level variables to explain the variance in canoe sales among Tawahka households. To get at individual households' motivations for involvement in the sector, I turn to the Tawahka's own statements regarding their canoe sales, and match these against their stated rationale for canoe construction in the first place. Such data are complete for a subset of 162 canoes sold between 1996-98,

Fig. 6.5 Trends in canoe sales, TABR, 1990-97.



Source: Household surveys, 1995, 1996, 1998.

and are summarized in Table 6.2. Of the 162 canoes, 59 ended up in personal use, 29 were lost or rotted, and the remaining 74 sold.

Respondents claimed that 44% of canoes were made with the intention of selling, of which the majority would be sold “to make money,” i.e., as a productive option on a par with wage labour, gold panning, etc. The rest were made with the intention of selling in order to cover pressing but not urgent needs, such as children’s education (AS; CS). Not surprisingly, all but 14.3% of the canoes intended for sale *were* sold. The reasons given for sale matched the original intent well; the most common motives included the need to make money, pay educational expenses, and to obtain food and clothing. These data suggest that almost half of canoe sales are the pre-planned outcome of deliberate production for the purposes of sale in response to certain anticipated household needs (see Chapter Four).

But Tawahka also claimed to have made canoes in response to more pressing needs: six canoes were made with the expressed purpose of paying for medical expenses—as an *ex-post* form of self-insurance. As one resident of the Patuca explained:

...if I have someone in my family sick, and there is no way to obtain money, and no source of [wage] work, now, if there is only the money that will come from a *pipante*...I will have to...make this *pipante* for my family (RS, BRP meeting, February 1998, Wampusirpi, *transl.*).

Motives such as this help to explain the 74% of total canoe sales (n=238) that occurred in the same year as the canoe’s manufacture. In this respect, Tawahka note that canoe sales were particularly good for meeting one-time, lump-sum needs. Unlike the sale of cacao, for example, which yields small amounts over time, the sale of a single canoe can cover tuition or holiday demands (AS). In addition, the shorter production interval for a canoe, and the Tawahka’s sentiment that forest resources can be had “for free,” made canoe sale a relatively attractive form of market involvement at such times.

But what of the 25% of canoes that were over a year old before they were sold? Obviously Tawahka do not pre-plan all sales. In fact, when Tawahka informants’

Table 6.2. Tawahka motivations for making and selling canoes, 1996-98.

	For personal use		personal use		for sale	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
For personal use	107	66.0	55	48.7	4	8.2
For sale						
a. "To make money"						
(unspecified)	17	10.5	6	5.3	9	18.4
for food & clothing	10	6.2	4	3.5	8	16.3
holiday expenses	2	1.2	2	1.8	1	2.0
b. To self-finance						
for child's education	7	4.3	1	0.9	6	12.2
acquire tools	1	0.6	4	3.5	1	2.0
to finance household move	0	0.0	1	0.9	0	0.0
capital for store	0	0.0	1	0.9	1	2.0
to pay agricultural labour	0	0.0	1	0.9	0	0.0
c. To self-insure						
sickness in family	6	3.7	6	5.3	8	16.3
d. Other						
debt repayment	3	1.9	4	3.5	5	10.2
contract obligation	6	3.7	0	0.0	3	6.1
favour for relative	3	1.9	2	1.8	0	0.0
Fate: lost, rotted	-		26	23.0	3	6.1
No. observations	162		113		49	

¹ Reports response to open-ended question: "Why did you make this canoe?"

² Reports response to open-ended question: "What happened to the canoe? If sold, why did you sell it?"

Source: Household survey, 1998.

stated intent at the time of canoe construction is compared to their motivation for later sale, 28.3% of canoes intended for personal use were later sold off, often more than a year after they were made. Such sales appear to represent the liquidation of a productive household asset in response to an urgent need for cash: 19% were sold to cover costs of sudden illness. For example, one Tawahka man reported:

If I didn't make *pipantes*, how could I have taken my wife to [the hospital at] Ahuas? Because I sell *pipantes*, I didn't bother anyone, I didn't borrow, I went *tranquilo*. The *pipante* always gives 'big' money.' (FC, Krausirpi, 1998, *transl.*).

Another claimed:

We have always made *pipantes* for personal use, and also had them in reserve for whatever [unforeseen] necessity. (*Siempre hacemos pipantes para uso personal, y tenía como reserva para cualquier necesidad*) (UM, Krausirpi, May 1998, *transl.*).

Another 19% were sold for unspecified cash needs; 31.2% were sold to acquire food and clothing or repay debts (in the latter case, some canoes were seized from debtors). In other words, 30% of canoe sales between 1996-98 represented households pushed into liquidating a household asset by circumstance; they did not turn to forest-based extractivism *per se* to meet their needs. In the context of these "distress" sales, then, the profitability of canoe sale is not likely to have been closely considered, perhaps explaining why analysis of price data yielded inconclusive results. If distress canoe sales represent a form of *ex-post* insurance, then, how willing were households to 'cash' them in? Interview data suggest that they were reluctant. In a subsample of 59 households asked a hypothetical question about how they would raise cash in an emergency, only 12% of respondents considered selling their canoe; the majority (40.6%) chose to borrow from traders or merchants (and repay later with agricultural labour), by selling crop surpluses, or selling future livestock (see Appendix X). These responses suggest that although sale of the family canoe represents one response to emergency household needs, it was neither the only, nor the preferred, option.

In sum, emic explanations elucidate why those households that sold a canoe were motivated to do so, and offer qualitative support of findings presented in Chapter

Four. But what of the 45% of households that did *not* sell canoe between 1990-98: we know nothing of their motives *against* canoe sale. The nature of the data set prevents a closer examination of this 'negative' option. We may surmise, however, based on earlier analysis of the determinants of forest product sale (see Chapter Four), that such households may have eschewed canoe sale for a host of reasons: they may have sold other assets, found other ways to make money, not known how to make canoes, or been constrained by lack of knowledge of the market.

Outcomes of Canoe Sale

The previous section has shown that the Tawahka claim to sell canoes in order to purchase consumer goods, to invest in productive activities (i.e., to self-finance), and to self-insure. These claims suggest that canoe sale can directly and indirectly influence the long-term production pathways of households, either by affecting asset accumulation, financing particular activities, deflecting the demands of income shocks from other sectors, or by changing the quality of labour through education or improved health. But because the Tawahka also engage in a host of other non/off-farm activities *besides* canoe sale (see Chapters 3 and 4)—which may generate similar outcomes—how can we tell which attributes of a household at Time B can be considered an exclusive result of canoe sale at Time A? Of particular interest is whether or not the sale of a canoe can be a sufficiently significant economic event to send out ripples detectable in households' asset accumulation strategies. The question is important because it speaks to the role of forest products in the evolution of forest peasant wealth, which has been argued to very much condition the range of productive activities in which households subsequently engage (c.g., Takasaki *et al.* 2000b). Here I apply two distinct approaches (qualitative and quantitative) at two different time scales (a decade and a lifetime) towards understanding the contribution that canoe sales have made over time to the wealth and well-being of Tawahka households.

Quantitative Analysis

If a Tawahka household sold a canoe between 1990-97, can we identify outcomes of that sale with regard to the household's wealth and well-being from one to seven years later, in 1998? I developed a maximum likelihood Probit model to test the relationship between prior (1990-97) involvement in canoe sale and more current (1998) measures of household well-being. The 24 independent variables were chosen to represent what field observation and prior analysis deemed to be the most representative measures of household wealth and well-being (see Chapter Four), including proxies for productive assets, livestock holdings, extractive capital, human capital (education and health), financial holdings, and agricultural or land-based wealth; I use demographic variables to control for fixed household attributes such as household composition and age, and used 'dummy' village variables to control for the effects of location.

The Probit model is presented in Table 6.3, and appears robust (pseudo $R^2=0.59$; $P\leq 0.001$).¹⁹ The model predicts the increased probability of a household having sold a canoe for a one unit change in any given explanatory variable. The most significant results indicate that the households that had sold canoes in the past were flagged by several common attributes in 1998: they were headed by younger men (for every year older, the probability of having sold a canoe in the past decreased by 3%); they owned less prime lowland but significantly larger cacao orchards; and they owned fewer head of cattle but more buckets and more adzes, rifles, and two-handed saws.²⁰ In addition, households that sold a canoe prior to 1998 also experienced significantly fewer deaths between 1996 and 1998.

In short, the Probit model's findings show that the prior sale of a canoe resounds in significant but different ways within households' tangible and nontangible

¹⁹ The required assumptions for a Probit model were respected: regarding normal distributions, heteroskedacity, omitted variable bias, and multicollinearity. All analyses were run using STATA 4.0 statistical software. Some variables were normalized through the use of squared terms. To check for multicollinearity, all independent variables were regressed against all others; the adjusted R^2 values for each did not exceed 0.56. STATA also checks for multicollinearity, and eliminates offending variables.

²⁰ Indeed, one villager in Yapuwas used his earnings from canoe sale to buy the first chainsaw owned by a Tawahka. Chainsaw ownership could not be included in the analysis because of the excessively small sample size (only two are owned).

Table 6.3 Measures of Tawahka household wealth (1998) predicted by participation in canoe sale 1990-97 (Probit model).

Variable name	Variable description (household characteristics in 1998)	Sold canoe 1990-97 0=no; 1=yes	
		Coefficient ¹	Prob. ratio ² (binomial)
Intercept		-1.498	
MWORK	No. males (15-64 yrs) in hhld	0.611	0.222
FWORK	No. females (15-64 yrs) in hhld	-0.356	-0.129
DEPEND	No. dependents (0-14; >64 yrs)	0.169	0.061
RES DUR	No. years residence in village	0.022	0.008
HAGE	Age of male/female head	-0.098 **	-0.035
AVEDU	Mean yrs education, all >15 yrs	-0.228	-0.083
DEATHS	No. deaths in hhld, 1996-98	-2.079 *	(-0.661)
VEGA98MZ	Landholdings in lowland (ha)	-0.205 **	-0.074
CAC98MZ	Landholdings in cacao (ha)	0.941 *	0.341
COWT98	Head of cattle owned	-1.804 **	-0.654
SQCOW	(Head of cattle owned) ²	0.242	0.087
PIGT98	Total pigs owned	0.214	0.077
BALDE	Total buckets owned	0.584 **	0.212
RADIO	Total radios owned	0.759	0.275
QHOUSE	House quality code (1-9)	-0.281	-0.101
ADZE	Total adzes owned	2.823 **	(0.549)
RIFLE	Total firearms owned	1.317 *	0.477
SIERRA	Total cross-cut saws owned	1.311 **	0.475
NCANOE98	Total canoes owned	-0.168	-0.061
OWING98	Total Lempiras owed others	0.001	0.001
OWED98	Total Lempiras owed by others	-0.000	-0.000
KRS	Residence in Krausirpi (yes=1)	3.518 *	(0.919)
KRT	Residence in Krautara (yes=1)	4.934 **	0.569
YAP	Residence in Yapuwas (yes=1)	1.609	0.356
KAM	Residence in Kamakasna (yes=1)		
PAR	Residence in Parawas (yes=1)		
Total observations		89	
Observations at 0		29	
Observations >0		60	
df		24	
Critical Chi ²		72.53	
Pseudo R ²		0.592***	

¹ A one-unit increase in x increases the probability of $y=1$ by this many standard deviations.

² Change in the predicted prob. of $y=1$ for a one-unit change in the independent variable.

*, **, ***: $P < 0.10$, $P < 0.05$, $P < 0.01$.

asset profiles: households appear to invest canoe earnings towards accumulating 'normal' household goods like buckets, and in extractive technologies, and in agricultural intensification with an eye to cash cropping. And canoe sales may have been instrumental in averting household emergencies resulting in the death of members, perhaps by smoothing consumption through the rainy season, or by covering medical expenses. Prior canoe sale did not appear to significantly influence a household's overall education level, house quality, amount of debt held, or the wealth held in consumer luxuries such as radios.

Combined, these results illuminate several points about the short-term (i.e., from one to seven years) consequences of forest product sale by Tawahka households. First, they indicate that whether or not a household sold a canoe *can* have a statistically significant effect on what its members subsequently own, and, by extension, what they do. The finding that canoe earnings appear to have been invested in extractive technologies suggests that the Tawahka used canoe extraction as a means to further their involvement in the forest sector—at least for a time: all else held constant, the model also confirms earlier indications (see Chapters Three and Four) that *young* households are still those most likely to have recently engaged in canoe sale. Indeed, canoe sales seem to have spurred agricultural intensification, indicating that commercial extraction may provide a means for households to move out of extraction and into agriculture.

Second, the analysis' failure to isolate a link between canoe sale and subsequent educational attainment is probably more a construct of model design than a negation of the Tawahka's claims of the importance of lump-sum canoe sales in paying their children's educational expenses (AS; CS), probably due to the fact that earnings were invested in children old enough to no longer reside within the household, and therefore no longer influence intra-household education measures. Third, the negative relationship between prior canoe sale and cattle holdings is puzzling. Tawahka report that several canoes sold between 1990-98 were in fact bartered for cattle, and some of the most cattle-rich Tawahka households claim to have built their herds on canoe sale. The failure of a positive relationship to emerge from this analysis is likely due in part

to the fact that Tawahka use other means besides canoe sale to acquire cattle, and in part because this analysis' time frame is too short to capture the relatively long-term evolution of livestock wealth.

Life History Narratives

The Tawahka's own 'life history' narratives offer a means by which to redress the temporal and sampling constraints of quantitative analysis. This section summarizes data collected at the end of household interviews²¹ with male and female Tawahka household heads, towards examining the Tawahka's own interpretations of how canoe-derived earnings have shaped their wealth and well-being over the long term (n=40).²² A transcript of one such interview is presented in Appendix IX to illustrate the richness of these data, the multiple forest products *besides* canoes that influence household wealth accumulation, and, ultimately, the complexity of tracing the evolution of household wealth in forest societies.

Testimonies reveal that the importance of canoe sales to households has been predicated on two factors: the historic moment (*vis-à-vis* other activity choices) and the 'household moment,' i.e., the life cycle stage of the household, with particular regard to labour availability and land accumulation. As discussed in Section 6.2, canoe sale appears to have been most common during times of economic recession between periods of economic 'boom' (see also Table 2.9). During these periods, many Tawahka claim to have turned to canoe sale, or wage work in canoe construction, for lack of other ways to make money.

The consequence of such participation, however, appears to have been very much shaped by the prior experiences of the male household head (which in turn is a function of age), and the household's relative wealth at the time of sale. For example, four of the five households that owned small stores in Krausirpi during the mid-1980s

²¹ These informal chats were held at the end of more formal questionnaire-based interviews. If the respondent seemed interested, and if the interview context was favourable, I solicited their life story, emphasizing my interest in their economic pursuits and decisions over time. Also, when respondents owned cattle or rifles, I asked them to explain the providence of these specific household goods.

²² Obviously, data are biased to informants that I knew well and were therefore most open about their lives, and towards the relatively wealthy who were happy to talk about their roads to 'success.'

obtained their initial capital from selling canoes (RC; JD1; JD2; HH; MM). Although two eventually lost their stores to unpaid debt and prolonged medical expenses, three stores provided their owners with a 'leg up' into activities that were specific to that particular geopolitical moment on the Patuca: political positions, religious training, and the sale of beans to refugees. In contrast, several young men who sold large freight canoes in the mid 1990s also invested their earnings in the formation of small stores. With few other economic options available, however, they then drew from their stores' capital to open up new fields, to feed their young families, or to finance extractive trips when the inventory thinned (GC; JM; RO). In five cases out of six, the stores eventually failed, in part because although canoes provided important 'start-up' capital, these relatively young and asset-poor households did not have the collateral to keep them going as lean times continued through the 1990s.

Firearms and cattle are productive assets and important income sinks for which the Tawahka have traded forest products and gold throughout the 20th century (see Chapter Five). We can roughly gauge the relative importance of canoes in this regard from the individual acquisition histories of cattle and rifles/shotguns (see Appendix IX). For example, of the 37 Tawahka households that owned a firearm in 1998, 49% described the sale of a canoe as factoring at least in part in the firearms' acquisition. But only 15% of cattle-owning households claimed that canoe sale played a part in obtaining their beasts. These data, however, do not reflect the numerous times that cattle or guns were acquired in the past, and subsequently lost. For example, several Tawahka report having started or sustained a cattle herd by selling canoes, although through bad luck or ill health, have since lost or sold them all (GD; IM; GR; ES). These reasons may help to explain why qualitative analysis found only a weak relationship between canoe sale and subsequent cattle ownership.

Several Tawahka men testified to the importance of canoes in financing their children's education (RC; JD; AS; CS), which is one of the 'invisible', i.e., non-tangible ways in which canoe earnings are invested.

Often, testimonies suggest that canoe sales appear to have served no long-term purpose other than to sustain households through lean times by providing cash to buy

food and other 'ephemeral' commodities. In one case, a Tawahka claimed to have spent the 4000 L he had earned from canoe sale on a one-year drinking binge following the death of his wife (LS). Canoe sales also appear to have served to sustain ongoing activity choices. For example, one slightly older Tawahka man (who in 1998 had six children under the age of 13) began a small store in the late 1980s with his earnings from gold, and drew from his modest cacao orchards for his own family's expenses. Throughout the 1990s, he then cancelled outstanding store debts by having debtors help him make large freight canoes once or twice a year. With these canoe sales, he then financed the labour to expand this cacao holdings.

None of these pathways to asset accumulation were foolproof. Many Tawahka who planned to invest their canoe earnings towards long-term goals reported being thwarted by illness and bad luck: canoe sales intended for self-finance ended up as a means to self-insure. One man who sold nine freight canoes over eight years was able to buy some cattle, but later had to sell the cattle and keep producing canoes to finance treatment for his undiagnosed illness, a condition likely exacerbated by the onerous canoe work. Another paid for his tuberculosis medication through repeated canoe sale and cacao production; he claims that his good health is the only *recuerdo* he has of his forays into commercial canoe production. Another sold canoes only to pay to for treatment of his wife's blindness, and gave up when she proved incurable.

These oral testimonies nuance earlier findings that the Tawahka use canoe sale as a means to a) smooth income temporarily, until the next 'boom' comes along; b) finance movement into other activities; c) episodically sustain ongoing activities; d) as a periodic safety net in times of need. It is noteworthy that future commercial canoe production *itself* does not emerge as a desirable outcome of canoe sale, suggesting that few Tawahka perceive commercial canoe construction to be a long-term orientation. That is, few households appear to have, and fewer wished to, remain in canoe sales in the long term. The few households that *have* maintained canoe production as their principal economic activity for years perceive their continued involvement in the sector in terms of stagnation—proof of their inability to use canoe sale as a springboard into other activities. This 'negative' outcome is commonly attributed to

financial mismanagement, especially a cavalier attitude towards credit, and bad luck (FC; AS; IS). One of the most prolific canoe-makers of the 1990s put his long-term involvement in this way:

I see that [making canoes] takes a lot out of me, I sweat a lot, I have pains. I'm thinking that I'd like to make one more *cayuco*, to buy something—maybe a chainsaw!—and stay at home building a house. So I'm thinking of buying a chainsaw and dedicating myself to cacao, but I'm not sure how I'll make a living. There are many problems in making a *pipante*—life-threatening ones, like axe cuts.

Today, I don't want to make canoes any more, but I have to, because there's no other work. I always swear that I won't go to make another canoe. But my necessities always come first, and I always go back to make the same sacrifice (IS, May 1998, Krausirpi, *transl.*).

In sum, it appears difficult to ascribe any particular long-term or even short-term outcome to the sale of particular forest commodities such as dugout canoes. What a household derives from the sale of its canoe is conditioned by the timing of the sale with regard to larger economic cycles, the household's own circumstances at the time of sale, and luck. Overall, we might say that commercial canoe production *can* influence households' activity choices through facilitating certain types of asset accumulation (e.g., cacao, rifles), but that the degree to which this influence is sustained over time depends upon a host of local, historic, and household-level factors.

6.7 Future of the Patuca's Canoe Trade

The preceding discussion has illustrated the importance of canoes to the Tawahka over time. Canoes are both productive assets, which households rely on for subsistence pursuits, and marketable forest products, which have smoothed income streams in the past, and which Tawahka produce today to generate income, or which they may sell off in the face of pressing financial needs. Not surprisingly, 27% of households interviewed in 1998 (n=109) claimed to be planning to make a canoe the following year (see Appendix XI); 32% were undecided. Assuming that roads and alternatives to canoes remain few in the Mosquitia, the canoe is likely to continue to

provide such benefits to Tawahka households in the future. But as the Tawahka population explodes—internal growth rates throughout the 1990s exceeded 5% (see Chapter Two)—local demand alone is likely to increase exponentially if every household continues to aspire to canoe ownership. How will households cope, then, if evidence suggests that the trees needed to make canoes are becoming increasingly scarce?

There can be little doubt that Tawahka canoe builders today operate under conditions of supply-side scarcity not seen in the past. Evidence of such scarcity is both anecdotal and quantitative. For example, older Tawahka builders lament the need to go ever-deeper into extant forests to reach trees the size of which were once found along rivers' edge (ES 2). Already, 20% of builders seek new extraction sites because in traditional zones "*ya no hay palos*": there are no more trees (IS). Household-level data on canoe extraction show carvers using species once considered unacceptable in response to local scarcity of preferred species. And although overall production of canoes increased during the 1990s, the share of canoes made of high-quality mahogany decreased significantly. Of the 45 Tawahka households that claimed to have no plans to make canoes in 1998/99 (of 109 households asked the question), almost one quarter cited the local scarcity of trees as their reason.

This varied evidence points to the fact that local scarcity of good canoe trees is due to unsustainable rates of harvest by Tawahka themselves, either for canoes or construction lumber; agricultural practices also compromise local forests. As chainsaws become more common, pressure on forest resources may further intensify. Unfortunately, without data on natural tree densities, overall extraction rates, and species' replacement rates, it is impossible to empirically verify these claims.

In any case, the sustainability of Tawahka canoe production practices is a moot point, given the rates of forest conversion by colonists abutting and entering the TABR. Forests that the Tawahka have relied on for centuries are being cleared by outsiders for agriculture. This means that the traditional 'safety valve' in the face of local resource scarcity—simply going further/moving elsewhere—is curtailed by the advancing colonization front. If the rapid rates of colonization that characterized the

1990s (see Herlihy 1993, 1997) persist, traditional Tawahka extraction patterns will be severely compromised, as they are now being constricted. In addition, an emergent timber market—in which both Tawahka and colonists participate—has in the past few years begun to high-grade remaining forests for the very trees most suitable for canoe manufacture. Recent initiatives to curtail both colonist penetration of, and timber activities within, the TABR and similarly threatened buffer zones of the Río Plátano Biosphere Reserve are intended to curb the rate of forest and species loss (e.g., Proyecto BRP 1998).

In the meantime, Tawahka canoe makers must adapt to unprecedented and, in the short-term, irreversible, supply-side scarcity, that by any measure will increase over time. Combining data on past extraction with Tawahka's own views on the issue, I outline below eight scenarios by which Tawahka might adapt to supply-side scarcity, assuming that current infrastructure conditions on the Patuca persist.

Lower Quality Canoes

Recent decades have already witnessed a tripling of the number of species that the Tawahka consider appropriate for canoe construction. Carvers acknowledge at least three more species (*Cordia alliodora*, *Vochysia* sp., and *Ochroma lagopus*) as viable 'canoe' species, although as of May 1998 they had yet to harvest them for canoe construction. How many more of the 200+ tree species found within the TABR are potentially canoe-worthy remains to be seen.

By using a broader species range, Tawahka can temporarily sidestep the growing scarcity of the highest quality-trees. The trade-off is that canoes made from lower-quality trees must be replaced more frequently, potentially leading to depletion rates on a par with better species. This outcome is partially mitigated by relatively rapid growth rates of lower-quality trees compared with mahogany or cedar, and by the fact that some (e.g., *Schizolobium parahybum*) are frequently found in secondary forest.

Smaller Canoes

Comparison of modern and historic canoe sizes suggests no appreciable decrease in the width of canoes used, or sold, by the Tawahka. In other words, the Tawahka appear to be maintaining a size standard (of about 90 cm dbh), despite the increasing extraction costs of doing so. As trees of this diameter become increasingly scarce, it is foreseeable that smaller trees be harvested, resulting in smaller canoes (to a minimum of about 0.3 m beam). Such size constriction might compromise the multiplicity of canoe use, rendering family travel in a single canoe, for example, impossible.

Rising Prices

The potential effect that increasing tree scarcity might have on price is difficult to foresee. Although prices typically vary directly with scarcity of any given good, the price of large canoes in the TABR in fact appears to have decreased over time relative to consumer goods prices, perhaps in response to competition from suppliers on other rivers. In contrast, prices for small boats have increased markedly, although these are more likely to be made from lower quality, and thus, relatively abundant, trees.

Plantations

Of 84 households that I interviewed in 1996 about the composition of their lowland plantings, 32% had planted an average of 11 mahogany or cedar trees and were tending them in agricultural plots. They claimed to do so in order for their children and grandchildren to have wood to build their houses, and make canoes. In 1998, a regional NGO was promoting such practices by buying seed and establishing experimental plots. There is also a local precedent for successful cedar and mahogany establishment: in the 1980s, the UNHCR funded a project just downriver of the Tawahka, with the aim of replanting in hardwoods plots cleared by then-repatriated Nicaraguan refugees (COHDEFOR 1986). The trees were originally thought to require about 20-30 years before harvest, but the floodwaters of Hurricane Mitch may have wiped them out.

Canoe Maintenance

Some Tawahka boat builders have expressed interest in learning the rudiments of fiberglass repair. Those who have traveled to the Honduran coast have witnessed how fiberglass, in addition to glues and other techniques, can significantly extend canoe life. By investing in such forms of boat maintenance, the average two-year lifespan of Tawahka family canoes might be extended, sparing the need to harvest other trees. Nevertheless, Tawahka informants claimed in 1998 that levels of tree scarcity were not yet sufficiently acute to render such endeavors worthwhile.

Changing Construction Techniques

Several years ago, three Tawahka men were invited to participate in a workshop that taught them the basics of making canoes from wooden planks. The idea was to obviate the need for an entire tree when making one canoe. The techniques did not catch on: participants claimed that the tools and other materials necessary to make canoes in this way were prohibitively expensive, and that the technique was too time-consuming. Their training, however, may prove beneficial in the future.

Zoning and Management of the TABR

Inclusion of the Tawahka Reserve into the broader management strategy being developed for the Río Plátano Biosphere Reserve has meant that the Tawahka may in future be subject to community-defined controls on forest use (see Herlihy 1999). Such controls may include permitting extractive activities only in certain zones, and a regularization of harvest rates among households. In 1998, for example, it was proposed that Tawahka households only be allowed to harvest trees intended for personal, family canoes (Proyecto BRP 1998). If *batu* construction for sale is abolished, then, some Tawahka households would potentially suffer from reduced income streams. At the same time, the burden to adapt would be placed on the buyers of large canoes, who are typically non-Tawahka.

Already, several forms of community-imposed restrictions exist to curb excessive canoe harvest; they might be gainfully invoked in the enforcement of new

Reserve management rules. One form of community censure is 'taboos' against overharvest. Tawahka believe that canoe trees, like other forest resources, have a *dueno*, or owner. People perceived to be harvesting too many trees—especially if they are intended for personal profit—are reminded that the forest spirit may retaliate by causing bad luck to befall the carver or his close family. The recent deaths of two prominent canoe carvers—apparently to trichinosis and cholera—have been interpreted in these terms (IS). Another form of socially-imposed restraint on excessive canoe extraction is the tacit withholding of gifts to Tawahka households perceived to be too 'greedy.' If a *pipantero* is seen as becoming "too rich" from his efforts, his household will receive fewer gifts of meat; he will have fewer opportunities to borrow tools, or buy on credit at local stores. Although such communal reprimands may first encourage *pipanteros* to invest their earnings socially (in drinking bouts, meat-sharing etc.) they may also persuade them to ease up on canoe construction in the first place.

Also, canoe exports from the TABR began to be taxed in 1996 by AFE-COHDEFOR representatives in Wampusirpi and Barra Patuca. In 1998, Tawahka were charged tax on six large canoes exported downriver (a sum equivalent to about 5% of their final sale price) by the recently incorporated *municipio* at Wampusirpi. Such fees are likely to be levied more frequently once a AFE-COHDEFOR office is permanently established within the TABR. Such strategies may discourage Tawahka carvers from canoe export in the face of lowered profit margins.

Impoverishment

A final way for Tawahka households to 'adapt' is to become poorer. In 1998, 7% more Tawahka households were canoe-less than were in the late 1970s (Calix and Cruz 1977). This proportion may increase as the cost of obtaining canoes rises with scarcity. The first households to suffer would likely be those already poorest, usually those headed by single women with few resources to buy canoes. Borrowing neighbours' canoes can redeem for such households the productive functions of a canoe, but the insurance role played by family canoes is compromised if the family has

none. Thus ‘canoe poverty’ may effectively decrease the options for households in times of need.

Overall, then, it may be premature to predict the decline of traditional canoe making by a group that has defined itself culturally partly by this activity. As long as rivers remain the main transportation thoroughfares in the Mosquitia, Tawahka-made dugouts will likely be used on the majority well into the future. What these boats will look like, where they will come from, how well they will be maintained, and who will own them, however, will reveal much of how Tawahka adapt to forest resource scarcity.

6.8 Lessons from the Mosquitia Canoe Trade

The previous two chapters have used primary historical sources, field observation, household survey data, and oral history interviews to paint an economic picture of an obscure forest good in a remote region. Many of the details of the canoe trade are unique to the Mosquitia, and even there will likely endure only in geographic pockets such as the Patuca River basin, where roads have not yet eclipsed rivers as the veins of economic activity. Nevertheless, the story of canoes and their commerce offers important insights into the nature of rain forest economies over time, and how we perceive the role of forest products to rural peoples in developing countries.

First, evidence from the Mosquitia’s canoe trade helps to nuance our understanding of how ‘boom-and-bust’ economic patterns in rain forest settings—seemingly foreign structures imposed on commercially naive populations—are in fact often complemented by, and sustaining of, local systems of exchange. For example, the extractive infrastructure that is most prominent in ‘boom times’—i.e., a chain of debt and credit linking buyers with remote and scattered labourers—need not necessarily be viewed as a construct of foreigners. In the Mosquitia, for example, the system by which foreigners drained rubber and other forest products from the region in fact mimicked a long-standing historical pattern of coastward trade in which canoes

were obtained by a regional elite (the Miskito) from interior suppliers (the Sumu). While 'booms' were underway, historical narratives indicate that trade in local goods such as canoes could be integrated into payment systems (see Section 6.1). When booms turned to busts, these economic structures could then be wholly reclaimed by local peoples for regional trade in goods such as canoes.

The compatibility of local and export-oriented trade is further evidenced in the Tawahka's historic experience. For example, the Tawahka's transition from export-oriented extraction of *tunu* to the production of canoes for regional markets was made easier by their ability to modify 'boom'-time credit relationships in order to finance canoe extraction trips.²³ Other scholars of indigenous economies have also argued that there is an organizational continuity between 'foreign' and local trade networks (e.g., Hugh-Hones 1992).

I propose, then, that evidence from the Mosquitia's canoe trade, both past and present, counters claims by Mosquitia scholars that bust conditions equate to the virtual absence of market activity among remote rainforest societies (Helms 1971; Nietschmann 1973). Rather, evidence from the canoe story suggests that, rather than regression to subsistence alone, bust periods can signal the stimulation of *regional* trade, which among the Tawahka clearly helped maintain householders' income continuity through time.

Indeed, data regarding the *outcomes* of canoe sale by Tawahka households indicate that interstitial, non-boom times are as likely as 'boom' periods to be the times when local people accumulate the productive assets that later correlate to increased household wealth. Indeed, my interpretation of Tawahka testimonies suggests that 'bust' conditions may stimulate accumulation by individual households. This counterintuitive result appears to be due to the combined influences of human nature, group dynamics, and local peoples' perception of their economic future. Tawahka men testify, for example, that they were wont to immediately cash in their

²³ Indeed, in some cases, the very *contratista* hired by foreign companies to process forest produce became the middlemen who purchased Tawahka canoes for downriver sale.

relatively exorbitant boom-time incomes on ephemeral luxuries such as rum, fashionable clothing, and radios (SO; ES2, CC; DC; von Hagen 1940).²⁴ Other data show that even when Tawahka did use boom-time earnings to buy more durable, productive goods such as rifles and cattle, the feeling of *largesse* and never-ending prosperity meant that they were rarely held onto for long (e.g.: “*Cuando abundaba el pinto, no me importaba gastar*” (ES2)).²⁵ In short, I argue that ‘boom’ times may be characterized by the easy *acquisition*, but not necessarily *accumulation*, of household assets.

In contrast, ‘bust’ periods seem to drive accumulation in some forms of productive assets (i.e., extractive technology, agricultural intensification, but not in land area), for a number of reasons. First, with no one activity ‘overdetermined,’ households appear to diversify their market production into activities requiring more individual forms of enterprise, such as commercial canoe production. With the production unit shrunk from the group to the household, the social pressure to spend earnings communally is decreased. This may explain the strong correlation between prior canoe manufacture and later gun/rifle ownership. Furthermore, the scarcity of cash relative to boom times means that barter becomes the key medium of exchange. In the case of canoes, the one-to-one barter ratio for guns or cattle renders the ability to squander earnings relatively difficult. Finally, residents claim to feel relatively poor during bust periods, and, as everywhere during times of perceived economic recession, are less inclined to liquidate savings.

Third, this study found evidence of consistency in canoe valuation through time, and a constancy in the fundamental dynamics of canoe exchange (e.g., the

²⁴ For example, a participant in the brief gold ‘boom’ of the late 1980s claimed he worked to pay “only the cost of the *guaro* [rum]” (ES). It is especially noteworthy that *tunu*, *chicle*, and *rubber* production were fundamentally social activities, in which groups of ten or more men worked for long months together (see Offen 1998), and so tended to spend their earnings in *socially*-oriented ways upon their return: work parties in the forest segued into drinking bouts in the village. A modern example of this same phenomena occurred during 1998’s ‘mini-boom’ in mahogany lumber. Forty Tawahka men earned relatively astronomical wages guiding rafts of mahogany down the Patuca, during which they suffered dehydration, malarial episodes, and debilitating fungal infections. Yet upon receiving their wages at their final destination, the coastal town of Barra Patuca, the majority engaged in a three-day drinking spree such that some lacked money for the fare home. Of 40 men hired as raftsmen, only one bought a cow with his earnings.

²⁵ “When money was abundant, I thought nothing of spending [it]...” (ES2).

enduring importance of barter) for at least the past century. I therefore nuance Nietschmann's (1973) and Helms' (1971) theses that an increase in market-based orientation by local people, especially through the increased use of money, must necessarily undermine indigenous exchange systems and engender increased reliance on a foreign, cash-based economic system.²⁶ While this may be true for goods for which export and local markets *compete* (e.g. turtlemeat), and is perhaps a prevalent pattern where indigenous groups interact *directly* with outsiders, I argue that the inevitability of this process is strongly dampened for goods with exclusively regional markets, especially in the hinterland of regions already at the periphery of world markets. For example, the Tawahka's increased involvement in the national economy in some spheres (e.g., cacao) has not inevitably led to the erosion of traditional barter arrangements or the 'capitalization' of exchange when it comes to canoes.

In the context of conservation/development initiatives, this study's main contribution is to demonstrate how a close examination of a temporally steady, regionally-based and largely autonomous market system, such as the one by which canoes are traded in the Mosquitia, can reveal much of how, why, and when local peoples turn to forest goods and local trade networks to meet their needs over time. This information should prove particularly useful to organizations and governments involved in improving the well-being of forest dwellers through various forms of market development (from credit provisioning and infrastructure development to vocational training). Especially in light of donor focus on *community*-led development, it would appear that *indigenous* trade networks provide the most apt templates for the long-term success of rain forest product marketing schemes.

²⁶ This finding should also resound with the many other studies of forest product marketing that also report the 'infection' of traditional exchange systems with "short-term competitively established relationships of expediency" (de Beer and McDermot 1996:105).

CHAPTER SEVEN

Conclusion

This dissertation has examined the importance of forest product sale in the livelihood strategies of a Central American forest people, the Tawahka Sumu. The Tawahka are a small indigenous group (pop. 1,000 in 1998) living along the mid-Patuca River in Honduras' eastern rain forest. Initial evidence about the importance of commercial extractivism to households there was ambiguous. On the one hand, Tawahka claimed categorically that "in the forest is our money."¹ On the other, visitors to Tawahka communities readily note that villagers earn market income from a variety of *non*-forest sources; some households rarely set foot in the forest. In this dissertation, I have set out to resolve this apparent inconsistency by identifying *when* and *why* individual households turn to forest product sale. The question is important because of recent interest in forest product marketing as a means to raise rural incomes while conserving threatened rainforests. But the uneven success of this now widely-promoted practice has been attributed to our poor understanding of *extant* market-oriented forest extraction and the relative place it holds within forest peasant livelihood systems. Efforts to date have documented the diversity and flexibility of peasant production within and between communities. This study adds a Central American example, and offers an unusual longitudinal approach to the problem by analyzing within-year and between-year patterns of forest product sale. In doing so, I demonstrate that a hybrid conceptual approach—borrowing insights from diverse fields, including cultural ecology and neoclassical household economics—is particularly well suited to grappling with the peculiarities of forest peasant economies (e.g., high degree of environmental uncertainty, land abundance, and thin labour pools) that challenge conventional economic interpretation. Below I summarize the specific findings of

¹ My translation of a comment made by Tawahka villager IS at a BRP meeting in Krausirpi, March 1998. The original remark, in Miskitu, is: "Yawan lala barsa, untara."

each of the foregoing chapters, then discuss the common themes that unite each into a comprehensive whole.

Chapter Summaries

Chapter Two combines 27 months of field observation of Tawahka village life with insights from a growing corpus of published material on the Tawahka to establish the basic parameters in which Tawahka livelihoods were circumscribed in the late 1990s. I found that the Tawahka share much in common with other neotropical forest peasantries, particularly in the details of their subsistence pursuits and in some aspects of their social and labour organization. The Tawahka are distinguished, however, by a particularly rapid internal growth rate; data suggest the Tawahka population will double within 15 years. This mounting demographic pressure combines with increased territorial circumscription of the Tawahka homeland by agricultural colonists to challenge the long-term ability of the Tawahka to manage their lands sustainably.

In Chapter Three, I laid out the process by which interview data, drawn largely from informant recall of market transactions, can be summoned to identify patterns of forest use, reliance, and specialization. Drawing from a survey of 88% of Tawahka households ($n=116$) for the year 1997-98, I show that the Tawahka as a community earned some 18% of total market income from the sale of forest products; the balance was derived from wage work, gold panning, petty trade, livestock sale, and the sale of agricultural produce. Both within and between villages, however, individual households engaged unevenly in commercial extraction. In 1997-98, only 62% of households sold forest products; dependence—or 'reliance'—on the sector varied from 0-93%, and showed significant positive correlation to overall earnings from the sector. Furthermore, I distinguished reliance on commercial extraction from *specialization* in the sector, which among Tawahka households appeared rare. The household-level heterogeneity in market behaviour that I found among the Tawahka complements similar findings among forest peasants in the Amazon and elsewhere. A unique contribution of Chapter Three is the comparison of market income data across years (1994, 1995, 1997). Results show that as a people, the Tawahka's market activity mix

and income distribution patterns remained remarkably steady across years. Group-level continuity, however, masked considerable portfolio shuffling by households over time. Indeed, I found that only one household in a subsample of 48 had sold forest products in each of the three sample years. The implication of this longitudinal analysis is that forest extraction by individual Tawahka households appears to be a highly elective activity driven by factors that change between years, rather than a long-term strategy of income generation.

In Chapter Four, I then applied more advanced analytical techniques to the survey data to identify what household-level factors best explained: a) when households participated in commercial forest extraction, and b) the degree to which they relied on the sector. Results suggested that households turn to commercial extraction to cope with certain types of misfortune but not others, and that young households were more likely to engage in the sector. Demographic constraints on commercial extraction appeared to include lack of access to extra-household labour, and status as a single mother. Different types of wealth (e.g., those held in physical assets, in extractive technology, or in land) were shown to influence households' extractive involvement in distinct ways.

The analytical eye of Chapter Five and Six then focused on one forest product in particular: the dugout canoe, while deepening the temporal scope of analysis by several hundred years, to offer an historically informed analysis of the product's production and trade over time in the Mosquitia. In Chapter Five, I introduced the product and described its importance to local peoples as a productive asset and as collateral. Drawing from participant observation and household survey data, I outlined the steps in canoe manufacture and highlighted the constraints on production, including supply-side scarcity, as well as the cultural significance of the activity. In Chapter Six, I examined the Mosquitia's canoe trade from its evolution from the 17th century to its modern expression on the Patuca River. To do so, I interpreted an array of historic texts, oral history data, focus group interviews, and household survey data collected between 1995 and 1998. The analysis shows how trade patterns evolved apace with the region's changing ethnic composition and biogeographic parameters. I

showed that canoe sale remains an important way for Tawahka households to purchase desired consumer goods, and also to self-insure and self-finance; the results serve to bolster and nuance the more general findings of Chapter Four with specific example.

Each chapter, then, has contributed a distinct insight to the role of forest resources in Tawahka livelihoods over time. But within the topical and analytical specifics of each chapter are common themes, issues, and methodological directions that may resound with recent attempts to encourage the development and conservation of forest peoples throughout the neotropics in general, and within the newly-created Tawahka Asangni Biosphere Reserve in particular. I discuss these common findings below, and, where appropriate, refer to the specific chapter from which an insight was gleaned.

Principal Findings

1. Forest Product Sale as ‘Natural Insurance’

This dissertation offers considerable evidence that the *ex-post* insurance function of the forest to forest peoples—a tenet well illustrated in the case of subsistence activities but lacking empirical examination within market production—prevails among the Tawahka, at different temporal scales.

I show, for example, that forest product sale may become particularly important to forest peasantries during ‘bust’ times—that is, the long periods between ephemeral, export-oriented ‘booms’ (Chapters Two and Six). During busts, households fan out their production portfolios, and the sale of forest products within regional markets at this time can become relatively important in smoothing income across and within years. Where ‘boom’ economies have been oriented to the extraction of forest resources, I propose that in subsequent periods of economic recession, the continued sale of forest products—albeit at low levels and intra-regionally—acts as an attractive economic activity for households just emerging from a ‘boom’-time economic orientation. In other words, commercial extraction offers a form of ‘employment

insurance' during the periods of recession that have characterized the Patuca basin's economic history (Chapters Two and Six). I also present evidence suggesting that forest product sale offers a form of *ex-post* insurance to households over shorter time scales. For example, analysis of household-level data from 1997-98 shows that households sell forest products to cover the costs of asynchronous misfortunes such as illness among family members and crop shortfall. In this regard, the short production interval of forest products is an attractive feature of the sector.

These results suggest that conservation and development initiatives that seek to either deter or encourage certain forms of market-oriented forest use might best envision forest dwellers' interest in the sector as predicated on household circumstance or on the greater cost-price environment, rather than on any particular attribute of the resource itself. Influencing 'external' factors such as availability of credit or crop insurance, then, may offer the most concrete way for conservationists to steer forest peoples' extraction patterns in desired directions.

2. Interconnectedness of Commercial Extractivism and Household Wealth

Findings of this study also offer further evidence of the interconnected nature of activity choice (specifically, commercial extraction) and different forms of household wealth. I show, for example, that wealth held in physical assets—even when its accumulation dates from *prior* engagement in commercial extraction—decreases the likelihood of that household returning to the forest as a source of market income (Chapter Four and Six). The finding points to the 'up-and-out' nature of commercial extraction: although the sector provides a means to accumulate wealth, participation at any given point appears to decrease chances of future involvement. The obvious exception to this pattern, however, is households that have accumulated in *extractive* technology, and who were found to be significantly more likely to participate in, and rely on, forest product extraction.

Furthermore, the study shows that all else held equal, households with little prior experience in extractivism are those *most* likely to extract for commercial sale,

and those most likely to rely on the sector (Chapter Four). Conversely, households with greater wealth in extractive knowledge (as proxied for by experience in canoe-making, age, and length of residence in a given area), appear to eschew extraction as a means to generate market income, often remarking on the physical hardships of forest work (Chapters Four and Five). This result urges recognition of the disjuncture between reservoirs of 'indigenous knowledge' (the old) and those most likely to need that knowledge in pursuit of commercial extraction (the young). For NTFP marketing initiatives to assume a common level of enthusiasm among all households in forest product extraction would be to ignore the complexities of market activity differentiation within forest peasant societies.

3. Household Reliance on Forest Product Sale and Pressure on Forest Resources

Patterns of forest reliance identified in Chapter Three and Four indicate that a strong relationship exists between a household's *reliance* on commercial extractivism (i.e., the contribution of the sector to a household's total income) and the total amount of income earned from forest product sale; in other words, forest extractors appear to respond to economies of scale. But this result should be interpreted with care, for several reasons. First, total income earned from the sale of forest products should not be interpreted as a proxy for a household's pressure on forest resources, because of the vastly varied nature and value of forest goods. Second, for any given household, the link that I identified between reliance and 'input' is highly ephemeral. I show in Chapter Three that households move easily into and out of the commercial extraction, in response to specific needs and constraints. Thus a reliant household today is not likely to be so tomorrow. For these reasons, attempts to monitor, curtail, or zone specific forest areas for specific uses—such as those planned for protected areas in the Mosquitia at present—or identify particularly 'heavy' user groups, need to be based on long-term measurements of forest use that clearly distinguish the type and duration of use at the household and community level.

4. Continuity in Forest Peasant Economies

Evidence from this study indicates that the economic experience of forest peasantries is characterized by a greater degree of continuity between traditional exchange systems and 'market economies' than is commonly recognized. For example, Tawahka testimonies suggest that during the periods of their greatest 'integration' into the world economic system—as suppliers of extractive products during 'boom' times this century—the organization of production was built upon, and reinforced, traditional patterns of (canoe) exchange in the Patuca basin. These patterns of exchange in turn reflected centuries of prior canoe trade in the Mosquitia (Chapter Six).

Second, I show that kin ties and cultural affiliation remain important in how Tawahka earn money today, as they have done historically, contrary to suggestions from other scholars that inter-personal ties and cultural norms are eroded by increased involvement in modern markets (Chapter Two; Chapter Six). Third, the Tawahka's experience of monetization is far from uni-directional. Rather, locals characterize times of money glut versus money poverty, using linguistic terms that evoke the ebb and flow of a natural resource.

In sum, I find that the Tawahka *have* "been able to adapt to and even take advantage of capitalism without losing their historical specificity as noncapitalist producers" (Korovkin 1997:89). This study therefore suggests that analyses of economic 'integration' by remote rural societies (e.g., Godoy *et al.* 1997a; Sierra 1999) would benefit from a more nuanced conceptualization of how forest peoples engage with local, regional, and international economies. Among the Tawahka, what may appear to be a spectrum of economic integration among communities and households in fact masks, at both levels, a common history of intense past involvement in the international economy as producers. For researchers to overlook such historic experience among rain forest peoples is to underestimate their economic sophistication and the fundamentally flexible and adaptable nature of their income-generating systems.

5. 'Indigenous' Economies

Throughout the dissertation, I refer to the Tawahka, a small indigenous group with a distinct language and cultural identity, as 'forest peasants.' I do so because, as Chapter Two shows, many aspects of the Tawahka's livelihood system aligns them with non-indigenous forest peasants throughout the Middle and South American tropics, such as the *ribereños* or *coboclos* of the Amazon. Traits in common include a livelihood system based on a diverse mix of subsistence activities and production for market exchange (a trait by which 'peasants' are defined; see Ellis 1993); a long history of inter-ethnic mixing with Iberian peoples, or *mestizaje*, and resultant familiarity with the Spanish-speaking world; and a long history of intense—if sporadic—integration into international economies as producers. In addition, the economic environment that prevailed on the Patuca in the late 1990s mimicked that of many remote forest societies, characterized as it was by relative land abundance but lack of formal land markets, few formal ways of holding wealth, thin or absent credit markets, high transaction costs, and impeded access to price and product information (Chapters Two and Four).

These commonalities provide a basis for comparison of the findings of this study to research conducted among other forest groups, be they recent colonists (e.g., Pichón 1996; Murphy *et al.* 1997) or long-established forest 'peasantries' (e.g., Coomes 1996). But empirical evidence from this study *also* points to two areas in which Tawahka economic behaviour appears distinctly 'indigenous'—that is, informed by cultural traits less noticeable among non-indigenous forest groups. First, the Tawahka display a strong reliance on kinship networks, especially those accessed through maternal ties, when determining activity choice and emphasis (Chapter Four and Five). The importance of such extra-household labour is accentuated in the Tawahka case by the extreme youth of the population, a situation which in itself is arguably a result of the Tawahka's specifically indigenous experiences this century (Chapter Two): because Tawahka household composition is weighted strongly towards children ('consumers'), adults ('producers') must look elsewhere for adult labour.

Second, and closely tied to the first point, this study offers evidence of significant pressure on Tawahka households to invest market earnings socially. I found Tawahka hesitant to invest in ostentatious wealth (in part because neighbours are quick to 'demand-borrow' idle canoes, land, and other assets), quick to demand cash for work that will result in cash (Chapter Five), and liable to spend cash earned in groups in social drinking bouts.² Furthermore, the Tawahka's remarkable social tolerance of the most overt theft (Chapter Two) suggests communal sanction on 'redistribution.'

I contend that a propensity to invest socially has influenced the Tawahka's economic choices and resultant resource use in three ways. First, I found a low correlation between past income windfalls (especially those earned during 'boom' times) and any significant asset accumulation; conversely, there appeared to be a close correlation between some types of household wealth and the less conspicuous earnings derived from individualistic market activities (Chapter Six). Second, I found evidence of community censure on obvious overharvest of forest products intended for sale (Chapter Five). Third, tolerance of crop theft is ultimately paid for by the most experimental farmers whose crops are asynchronous with, or distinct from, their neighbours'; crop theft can therefore considerably dampen 'expert' farmers' enthusiasm for agriculture, and perhaps encourage engagement in other types of activity.

Combined, the insights of this study point to how the Tawahka can be both 'typical' forest peasants *and* combine distinctively indigenous traits. This nuanced view of the role of cultural factors in forest peasant production offers an empirically-based middle ground to the polarized debate on the existence of distinct forms of 'indigenous' economic organization (e.g., Bedoya 1995; Simmons 1997).

² A pre-Columbian characteristic of neotropical lowland peoples that is well documented historically among the Tawahka, rather than an outcome of trade-induced access to alcohol.

6. Methodological Directions

Here I describe three methodological strategies that run throughout the dissertation, and outline what they may offer to future work with forest peasants. First, interpretation and analysis was informed by the Tawahka's own views and comments, which I recorded *verbatim* when possible. I did this primarily to better ground discussion in 'real-life' voices from the study site, but the technique also served to illustrate that local peoples are self-conscious actors in the process of development. For example, I show that Tawahka explanations for observed economic phenomena were repeatedly borne out by my 'objective' analysis. The result adds voice to ongoing efforts to better incorporate the wealth of local human capital into efforts at conservation and development (e.g., Herlihy 1999).

Second, I show ways in which the shortcomings of the household as an analytical unit can be overcome, particularly with regard to the household's imperfect capture of *inter*-household labour and asset flows and *intra*-household conflicts. For example, I show that extra-household labour variables have predictive power in explaining in-house activity choice, and I show that distinguishing the gender of the household head is helpful in understanding production patterns. On the other hand, the attractiveness of the household as a discrete, observable unit *does* appear to accurately reflect how some assets are held within forest peasant communities. I found evidence that productive assets—and the activity choices they facilitate—do 'attach' to the physical space of particular households, contrary to field perceptions of asset lending. Finally, the predictive strength of house quality (a proxy for tangible household wealth) in explaining income patterns suggests that physical capital may indeed concentrate in the physical space of the household. This finding may explain why activity choice remains static even among households experiencing significant demographic change.

Third, I demonstrate throughout the dissertation ways in which longitudinal data may be incorporated into studies of forest peasant livelihoods. In so doing, I extend the 'snapshot' approach that has characterized studies to date, and show that

historically grounded depictions of forest peasants offer a better template for successful long-term development projects.

In sum, then, this dissertation shows that forest peoples such as the Tawahka are indeed capable of marketing forest products, and do so in an array of circumstances and under various constraints. Conservation and development initiatives, however, would be misguided to promote this particular form of market activity without recognizing that local communities have other economic options, including ones preferred over the hard work of rain forest extraction. Indeed, the heterogeneity of forest peoples' production activities, both today and over time, testifies to their adaptability to a challenging physical, and isolated economic, environment. Illustrative of this livelihood adaptability is the following testimony of a 45-year old Tawahka man as he reflects on his experience with the market economy over time; his words also allude to what this dissertation describes: the highly *contingent* nature of forest extraction in meeting smallholders' needs.

I've made money with [wild animal] skins, and I've lost money; I've made money [from panning for] gold, and lost money... This is what it's like, things to do with money... I look as I go along. For next year, I'll try to plant maybe one [ha] of beans. But if it doesn't work out, I'll have nothing more to do with beans. Because I see I have no luck. It's been two years that I don't get any yield. Better that I leave beans and try something that pays off...

One time I planted maize. You should have seen it—what a field! But in the end, a [neighbour] set it on fire [by accident]—it was the dry season, and it all burned on me. I lost everything....

So, I go [along], trying all sorts of work, to see which one works out, and to dedicate myself to that.

Now, I think I'll try this lumber work of Aurelio's. I can say: 'Look, cousin, let's go and get out some wood—maybe 5,000 [cubic] feet.' But I'll have to see. If I get a profit from it, well, I'll have to continue. But if it doesn't work out, why would I continue? *Batallar, batallar—por de balde* [Struggle, struggle—for nothing]. In everything, it's much better to try, and be convinced, as they say (UM, Krausirpi, May 1998, *transl.*).

Appendix I

Facsimile of agreement between the Harvard Institute for International Development (HIID), and research associates of the 'Honduras Forests Project,' 1996.

Appendix 2 - Data access and authorship agreement

Data Access, use and publication agreement

From: Ricardo A. Godoy, Nick Brokaw, and David Wilkie
To: Kandra McSweeney, Adoni Cubas, Glenda Cubas, Han Overman, and J. Demmer.
Date: February 26th 1996

The members of the HIID Honduras Forest Project (R. Godoy, P.I.) by signing below agree to the following project research data access, use, and publication conditions.

1. All project related data (see list below) will be provided to the P.I. (R. Godoy) by all project members (see list below) not later than 2 weeks after the end of the field data collection phase of the project.
2. All project related data will be integrated into the project's master database in Boston.
3. All project members will receive from the P.I. a complete and identical copy of the project's master database that covers all calendar months of their formal association with the project. Members will receive the database copy no later than 1 month after all project related data are received by the P.I.
4. Pertaining to the writing, authorship and publication of peer reviewed journal articles, books, book chapters and popular papers and the presentation of papers at meetings and conferences that make use of information extracted directly from the project master database or from primary datasets from which the master database was created:
 - a. All project members agree to provide all other members with an outline of any proposed publication or presentation in a timely manner sufficient that all project members can, if they wish, comment on the content of the proposed publication or presentation and/or agree upon authorship rights, prior to submission of the paper for publication, or its presentation at a meeting or conference. within two months
 - b. All members will acknowledge the source of funding for the project in all publications and presentations and will acknowledge other project members contributions when appropriate.
5. No raw or unpublished tabulated data from the master database or from the primary datasets, from which it was created can be given to any non-member without prior agreement of all project members.
6. Students will have 2 years starting on January 1st 1997 to use the results of the data to complete their theses or publish results. If, after two years, students do not have finished their theses or do not have fairly complete manuscripts that show substantial progress in analyzing the data. N. Brokaw, D. Wilkie, and R. Godoy

will decide what steps to take so that the information gets analyzed.

Project Members

Name:
above
Ricardo Godoy
Nicholas Brokaw
David Wilkie
Han Overman
Jose Demmer
Adoni Cubas
Kendra McSweeney
Glenda Cubas

by signing I agree to the conditions

Ricardo Godoy
Nicholas V. Brokaw
David Wilkie
Han Overman
Jose Demmer
Adoni Cubas
Kendra McSweeney
Glenda Cubas

Project Related Datasets

Animal Names
Assets
Cash Income
Daily Event Calendar
Data Codes
Data Dictionary
Demography
Departed SUBID
Education Level of Parents
Fauna Transects
Focal Follows
Focussed Focal Follows
Foraging Returns
House Valuation
Lifespan and Value of Goods
Marginal Value of Foraged Goods
Plant Transects
Plant Names
Rainfall and Temperature
Scans
Suita Productivity
Value of Non-priced Goods
Value of Priced Goods
Wage Labor
Weighdays
Pipante Data - points 1, 2, + 3 not applicable
Hunting Diaries

c:\work\contract

Appendix II

Facsimile of *constancia* from FITH/Asang Launa giving permission to conduct research in Tawahka communities, 1997.



PRIMERA CLASE
UN LEMPIRA
1996-1999

Nº 4614045

CONSTANCIA

1	
2	Por la presente la Federación Indígena Tawahka de Honduras (FITN) y la Asocia-
3	ción "ASANG LAUNA" órgano político y la instancia técnica ambientalista el se-
4	gundo, ambos organismos con personería jurídica, en nombre del pueblo tawahka
5	asentados en el oriente de Honduras HACEN CONSTAR: Que KENORA MCSMENEY de na-
6	cionalidad canadiense convivió con nuestras comunidades aproximadamente dos (2)
7	años, por lo que le guardamos un enorme respeto, cariño y confianza.
8	Nuestros lo abajo firmantes en representación del pueblo y de las organizaciones
9	tawahkas AUTORIZAMOS: a la señorita MCSMENEY para que promueva y divulgue la -
10	situación crítica en que vive nuestro pueblo actualmente, utilizando cualquier
11	medio.
12	También queremos que busque apoyo técnico y financiero para apoyarnos en nues-
13	tros proyectos de desarrollo.
14	KENORA MCSMENEY ha sido nombrada "Miembro activo de la Asociación "ASANG LAU-
15	NA" en su última reunión. Esto le faculta a establecer una oficina de contacto
16	y la coordinación de un comité de solidaridad con el pueblo y la "RESERVA DE LA
17	BIOSFERA TAWAHKA ASANGUI.
18	Esta autorización tiene valor y efecto por un período de cinco (5) años a par-
19	tir del primero de julio de 1997 y para los fines correspondientes de interés
20	particular, se firma la presente constancia en Krausirpa, DEPTO DE GRACIAS A
21	DIOS, río Patuca, Honduras, a los treinta días del mes de junio de 1997.
22	
23	
24	
25	



EDGARDO BENITEZ

ISIDRO MARTINEZ

1		
2	COORDINADOR EJECUTIVO	REPRESENTANTE DEL CONSEJO
3	ASOCIACION ASANG LAUNA	DE ANCIANOS TAWAKAS
4		
5		
6		
7		
8		
9		
10		
11	Dirección: Asociación Asang Launa- FTTH	
12	Apartado postal No. 4245	
13	Temucigalpa, Honduras CA.	
14	Tel-Fax (504) 37-75-43	
15	E-mail:	
16	Tawahka @ Asangni. Sdnhon. org.hn	
17		
18		
19		
20		
21		
22		
23		
24		
25		

Appendix III

Questionnaire administered to 116 Tawahka households, February-May, 1998.

Encuesta 1998

Numero _____ Fecha _____

1. Pipantes/ cayacos 1996-1998:

I

II

III

Fecha _____

Spp _____

Ancho/Largo _____

Nombre del lugar _____

Dist. pip/pied _____

Porque allí _____

Impuesto? _____

Contratado? _____

Quien _____

L valor _____

Valor cosas _____

Porque ud.? _____

Porqué lo hizo? _____

Carbiar: # pp _____

días _____

porque _____

Rastrar: # pp _____

días _____

porque _____

Vendido? Detalles: _____

Porque? _____

2. Para pipantes regalados / encontrados / comprados 1996-98:

Fecha _____ Edad de pip. _____ Spp _____ Ancho/Largo _____

Detalles de compra, etc.; Porqué?: _____

3. Para pipantes perdidos: vendidos / regalados / aruinados 1996-98:

Fecha _____ Spp _____ Ancho/Largo _____

Detalles de venta; Porqué? _____

4. Si ayudó hacer pipante ajeno en último año:

Fecha _____ Trabajo particular _____ Días _____

Acuerdo: _____

5. SI / NO , tiene la idea de hacer pipante para vender?

Porque si/no _____

Donde va ir _____

Mejor puesto? _____

Porque diferencia? _____

La última vez que prestó pipante,

6. DE QUIEN _____

Frecuencia: _____

Acuerdo: _____

7. A QUIEN? _____

8. a. _____ hacha b. _____ balde c. _____ serrucho a mano d. _____ sierra
 e. _____ batea f. _____ martillo g. _____ radio h. _____ rifle/escopeta***
 i. _____ motosierra j. _____ awil k. _____ adze l. _____ perro
 m. _____ molino n. _____ canaleta o. _____ motor

***Tenía antes? SI / NO Qué pasó?

10. Misma casa/lugar desde Marzo 1997: SI / NO Qué pasó?

11. Aquilado una casa desde Marzo 1997:
 Detalles:

12. Desde Marzo 1997, venta de: Valor en L. Valor de cosa Cosa
suita
tarro
tablas
postes
palos rollisos

13. CASA: Lamina + piso tablas + paredes tablas + grande + nuevo = _____

14. JEFE/JEFA: Alguien le debe?
 credito/tras _____

15. Debe a alguien?

piso _____

mano vuelta _____

17. Adelantos desde Año Nuevo. Detalles: _____

18. Pisto en banco comunal? _____ Cantidad _____
 Porque SI / NO _____

20. TRUCHEROS: Valor de productos

Gana mensual (todo)

Ganancia estimada (%)

De donde son productos

% transacciones en efectivo

Valor de deudas

Como va recoger deudas

Tasa y circunstancias de interes

21. ARROZ 1997: Todo el hogar
 Parcela I

Parcela II

Parcela III

Tamaño	_____	_____	_____
Dist. a pip/pied	_____ / _____	_____ / _____	_____ / _____
De que hecho?	M.A. / GUAM	M.A. / GUAMIL	M.A. / GUAMIL
Porque no m.a.?	_____	_____	_____
De quien es guamil?	_____	_____	_____
Años en descanso?	_____	_____	_____
Que sembró antes?	_____	_____	_____
	_____	_____	_____
	_____	_____	_____

Si prestado, acuerdo:

Herbicidas? _____
 Va meter ganado? _____
 Cosechado, lb _____
 Perdidas _____
 Vendido-CASUALLA; Detalles; porqué _____

Vendido-ORO; Detalles; porqué _____

Pagó a alguien para apilar arroz? Cantidad/Pago _____

Para comer: LB comprado desde cosecha _____

De donde conseguí semilla para 1998? _____

Alguien pidió semilla de ud.? (Regalado/vendido)

23. Arroz de 1998 va ser en mismo puesto? SI / NO

24. Cuantas tareas va sembrar ahora? Y sus hijos? _____ + _____
 De monte alto? Porque no?

36. FRIJOLES 1997:	Parcela I	Parcela II	Parcela III
Tamaño:	_____	_____	_____
Lb. cosechadas:	_____	_____	_____
Lb. vendidas; Detalles	_____	_____	_____

Porqué vendió?

37. FRIJOLES 1998:	Parcela I	Parcela II	Parcela III
Tamaño	_____	_____	_____
Dist. a pip/pied	_____ / _____	_____ / _____	_____ / _____
De que hecho?	_____ orilla / vega	_____ orilla / vega	_____ orilla / vega
Porque no orilla?	_____	_____	_____
De quien es la tierra?	_____	_____	_____
Si prestado, acuerdo:	_____	_____	_____
Años en descanso?	_____	_____	_____
Que sembró antes?	_____	_____	_____
Cosecha esperada (45)	_____	_____	_____
Perdidas (44)	_____	_____	_____
De donde semilla?	_____	_____	_____

Alguien pidió semilla? Quien? Vendido? Regalado?

42. Solo jefe/jefa: Parcela I Parcela II Parcela III

a. Chapiada

b. Siembra

c. Limpieza

d. Cosecha

43. Frijolares ajenos: Ajeno I Ajeno II Ajeno III

a. Chapiada

b. Siembra

c. Limpieza

d. Cosecha

46. Area en POTRERO: _____ Detalles: (de m.a., guamil? comprado? prestado?)

47. Trabajo en potrero ajeno desde Año Nuevo:
Días _____ Trabajo _____ Acuerdo _____

48. Todo el hogar: tareas en YUCA 1997: _____ 1998: _____

49. Perdidas de TIERRA en ult. año: milpa / guamil / vega / alto / orilla Area: _____
Acuerdo: _____

50. Nueva tierra (guamil comprado, reclamado) en ult. año: vega / alto / orilla Area: _____
Acuerdo: _____

51. Tierra ajena prestada: 52. Tierra prestada suya:
Donde _____
A quien _____
Acuerdo: _____ Acuerdo: _____

53. Todo el hogar: Area total en GUAMIL: _____ alto _____ vega

54. Palos de CACAO (todo el hogar): _____ + _____ + _____ + _____ = _____

55. Lb. vendidas desde Año Nuevo: _____ mas / menos que normal
Porqué vendió? _____

56. Matas de SUPA (todo el hogar): _____ + _____ + _____ = _____

57. Madera de COLOR (todo el hogar): _____

58. Ultimos dos veces cazando/pescando (Jefe/Jefa) desde Año Nuevo:

Cuando _____
 Que consiguió _____
 Que usó? _____
 Que hizo? (vendido, regalado) _____

Normal? _____

59. Ultimos dos veces comprando carne

Cuando _____
 De quien _____
 Clase _____
 Valor _____

60. Ult. dos veces carne regalado

61.	gallinas	cerdos	ganado***
# tiene	_____	_____	_____
# comido en ult. año	_____	_____	_____
# vendido	_____	_____	_____
Pisto/cambio/valor:	_____	_____	_____

Porque? _____

perdido por... _____
 vende leche? _____
 vende blanquillos? _____
 ***Ha tenido antes? SI / NO Sus padres tenían? SI / NO Qué pasó? _____

62. Total de ore vendido 1997: _____
 Detalles: _____

63. Ore vendido 1998: _____
 Detalles: _____

64. Venta de artesanía 1998: _____
 Venta de leña 1998: _____

65. Trabajo en 1998 (todo el hogar, con detalles):
 a. cacao _____
 b. maestro _____
 c. organización _____
 d. maquina de orcar _____
 e. guia/ayudante _____
 f. aserrando madera _____
 g. otra manera _____

66. Tiempo de Semana Santa, como conseguiría:

a. sal/jabon/cafe _____
 b. machete/ropa _____
 c. hierbas _____
 d. emergencia, Ahuas _____

67. Que haría con: a. 100L _____
 b. 1000L _____
 c. 5,000L _____
 d. 10,000L _____

69. Personas del hogar: edad años educ. estud. afuera? Gasto 97/98

1996-98: nacimientos muertos parejas

73. Todo familia en aides? SI / NO Donde/Quien

75. Mayoría de niños:
 muchache/a:
 adulta:
 Total años/location afuera de Reserva:

76. Salidos del río en ult. año:

71. Días en 1998 en actividades de iglesia otra
 Ultimo taller/cursó:

72. Lo más útil? Porque?
 Otra entrenamiento especial?

79. Lapia / Madrina de hijos 80. Total de lapia / madrina de jefa

81. Enfermedades ahora en casa: SI / NO Detalles:

82. Gente "grave" en ultimo año: SI / NO
 Quien? Edad Quien Edad
 b. que tenía
 a. días sin trabajar
 c. tratamiento
 d. de quien
 e. # días
 f. donde
 g. acuerdo
 h. como pagó/duda?

83. Venta de medicina natural en 1998:

84. Que hacía sus abuelos?
 Como ganaron pisto sus padres cuando era recién nacido?
 Cuando tenía 10 años, que hacía sus padres?
 Usted, de muchacho/a?
 Recién juntado?
 Hacían 10 años?

<i>ule</i>	<i>chicle</i>	<i>venta de arroz/frijoles/maíz</i>	<i>potrero</i>
<i>pipantes</i>	<i>guía</i>	<i>empleado de organización</i>	<i>iglesia</i>
<i>maderero</i>	<i>cueros</i>	<i>tiempo de refugiados</i>	<i>trab. en la costa</i>
<i>lava oro</i>	<i>cacao</i>	<i>cria de chanchos, gallinas</i>	<i>ganados</i>
<i>bananera</i>	<i>ejercito</i>	<i>mano de obra</i>	<i>artesania</i>
<i>trucha</i>	<i>maestro</i>		

85. Vida ahora mejor / peor / igual de sus abuelos? Porque?
86. Que le gustaría más dejar para sus hijos?
87. Como le gustaría ver a sus niños más pequeños hacer pisto en 30 años?

Appendix IV

Sample images from the 'history album' used by the researcher during oral history interviews, 1998.



Marco Acosta, *ladino* store owner with jaguar skin, at Krausirpi, Río Patuca, ca. 1970 (*limi taim*). Photograph courtesy of William Adams.



Tawahka children on way to the schoolhouse, Krausirpi, Río Patuca, ca. 1970. Photograph courtesy of William Adams.



**"Labourers in one of Geo. D. Emery's Logging Camps," Miskito Reservation
(probably Rio Wawa), Nicaragua. Photograph reproduced from Feldballe (1893).**



Miskito family boiling *Castilla* sp. (*tuna*) latex, at Pimienta, Río Patuca, ca. 1970.

Photograph courtesy of William Adams.

Appendix V

Interviews conducted with residents of the Honduran Mosquitia, 1995-98.

Ref. code	Sex	Ethnic ¹	Age	Occupation	Date	Loc. ²	Lang. ³	Approx. duration (hh:mm)
AH	M	M	45	engineer	29-Apr-98	A	S	1:00
AL	M	M	50	subsistence farmer	1-Mar-98	K	S	0:30
AOa	F	T	70	subsistence farmer	11-Apr-95	K	S	0:30
AOb	M	T	55	subsistence farmer	3-Mar-95	K	S	0:40
AS*	M	T	46	subsistence farmer, entrepreneur	28-Feb-98	K	S	0:45
BS1	M	L	65	trader, storekeeper	1-Mar-95	K	S	2:00
BS2					26-Apr-98	W	S	0:45
CC*	M	T	80	subsistence farmer	6-Feb-98	K	S	1:10
CM	M	M/T	28	subsistence farmer, storekeeper	15-May-98	K	S	0:50
ES1	M	T	55	subsistence farmer	13-Mar-95	K	S	0:55
ES2					20-Apr-98	K	S	2:45
FA	F	M	65	subsistence farmer, retired	9-May-98	B	S	1:30
FG	M	S/T	40	subsistence farmer, <i>pipantero</i>	25-Apr-98	K	S	0:30
HC	M	M	60	schoolteacher	31-Jan-98	Tg	S	1:30
HM*	M	M	83	retired <i>motorista</i> , entrepreneur	4-Jun-98	Tg	S,M,E	3:00
IM*	M	T	55	subsistence farmer	13-Mar-95	K	S	0:30
IS	M	T	46	subsistence farmer, <i>pipantero</i>	18-May-95	K	S	1:45
JB	M	L	63	retired storekeeper, farmer	9-Feb-98	W	S	2:00
JM	M	M/T	37	subsistence farmer	15-May-98	K	M	0:20
LC	M	L	45	trader, storekeeper	2-Jun-98	W	S	1:15
LD	M	M	55	subsistence farmer, tailor	15-Mar-98	A	S	2:15
LM	M	M	50	subsistence farmer	10-May-98	T	S, M	0:30
RC	F	T	83	subsistence farmer	31-Mar-98	K	M	0:35
RS	M	T	65	subsistence farmer	20-Feb-98	K	M	1:00
SO	M	T	43	subsistence farmer	26-Feb-98	K	S	2:30
UM	M	T	50	subsistence farmer	15-May-98	K	S	1:30

¹ Ethnicity: M: Miskito; T: Tawahka; L: Ladino.

* Since deceased.

² Interview location:

Patuca River communities: A: Ahuas; B: Bodega; K: Krausirpi; T: Tukrun; W: Wampusirpi.

Tegucigalpa: Tg.

³ Language: S: Spanish; M: Miskitu; E: English.

Appendix VI

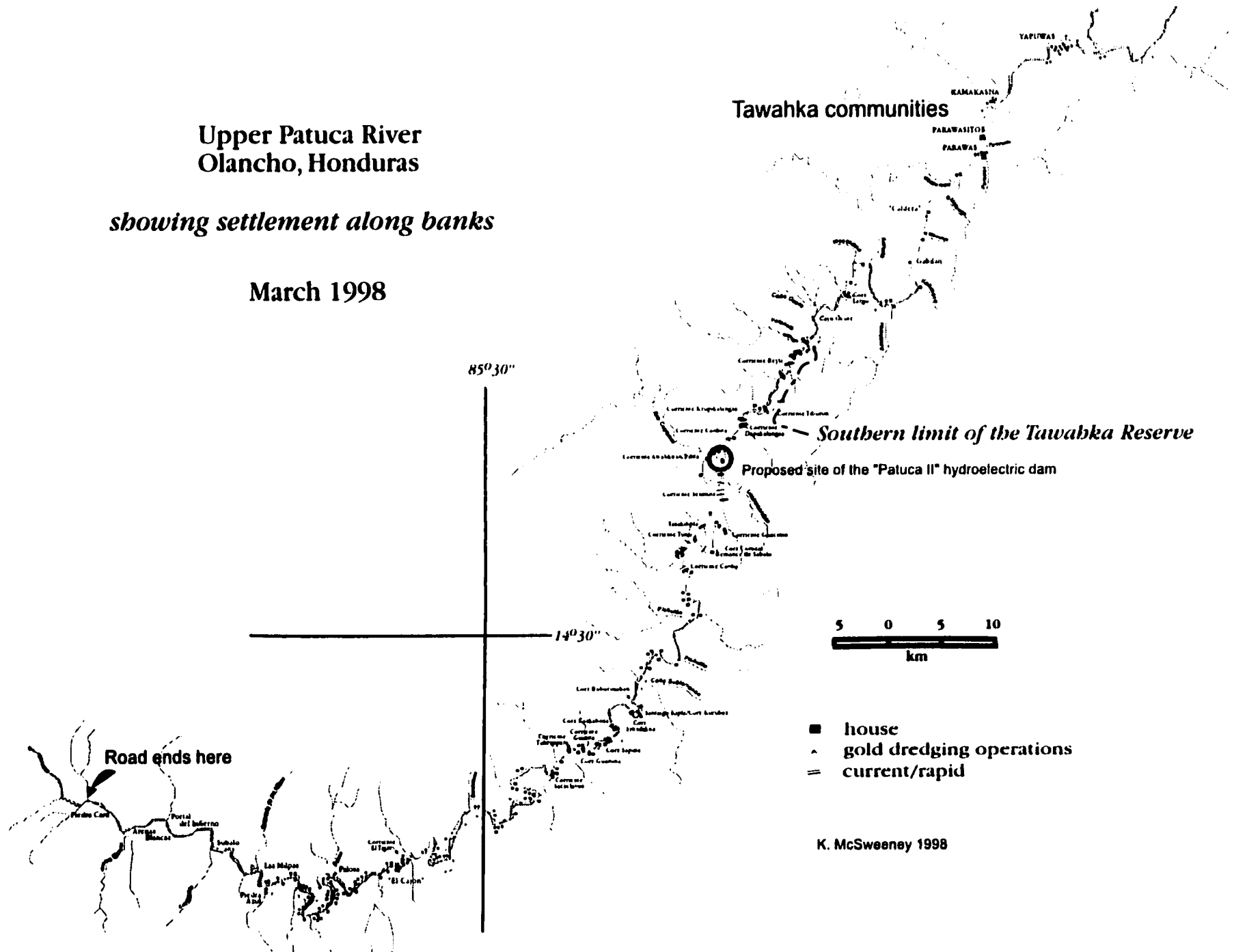
**Upper Patuca River, Olancho, Honduras,
showing settlement along banks, March 1998 (map by author).**

Upper Patuca River Olancho, Honduras

showing settlement along banks

March 1998

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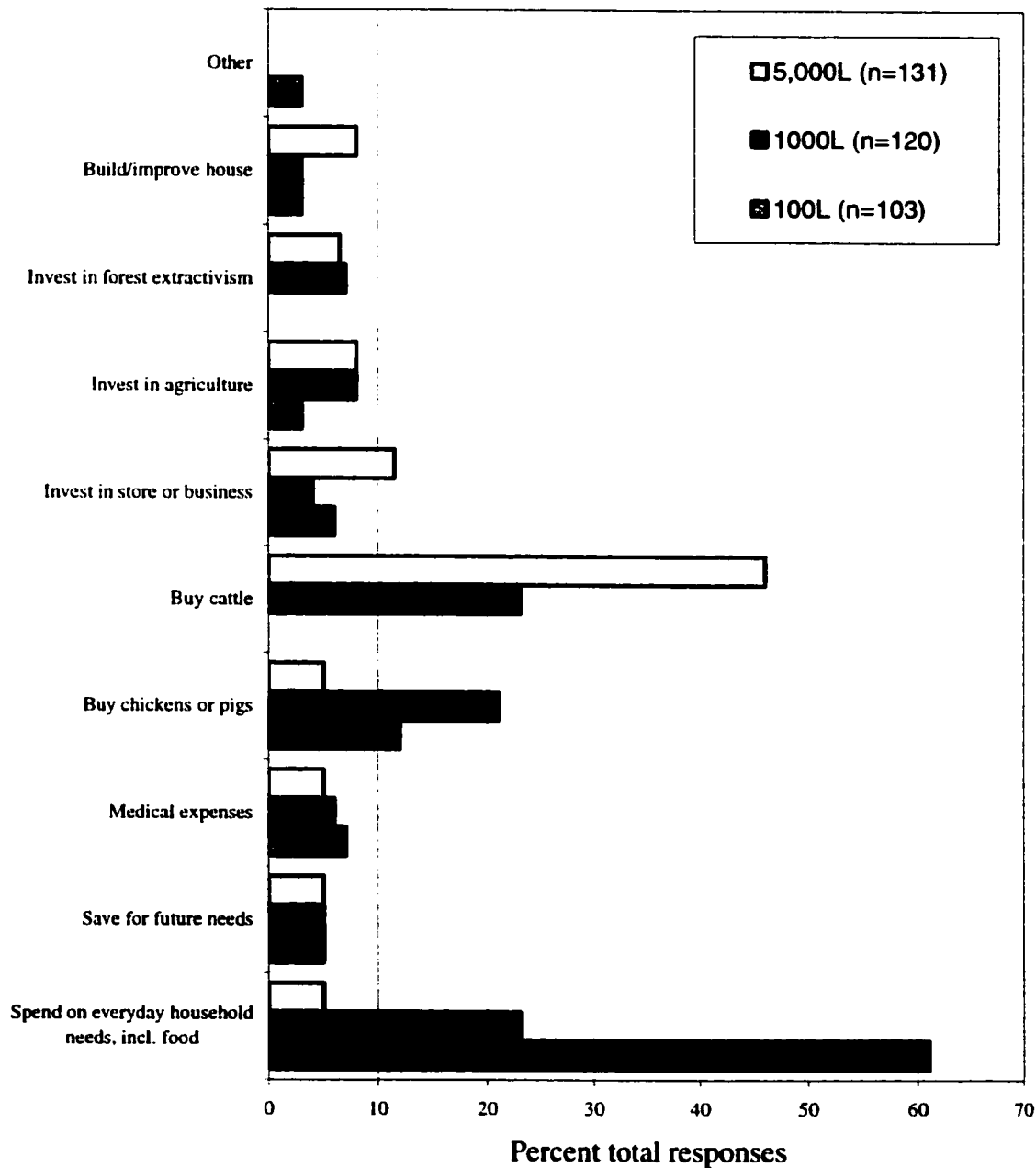


K. McSweeney 1998

Appendix VII

Tawahka responses to hypothetical cash windfalls, TABR 1998:

*What would you do with 100, 1,000, or 5,000 Lempiras?*¹



¹ Respondents typically interpreted this to mean: 'If you were *given* this amount....' (i.e., as a gift). Sample sizes vary because not all respondents answered all questions.

Source: Household survey, 1998.

Appendix VIII

Transcript of interview with informant HM, Tegucigalpa, June 1998.

The following is a direct transcription of a portion of an interview I recorded with an 83-year old Miskito/Pech/Bay Islander (now deceased), who had worked as a motorista on the Patuca during the 1930s and 1940s. Here I ask him details of how Tawahka rubber tappers obtained credit. The interview was held in English.

KM: One of the [rubber] buyers lived in Yapuwas?

HM: Yes, the one that was in Yapuwas, the one that was buying: "weigh and pay."

KM: Did he provide credit [to the tappers]?

HM: Yes, to the workers. There are many, many, gone with it in the pocket also!

KM: You mean they took credit and never returned?

HM: Yes: go an never come back—never returned. Some. Others, they came back.

KM: So...how did the *contratista* get his money back? ¶

HM: He don't get no money. He lost it. That's a big reason. That's the reason he give credit to who he know that work honestly. He give *them* credit, but the other people he don't know, he don't. Maybe a couple Lempiras credit, maybe to try them out, maybe. Some of them pay their debt quick, then take double of it, and then take double and gone—gone for good! Oh yes. People—they're not so honest.

KM: So lots of money was lost [by the rubber company]?

HM: Oh yes, out of all the companies. But still, the mahogany company [for example], they don't lose nothing, 'cause what they're payin' is NOTHING to what they're gonna gain.

Appendix IX

Transcript of interview with Tawahka informant UM, Krausirpi, May 1998.

The following story emerged when I asked a Tawahka informant to tell me how he came to own his rifle. His tale exemplifies the convoluted nature of credit systems in remote forest environments, and illustrates the complex role of forest products in asset accumulation strategies. The story is also revealing of Tawahka perceptions of life and money. The year is about 1970. Translated from Spanish.

I owed 45 L to Don Santiago Rivas [a storeowner] in Wampusirpi. The debt was from earlier. I had taken some provisions—flour, sugar, coffee—on credit, to bring here [to Krausirpi]. But when I went to tap *tunu*—at this time there was a *tunu* market—I didn't deposit it with Don Santiago, I went to deposit the *tunu* with a señor named José Velasquez, from Tegucigalpa, who lived in Ahuas; he had a man named Mario in charge of his business, and it was he who received the *tunu*.

So the debt [with Don Santiago] was still 'waiting.' I [also] owed a debt to Marcos Acosta, worth 75L. Marcos Acosta said, "I'll help you [pay off your debt]. I want you to go with me, to Brus [Laguna], you can work for me and cancel your debt." I went with him. He went to La Ceiba to buy *mercaderia*...he also had a *cantina*. He said to me "You will also stay to look after the *cantina*." "*Bueno*," I said. After a month and a half, Santiago Rivas arrives in Brus, because the municipal offices were there. He sent for me, to go to the council hall. The mayor said to me, "Look, you have owed this man for more than a year." "Yes," I said. "But look, I've come here to work, but I'm not earning enough to eat, *and* pay off the debt. The man [Marcos Acosta] pays me 75 L a month but I came to pay a debt I owed him—so what can I do?" I couldn't pay. So I said, "Wait. I'll be here. From January on I'll occupy myself with repaying the debt all at once." [But] I returned [to Krausirpi] in January, without paying.

Then, in June, I got a letter from the *auxiliar*, saying that I had to pay my debt, or else they would send notice to arrest me. Then, Don Santiago came here [himself]. He had a store here, that he left in the charge of Barrios, a young guy. He came to drop off supplies. I went to his house. I said, "Look, I just got a note. You can read it." He gave it to the young guy [to read], because he couldn't read. So I said, "Please, give me some provisions on credit." He gave me provisions—but of little value, maybe 50-60 Lempiras: flour, oil, sugar, coffee, rice.

So I left, with my brother Juan, he was still a kid, 11 years old. We brought only our machetes. We went to [Caño] Unawas. We were there six days. I made two deadfall traps, no more. We used armadillo as bait. The day after I placed them, I didn't get anything...after 3 or 4 days, I go and I see the trap has fallen. Inside I see a *tigrillo* [wild cat], big, 3½ feet long. So I took it out. I skinned it at our camp, where we were sleeping...and dried it, and I said to my brother, "Let's go."

At that time a *tigrillo* skin went for 250 L. So...I went to deposit the skin. So then, when Don Santiago came upriver again, I said, "Let's do a reckoning, I want to be free of my debt." So I cancelled my debt, and had about 200 L left over. The rifle, it only cost me 70 L. I paid in cash.

-- UM, 15 May 1998, Krausirpi.

Appendix X

Tawahka responses to questions regarding hypothetical market needs, TABR, 1998.

Response ¹	Salt		Minor Medical ²		Emergency	
	no.	group %	no.	group %	no.	group %
Impossible	3	2.8	0	0	5	4.3
Don't know		0	1	0.9	8	6.3
Savings	1	0.9	0	0	3	2.6
Salary	5	4.7	6	5.4	2	1.7
Wages						
from agricultural work	25	27.3	36	35.1	2	1.7
from domestic work	3		3			
from [redacted]	1		0			
Sell Goods						
cacao	34		19	29.7	3	13.7
beans	3		6		5	
rice	2				2	
[redacted]	1					
[redacted]	1					
[redacted]	1				1	
[redacted]	1					
[redacted]	1					
gold	5		1			
chicken(s), eggs	4		6		1	
pig(s)	1		1		4	
Sell/Pawn Assets						
dog(s)		0.9		2.7	1	24.8
cow					12	
gun					3	
radio					1	
[redacted]	1		3		12	
Use Store Inventory	3	2.8	3	2.7	6	5.1
Solicit Gift						
from family/neighbours	2	1.9		0	1	3.5
community donation					3	
Borrow						
unspecified source	3	7.5	7	23.4		35.9
from friends/family			8		9	
from store:						
a. no repayment specified			9		19	
b. repay with agro work	4		1		9	
[redacted]			1		1	
d. repay in beans	1					
e. repay in cacao					4	
Total no. responses ³	106		116		117	
No. options offered	23		16		24	

¹ Response to the open-ended question: Around the time of Holy Week, what would you do to:
a. obtain salt; b. cover costs of local medical care; c. cover cost of medical evacuation from village?

² Responses reflect the common practice of exchanging agricultural work for treatment by *curandero*.

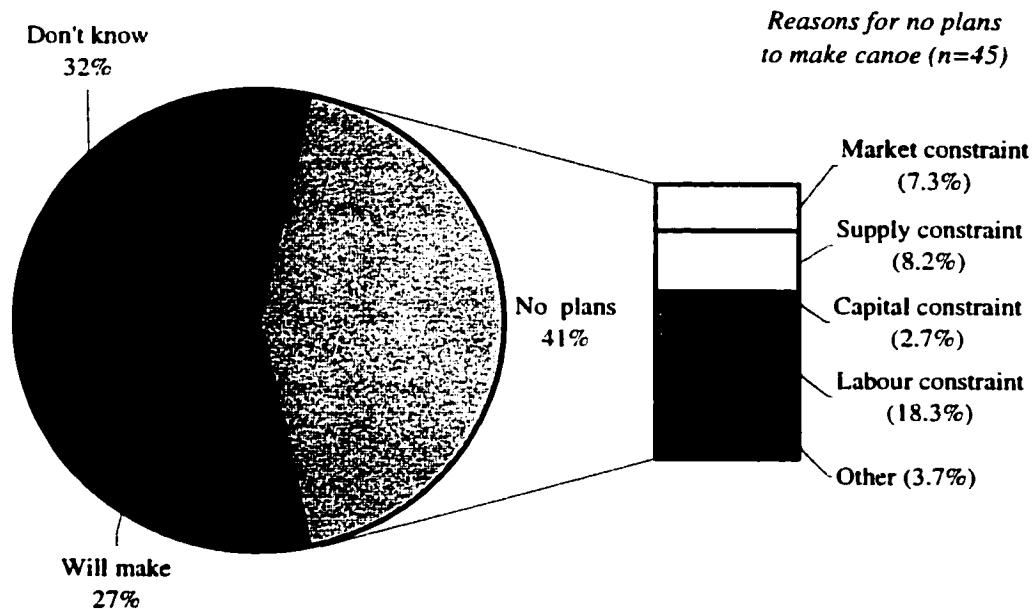
³ 100 respondents answered the question. The number of responses reflects multiple answers.

Source: Household survey (n=100), 1998.

Appendix XI

Tawahka responses regarding future canoe manufacture, 1998.

Response to question: 'Do you have plans to make a canoe this year or next (1998 or 1999)?' (n=109)



Market constraints cited: price too low, no profit, no buyers.

Supply constraints cited: trees too scarce/too small, political problems.

Capital constraints cited: no money.

Labour constraints cited: single woman, too old, too sick, away studying, doesn't know how.

Source: Household survey, 1998.

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