

SOCIAL AND ENVIRONMENTAL IMPACTS OF BIG-LEAF MAHOGANY

(*SWIETENIA MACROPHYLLA*)

LOGGING ON PERUVIAN INDIGENOUS COMMUNITIES

A Thesis

presented to

the Faculty of the Graduate School
at the University of Missouri-Columbia

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

by

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JULY 2014

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The undersigned, appointed by the dean of the Graduate School, have examined the thesis entitled

SOCIAL AND ENVIRONMENTAL IMPACTS OF BIG-LEAF MAHOGANY
(*SWIETENIA MACROPHYLLA*)
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presented by Aaron A. P. Groth,

a candidate for the degree of master of arts,

and hereby certify that, in their opinion, it is worthy of acceptance.

Dr. Larry Brown

Dr. Soren Larsen

Dr. Robert Walker

DEDICATION

This work is dedicated to the indigenous inhabitants of the Purús and Curanja Rivers and to the landscapes, plants, and animals of the Alto Purús region.

This work is also dedicated to my family. Without the love and support of my mother, Janice Pierce; my father, Philip Groth; my brother, Nathaniel Groth; and my aunts, Karen Pierce, Lori Pierce and Gwynne Pierce, and my Uncle Brent, this work would not have been possible.

“Ahora la palabra indio me parece que ya tiene un sustento más justo, un contenido más justo; indio ya quiere decir hombre, económica y socialmente explotado y, en ese sentido, no solamente todos somos indigenistas en el Perú, todos somos indios de un pequeño grupo de explotadores”

—José María Arguedas (1968)

(Now the word "Indian", methinks, already possesses a more fair foundation, a more fair content; "Indian" now means man [and women and subaltern!], economically and socially exploited, and in this sense, not only are we all Indianists in Peru, we are all "Indians" of a small group of exploiters). (Translation by Aaron Groth)

ACKNOWLEDGEMENTS

Many individuals and institutions contributed to this research.

First, and foremost, I thank the indigenous communities of the Purús and Curanja Rivers, who permitted me to work with them during 2011, and to again conduct research during December 2013-January 2014. A thanks also goes to the leadership of the Federation of Indigenous Communities of Purús (FECONAPU) and the leadership of the contract Administrator of the Purús Communal Reserve, ECOPURÚS for their help and cooperation in my research endeavors.

I also wish to acknowledge and thank the staff and directors of the Upper Amazon Conservancy/ProPurús who hosted me during my research in December 2013 through January 2014; they afforded me lodging in their field office and logistical support (i.e. a boat and motor). Chris Fagan, Executive Director of Upper Amazon Conservancy, first gave me the opportunity to work with indigenous communities in the Peruvian Amazon in 2011 as a Community Conservation Specialist. He remains an excellent friend and mentor. I wish to extend special thanks to Chris Fagan and UAC/ProPurús for permitting me to use photos, maps, and other materials in this thesis. Thanks also Chris for looking over my research proposals. José Borgo Vasquez and Jairo Samuel Roque of ProPurús are co-workers from 2011, and larger-than-life friends. During their vacation, they accompanied me on river travel expeditions and were valuable informants during my research (December 2013 – January 2014.) Alex Cartegena Eten of ProPurús offered valuable insight and shared information as well.

My advisor, Dr. Larry Brown provided advice and guidance through trials and tribulations associated with thesis research and graduate studies. Dr. Soren Larsen has been an asset to my committee; furthermore, he is a dedicated Director of Graduate Studies. Dr. Brown, Dr. Larsen, and Dr. Mark Palmer supervised me as I led discussion sections of Regions and Nations of the World – Western and Eastern Hemispheres, offering constant support and advice. Dr. Robert Walker, is an asset as an outside committee member, having many years field experience in the Amazon. His course “Peoples and Cultures of the Amazon” contributed greatly to increasing my understanding of the indigenous communities of the Amazon. I am indebted also to Dr. Stephen Bunker, who passed away in 2005. He offered the first course I took concerning the Amazon (Social Ecology of the Amazon Basin) at the University of Wisconsin-Madison. Nine years later, I find myself still using valuable sources from that class.

My research focus and design were further informed by Dr. Francisco Aguilar’s graduate seminar, Ecosystems Management: The Human Dimension. Dr. James “Sandy” Rikoon’s graduate research seminar, Political Ecology, served to greatly inform both my research and writing. Special thanks to Dr. Ivan Reyna, who assisted with my translation of informed consent and other forms into Spanish. Dr. Reyna is Peruvian and offered great insight into the country’s history.

This research has been socialized through multiple presentations. In April 2012, I presented “Conservation of Alto Purús” at the University of Wisconsin-Rock County’s Kinneman Lecture. At the West Lakes-East Lakes Joint Meeting of the Association of American Geographers, in October 2012, I presented research to colleagues under the title “Natural Resource Use in Four Indigenous Communities of the Upper Amazon.” Dr.

Antoinette WinklerPrins offered encouragement and advice, and prompted me to join the Conference of Latin Americanist Geographers (CLAG). In November 2012, I socialized my research at the University of Missouri-Columbia through the Noel P. Gist Seminar on International Affairs, presenting: “Indigenous Communities and the Conservation of Alto Purús.” Special thanks must go to my friend Winston Vásquez Arévalo and David Lluncor of the National University of Ucayali for arranging a short-notice presentation of my research at the UNU in Pucallpa, Ucayali, Peru in January 2014. Over thirty minutes of public questions, comments, and debate followed my presentation: “Integrando Ecología Política e Historia Ambiental: la extracción de caoba (*Swietenia macrophylla*) en territorio Huni Kuin” (Integrating Political Ecology and Environmental History: the extraction of big-leaf mahogany (*Swietenia macrophylla*) in Huni Kuin territory.) Finally, Dr. Larsen afforded me the opportunity to present my thesis research to his Honors Global Sense of Place class in April 2014. These were valuable opportunities to share my research, receive peer feedback, and to concentrate my research focus.

Diego Shoobridge was a supervisor and mentor during three of my four years of Peace Corps service in Peru, and he encouraged me to work in the Peruvian Amazon with indigenous communities. He offered advice and feedback on my research plan and has always offered encouragement. He too remains a larger than life personal friend.

Frederick Norbury, a career US Forest Service employee and former Director of the Peru Forestry Sector Initiative (a project of the USFS), provided expert advice and guidance, with feedback and comments on earlier drafts of this thesis. Furthermore, Fred shared his professional contacts, and offered great encouragement.

Thanks also must go to Dr. Barbara J. Williams, Professor Emeritus of the University of Wisconsin Colleges/UW-Rock County, for being a terrific family friend, mentor and unofficial advisor in the pursuit of my graduate education in Geography.

Melisa Sánchez, a friend and Peruvian anthropologist with much experience in the Amazon, working with indigenous communities and various institutions, offered advice and guidance in my research endeavors.

I would be remiss if I did not also acknowledge and thank Victoria and Milagros Cardenas Llamas and their family for their friendship and hospitality during my stays in Peru. Likewise, many thanks go to my 2009 host family (who remained a host family until my departure from Peru in December 2011), Miriam Gómez Tuesta and Manuel (Manolo) Perales (and of course Cesar and Daniel) for their friendship and hospitality.

This research would not have been possible without funding support from the University of Missouri-Columbia Department of Geography and Graduate School. I thank the Department of Geography and the support of the A.P. Green Foundation and the Wheeler Endowment for offering student field research awards. Funds for travel were provided through the John D. Bies International Travel Award. Faculty of the School of Natural Resources selected this research proposal for funding through the Conservation Biology Fellowship (funds provided by the Graduate School). I wish also to acknowledge and thank the University of Missouri-Columbia for supporting Returned Peace Corps Volunteers' pursuit of graduate study through the MU Paul D. Coverdell Peace Corps Fellowship.

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LIST OF ABBREVIATIONS

AIDSESP: Asociación Interétnica de Desarrollo de la Selva Peruana
ANP: Área Natural Protegida
ATFFS: Administración Técnica Forestal y de Fauna Silvestre
CITES: Convention on International Trade in Endangered Species of Wild Fauna and
Flora
DEFFS-U: Dirección Ejecutiva Forestal y de Fauna Silvestre de Ucayali
DGFFS: Dirección General Forestal y de Fauna Silvestre
ECOPURÚS: Ejecutor del Contrato de Administración de la Reserva Comunal Purús
EIA: Environmental Investigation Agency
FECONAPU: Federación de Comunidades Nativas del Río Purús
GOREU: Gobierno Regional de Ucayali
IGV: Impuesto General a las Ventas
ITTO: The International Tropical Timber Organization
INRENA: Instituto Nacional de Recursos Naturales
MPP: Municipalidad Provincial Purús
ORAU: Organización Regional AIDSESP de Ucayali
OSINFOR: Organismo Supervisor de los Recursos Forestales Maderables
PCR: Purús Communal Reserve
PNAP: Parque Nacional Alto Purús
PAU: Proceso Administrativo Único
PCM: Presidencia del Concejo de Ministros
PGMF: Plan General de Manejo Forestal
POA: Plan Operativo Anual
SERNANP: Servicio Nacional de Áreas Naturales Protegidas
SUNAT: Superintendencia Nacional de Administración Tributaria
UAC: Upper Amazon Conservation
UIT: Unidad Impositiva Tributaria
UNALM: Universidad Nacional Agraria La Molina
UNU: Universidad Nacional de Ucayali

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ABSTRACT

Big-leaf Mahogany (*Swietenia macrophylla*) is the neo-tropic's most valuable hardwood but it continues to experience rapid and in many cases irreversible depletion throughout its range. In Latin America, unsustainable harvests result in the exhaustion of the resource within one region and the displacement of extraction to increasingly more remote areas, including protected areas and titled indigenous lands. This study draws from political ecology theory to explore the social and environmental impacts of mahogany logging with six indigenous communities of the remote and biologically diverse Alto Purús region of Peru. Specifically, it uses ethnographic methods and participant mapping to examine the processes of marginalization and degradation of indigenous peoples and lands as a consequence of mahogany extraction in this region, as well as to understand indigenous responses to the extraction of this resource in the context of power asymmetries between indigenous communities, the state, and the timber industry.

Keywords: Amazon, indigenous, Big-leaf Mahogany (*Swietenia macrophylla*), selective logging, social impacts

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I. Introduction

Tropical forests harbor the largest genetic and biological diversity of all terrestrial ecosystems. These forests, throughout the world, host a great number of indigenous communities. In both the Amazon and on the island of New Guinea there still exist populations of indigenous peoples voluntarily living in isolation. Logging of tropical forests has not only compromised the ecological integrity of forests, it has impacted indigenous communities and rural communities. While images of tropical forest cleared to convert land to oil palm plantations, pasture, or agriculture may dominate popular images of deforestation; selective logging operations cover vast, remote areas and are spatially dispersed – and cause forest disturbance and degradation. Prior to mechanization, tree cutting ability was restricted to axes and saws. Modern forestry operations now include use of tractors, bulldozers, chain saws, and even helicopters and airplanes. Bulldozers are used to open roads and skid trails, and quickly fell high value timber. In remote areas, timber haulage may be limited by human power complemented by pulleys, levers, and other techniques. Waterways constitute an essential part of timber transport. Animal traction, tractors, railroads, lorries, and the construction of roads have increased the ability to haul tropical timber. Even though forest cover may not be lost, selective logging also impacts forest ecosystems.

Hundreds of tree species may exist within a single hectare and thousands throughout the forest. Individuals of the same tree species are spatially dispersed. A

high density may constitute 1-2 commercial-sized trees of single species per hectare. Clear-cutting of tropical forests and the selective logging of high-value timber species both impact rural and indigenous livelihoods. Governments influence forest extraction through state property regimes, land tenure policies, and regulatory frameworks. In Sarawak, Malaysia (island of Borneo) loggers have repeatedly bulldozed indigenous graves despite pleas of protest on the part of indigenous peoples (Brosius 2006). In Peru loggers have operated in Alto Purús National Park and adjacent territorial reserves for indigenous populations living voluntarily in isolation (Schulte-Herbrüggen 2003; Fagan and Shoobridge 2005, 2007; Round River 2009). Loggers used captured Murunahau (Chitonahua), a group that had been living voluntarily in isolation, as unpaid labor in the 1990s (Bedoya and Bedoya 2005). This highlights the insensitivity of logging interests to indigenous understanding of the forested landscape and customary land use. Violation of laws and human rights abuses occur during the extraction of high value timber.

Certain tree species have been selectively logged for centuries. Since the 1600s, European and North American markets have pressured neo tropical hardwoods, including big-leaf mahogany (*Swietenia macrophylla*) populations. This voracious demand drove the West Indies (Caribbean) mahogany (*Swietenia mahogani*) to commercial extinction. These tree species served for the ship construction of imperial navies (Spain and Britain). During WWII, big-leaf mahogany served the allies as a strategic resource (i.e. PT boat propellers) (Hoy 1946). Besides serving as a strategic resource, big-leaf mahogany is the most coveted neo-tropical hardwood on the international market. Furniture, floors, and decking in the United States often comes from tropical forests (Neuman and Zarate 2013). Extraction of big-leaf mahogany has gone through boom and bust periods, and

once a source is exhausted of readily available supplies, extraction inexorably moves to another location following local extirpation or commercial extinction. Dysgenic selection is the selective exploitation of the best trees, and has great implications for successful regeneration of the species. An erosion of genetic diversity for a species can quickly occur through its selective removal.

Peru ranks ninth in the world in forest cover, and it is second only to Brazil in total forest cover in South America, and its Amazonian forests are home to mahogany. More than half the country is forested, lying predominately in the Amazon basin. While Brazil has the greatest share of the Amazon basin, Peru possesses the second greatest extent. According to US Department of Agriculture data, between January and July 2013, Peru exported \$20 million in wood to the United States, increasing \$5 million from \$15 million reported in January to July 2012 (Neuman and Zarate 2013). As much as 80% of Peruvian timber is harvested illegally, according to the World Bank (Neuman and Zarate 2013). Asian countries, including China, import Peruvian wood, and Korean companies have begun sawmill operations in Pucallpa. Between 1999 and 2005, disturbance and deforestation rates in the Peruvian Amazon averaged over 600 square kilometers per year (Oliveira et al. 2007). The area of disturbed forest nearly equaled the amount of land deforested. During that time period, only 1-2% of disturbance occurred within natural protected areas (Oliveira et al. 2007). A total of 11% of forest disturbances and 9% of the deforestation occurred in indigenous territory (Oliveira et al. 2007). It should be noted the importance that roads play as a catalyst for deforestation, forest disturbance, and forest degradation. Some 75% of Peruvian Amazon forest damage is estimated to occur within 20 kilometers of a road; moreover 66% of forests

disturbances and 83% of deforestation occurs within 20 kilometers of a road (Oliveira et al. 2007). While deforestation implies a loss of forest cover, disturbance occurs due to selective logging operations. Repeated disturbance of an area by selective logging, exhausting commercial species may lead to degradation and damage: dysgenic selection and genetic erosion.

While remote sensing serves to track deforestation and disturbance, it cannot reveal the social relations surrounding the process of selective timber extraction occurring in Peru's Amazon forests. Chains of debt accrue from the source of capital down to the extractor (loggers working in logging camps become indebted to those they work for, and indigenous communities become indebted as goods are advanced at inflated prices for undervalued wood) through the system of *habilitación* (Bedoya and Bedoya 2005). The working conditions of logging camps have been documented (Shulte-Herbüggen 2003 for the Las Piedras River) and exposed debt peonage and/or slavery (Bedoya and Bedoya 2005)(Salisbury 2007 for the Alto Tamaya). The *habilitación* system entails chains of loans from the capitalist to the extractor. A logger advances goods of consumption to workers (salt, food, shotgun shells) along with work tools such as chain saws, motors, and boats (and the gasoline and oil needed). The amount advanced (at inflated prices) is deducted from the value of total wood extracted (Shoobridge 2003). The *habilitación* system is documented by many researchers (Sears and Pinedo-Vasquez 2011, 627; Salisbury 2007; White 1978; Hoy 1946; Shoobridge 2003; Bedoya and Bedoya 2005). This system is directly related to asymmetries of power between actors at different scales (local, regional, national, and international).

While the socio-environmental impacts of selective logging upon an indigenous community and indigenous responses have been documented for the Alto Tamaya (Salisbury 2007; Salisbury et al. 2011), the lack of peer-reviewed literature concerning the local social and environmental impacts of mahogany logging upon Peruvian indigenous communities is striking. Chris Fagan and Diego Shoobridge (2005; 2007) highlighted the problems of mahogany extraction in the Alto Purús region through reports of ParksWatch¹ and Round River Conservation Studies², but no peer-reviewed study has documented the extraction of mahogany from the indigenous perspective for the region. Most studies of mahogany concentrate on the ramifications of mahogany extraction related to: illegal extraction occurring in protected areas or territorial reserves for indigenous populations voluntarily living in isolation, conservation biology, future timber yields, or the role and relationships of actors in the chain of extraction (locating high value trees, cutting, transporting, sawing, exporting). An understanding of land tenure and property is crucial to understanding both the asymmetries of power and information existing between actors at different scales.

Peru's Land Tenure: Logging Industry, the State, and Indigenous Communities

The modern state manages public lands and may enact legislation and administrative rules to govern resource use on both communal and private property. Governments shape property rights and serve to help frame the rights and responsibilities of individuals and societies regarding sustainable natural resource management. Daniel Bromley posits: "Property is *not* an object but is rather a social relation that defines the

¹ Part of the Center for Tropical Conservation, Duke University, Durham, North Carolina.

² International conservation organization now based in Salt Lake City, Utah.

property holder with respect to something of value (the benefit stream) against all others” (1992, 2). Possession of property rights determines not only who can do what with a particular resource (i.e. a parcel of land, a tree, water) but also when and how they may use the resource (Wiebe and Meinzen-Dick 1998, 205). Private property, common property (*res communes*), and state property represent the property regimes where natural resources are controlled and managed (Bromley 1992, 2).

In Latin America, European conquerors usurped indigenous people of their lands, used indigenous people as slaves, and imported African slaves. Indigenous populations experienced a precipitous drop in population due to disease. Colonial and ecclesiastical authorities altered traditional social structures, oriented crop production to old world grains, favored European livestock, and organized indigenous labor for mining. Following independence, Latin American governments saw indigenous forest dwellers as “primitive” peoples needing civilization and assimilation into national culture (Davis and Wali 1994, 486). Another post-colonial legacy of Latin America is highly unequal distribution of land and income. Landlessness exists not because of physical scarcity but rather due to concentration of ownership in the hands of few powerful families.

Peru’s land tenure is complex. A detailed map of the region reveals a complex mosaic of land uses: various categories of protected areas, territorial reserves for indigenous populations in voluntary isolation, titled indigenous land, titled private land, and forestry concessions. Some hydrocarbon concessions overlap with protected areas, territorial reserves and indigenous lands. This representation of territory serves to obscure a history of conflict over territory and resources. To the indigenous populations of lowland South America, Europeans and South American Republics displaced and

substituted indigenous spatio-geographical and geopolitical knowledge of their own interconnections and “spatial distributions and hierarchies of power” (Vidal 2000, 638). Furthermore, it obscures the processes of demographic collapse and territorial dislocation of indigenous populations. Rapids, waterfalls, rocks, and other natural features directly relate to the ritual and mythology of indigenous populations.

Although Peru’s 1920 and 1933 Constitutions recognized indigenous communities it did not award land rights. Indigenous communities in Peru did not receive communal land rights until 1974. In 1974, Peru’s military government promulgated the Law of Indigenous Communities (Ley de Comunidades Nativas y de Promoción Agropecuaria de las Regiones de Selva y Ceja de Selva, D.L. 20653). This law enabled indigenous communities to register as legal entities, but restricted the amount of land that could be titled (Davis and Wali 1994, 487). A 1978 law stripped communities’ of rights to their forest resources – returning ownership of forest resources to the hands of the state. Specifically, in 1978, Law 20653 was reformulated as the Law of Indigenous Communities and the Agricultural Development of the Amazon lowlands, Andean piedmont, and eastern slopes of the Andes (Ley de Comunidades Nativas y el Desarrollo Agrario de las Regiones de Selva y Ceja de Selva, D.L. 22175). The indigenous communities could receive title to their land but not ownership of the trees or forest resources – that was reserved for the state.

The law was changed at the behest of regional logging interests, stripping indigenous communities of their ownership of forest resources (Heredia 1989, 195). According to Article 11, those lands apt for forests were not community property and were ceded for state use (Espinosa de Rivero 2010, 247). This shift radically changed

forestry legislation, enabling private individuals and firms to exploit national forests (Dall'Orso 1990). Article 85 established that private forest contracts could reach up to 200,000 hectares, and up to double that for National Forest extraction and exploration (Espinosa de Rivero 2010, 247). Moreover, it was hoped that this law would facilitate business investments in the Amazon lowlands, Andean piedmont, and eastern slopes of the Andes (Veber 1998, 394). Recognizing and titling indigenous communities remains an important legacy of the military dictatorship for indigenous Amazonians. Peru's 1979 Constitution guaranteed community property regimes as inalienable, imprescriptible, and guaranteed against seizure.

Davis and Wali found the Peruvian government titled an average of only 45.6 hectares per family for 20 ethnic groups for which data are available, but there exists a great variation in amount of land allocated per family even within the same ethnic group (1994, p. 487). Families in 61 Shipibo-Conibo communities received titles to land ranging in extent from 2.86 hectares to 66.87 hectares (Davis and Wali 1994, p. 487). Population growth, increasing population density, and fragmentation of small communal and family parcels of land can occur within a generation. Landholding size impacts indigenous communities' ability to practice sustainable resource management (Davis and Wali 1994, p. 487). Communities may request recognition of a greater area of territory, but there exist competing interests.

The Ministry of Energy and Mines has granted concessions superimposed on protected areas, territorial reserves for indigenous populations in voluntary isolation, and titled indigenous communities (the titled indigenous communities do not own the subsoil – again that is reserved for the state). Likewise the forestry authority has granted timber

concessions in areas adjacent to titled indigenous lands. A community's request for a land title or an increase in the size of the community may not be processed due to overlapping and conflicting claims (mineral, hydrocarbon, or forestry concessions) in adjacent areas (Tipula 2013; Salisbury 2007).

Notably, in Peru's 1993 Constitution, indigenous communities are only recognized as imprescriptible – not inalienable or guaranteed against seizure. Under the presidency of Fujimori, the Land Law (Law 26505) restricts indigenous communities' rights to their designated territory. While most communities legally exist as *Comunidades Nativas*, other indigenous communities have never received legal title to their land. According to the Directory of Indigenous Communities of the Peruvian Ministry of Agriculture, approximately 1,500 native communities with an extension of 10,503,888 hectares have been titled (Surrallés 2009, p. 32). Five territorial reserves for indigenous populations isolated voluntarily total 2,799,901 hectares. Communal Reserves are protected areas where neighboring indigenous communities maintain subsistence rights to resources while Peru's protected areas service (SERNANP)³ conducts activities of control, vigilance, and biological monitoring. These areas total nearly 2 million hectares. For those communities lacking access to large, forested areas for hunting and gathering or fishing areas, these communal reserves afford usufruct rights for subsistence.

In Peru, the government regulates the extraction of mahogany in indigenous communities as well as forestry concessions. In principle, the sequence for legal timber extraction in an indigenous community includes: inventory, management plan, annual

³ Servicio Nacional de Áreas Naturales Protegidas

plan of operations (POA), transportation permits, and post-harvest inspections by the national forestry and wildlife bureau (DGFFS)⁴, Ucayali regional forestry and wildlife bureau (DEFFS-U)⁵ and forestry regulator (OSINFOR).⁶ However, in practice, many laws are flagrantly violated or circumvented through corruption and conspiracy. Police, judges, and other public officials have been implicated in colluding with loggers (Newman and Zarate 2013). This occurs in a context of lack of technical knowledge, inadequate (or fraudulent) data, untrained workforces, poor communications, and weak bureaucracies. Even if the system worked the way it is supposed to, it is a poor fit to the traditional social structure and culture of the indigenous communities. Due to the region's remoteness and difficulties associated with travel, timber theft and other forms of illegal logging are not uncommon; furthermore, these activities may remain undetected for long periods of time.

Since indigenous communities do not “own” the forest on their titled lands, do not have funds necessary to cover the transportation and transaction costs associated with obtaining forestry permits, or have knowledge of administrative procedures, communities empower a third party to process their applications for timber extraction. How Amazonian households and communities use their land and their decisions to engage in forestry or adopt a more intense system of production depends not only on the property rights regime, but also upon biophysical, institutional, and socioeconomic factors (Futemma and Brondízio 2003, 391). Relationships between logging companies and

⁴ Dirección General Forestal de Fauna Silvestre

⁵ Dirección Ejecutivo Forestal y de Fauna Silvestre – Ucayali

⁶ Organismo de Supervisión de los Recursos Forestales y de Fauna Silvestre. While DGFFS and DEFFS-U are part of the Ministry of Agriculture and Irrigation (MINAGRI) and the Regional Government's Dirección Agraria (Agriculture Bureau) respectively, OSINFOR is part of the Prime Ministers Office (PCM).

Amazonian communities are characterized by informal negotiations and the reduction of communities' bargaining power through paternalistic relationships (Medina et al. 2009, 410). In Peru, Ucayali's office of the National Institute of Natural Resources (INRENA) recognized 34 community management plans. NGOs supported 10 communities in the drafting of management plans, while logging companies supported the remainder (Medina et al. 2009, 412). Studying four communities (two sites in Brazil, one in Bolivia, and one in Peru), Medina et al. found no communities harvesting and selling timber through their own community-based governing systems (2009, 412). This highlights the lack of indigenous participation in decision-making concerning resource extraction and the asymmetries of power and information regarding resource management.

Transaction costs associated with logging rights are often beyond the means of indigenous communities. Communities may face difficulty meeting the cost of hiring a forest engineer to develop annual harvesting plans (USD \$600 per year) (Medina et al. 2009, 414). It is not uncommon for communities to never receive payment or to receive payment over a year after the extraction occurred. Loggers negotiated with specific community members (or the community leader in commonly-owned forests), never with the whole community (Medina et al. 2009, 415) paralleling the findings of Watson (1996) for indigenous communities in Brazil. For a community to benefit from a community-based forest management (CFM) initiative, NGOs and government agencies, often supported by international donors, act as external partners for communities. Once this external support ceases for a CFM initiative, a community may face insurmountable

financial constraints and difficulties to compete with timber from other sources (Medina et al. 2009, 415).

Indigenous communities face fines from OSINFOR if timber claimed to be extracted from their territory was not extracted (making it probable that extraction occurred in protected areas or in another indigenous community). Likewise, if more trees are felled than specified in the management plan, fines can result. Depending on the severity of infraction, OSINFOR can suspend forestry management plans (and nix any proposal for management of other timber species or non-timber forest products). These irregularities can prompt an investigation by an environmental prosecutor and lead to criminal charges of depredation of natural resources, depredation of legally protected flora and fauna, ideological falsehood and moral turpitude. If timber is exported or sold outside of the Amazon (a tax free zone), the community must pay taxes to Peru's revenue department (SUNAT)⁷. The indigenous communities bear an undue burden for management of a resource over which they have little or no political, social or economic control.

Alto Purús

In 2011, I was responsible for data collection and writing natural resource use studies for four indigenous communities on the Purús and Curanja rivers for Upper Amazon Conservancy (UAC)⁸ and their Peruvian sister organization, ProPurús⁹. These two organizations are dedicated to protecting the biological and cultural diversity of the Amazon headwaters in southeastern Peru. UAC works with its Peruvian partner

⁷ Superintendencia Nacional de Aduanas y Administración Tributaria

⁸ Based in Jackson, WY.

⁹ Offices in Lima, Pucallpa (capital of Ucayali Department), and Puerto Esperanza (capital of Purús province).

organization, ProPurús, and in close collaboration with indigenous peoples, government agencies and other non-governmental organizations (NGOs) to strengthen the region's protected areas, build the capacity of its local communities, and implement well-informed, sustainable public policy.

On the Purús River, I worked with the Yine community of Monterrey and the Amahuaca community of Laureano. On the Curanja River, I worked with the Huni Kuin Communities of Santa Rey and Balta. The four indigenous communities border the Purús Communal Reserve, a protected area permitting subsistence use by indigenous communities. This Reserve forms the buffer zone of Alto Purús National Park, Peru's largest national park. No roads or waterways connect this region to other parts of Peru. It is accessible only by air from Pucallpa, the Regional Capital of Ucayali, to the Provincial Capital of Purús, Puerto Esperanza. In many respects, this region of Peru is aptly characterized as a "frontier." In 2007, Purús had a population of about 3,700, of which about 80% are indigenous. The remnant population is mestizo (of both European and indigenous ancestry) – mostly from areas outside Purús, living predominantly in Puerto Esperanza but also in two *caseríos* (small, rural communities), Mi Peru and Nueva Palestina. A number are public schoolteachers and work for government institutions.

Eight indigenous ethnicities inhabit 46 communities along the Purús and Curanja Rivers, and at least two indigenous groups living in voluntary isolation, including the Mashco-Piro and Curanjeños (Michael and Beier 2003), seasonally migrate through the area. Indigenous ethnicities include three Arawak groups: Culina (or Madíja) and Yine (Piro), Asháninka and five Pano groups: Huni Kuin (Cashinahau), Sharanahua, Mastanahua, Chaninahau, and Amahuaca. Amahuaca, Yine and Asháninka may visit

family members in other parts of Peru, while the Huni Kuin and Culina have kin in Brazil.

Indigenous communities of the Amazon may fission; most frequently, political conflict causes communities to fission. In the Alto Purús during the 1950s, following demographic recovery after a lethal smallpox epidemic after initial contact, the Huni Kuin settled in three communities: Balta and Santa Rey on the Curanja River and Conta on the middle Purús River. Since the 1980s, growing population pressure on local resources, and in the case of Conta, a major flood, precipitated the splintering of these communities. Some newly formed communities acquired land titles; however, certain communities are considered annexes. While there exist 23 titled indigenous communities in Purús, 46 are represented by the Federation of Indigenous Communities of Purús (FECONAPU)¹⁰, regardless of possession of title. FECONAPU is an inter-ethnic federation, representing eight ethnicities of the Purús and Curanja Rivers that was formed in the early 1990s (Rummenhoeller 2010). There is a National Inter-Ethnic Association for the Development of the Peruvian Amazon (AIDSESP)¹¹; each Amazonian Department has a regional affiliate – ORAU¹² in the case of Ucayali. Local federations then are connected to regional, national, and international networks of indigenous peoples. Communities without title are annexes of a titled community but have their own *apus* or *jefe* (village headman). It should be noted that a title increases the community's potential liability for legal sanctions for illegal logging or non-payment of taxes. An

¹⁰ Federación de Comunidades Nativas de Purús (FECONAPU)

¹¹ Asociación Interétnica de Desarrollo de la Selva Peruana (AIDSESP)

¹² Organización Regional de AIDSESP – Ucayali (ORAU)

annex would not have a land title, and would thus be unable to submit the paperwork for a logging authorization.

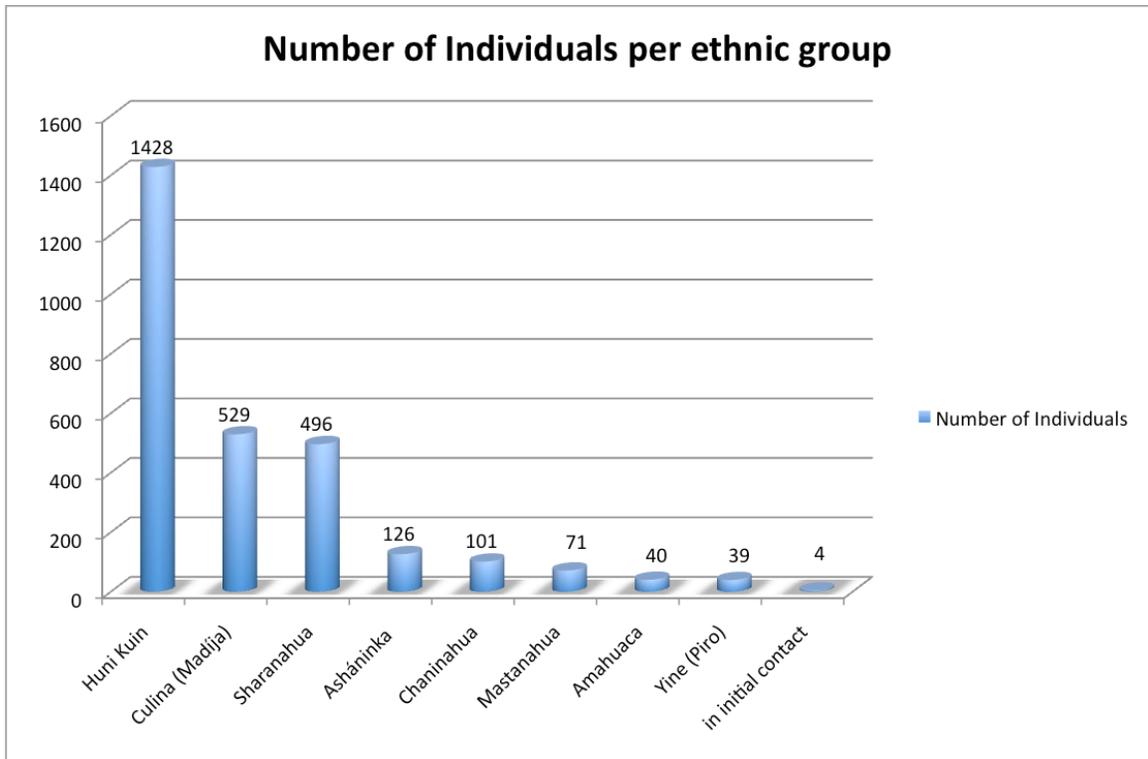


Figure 1: Indigenous population of Purús by ethnicity. Source: UAC/ProPurús n.d. Reprinted with permission.

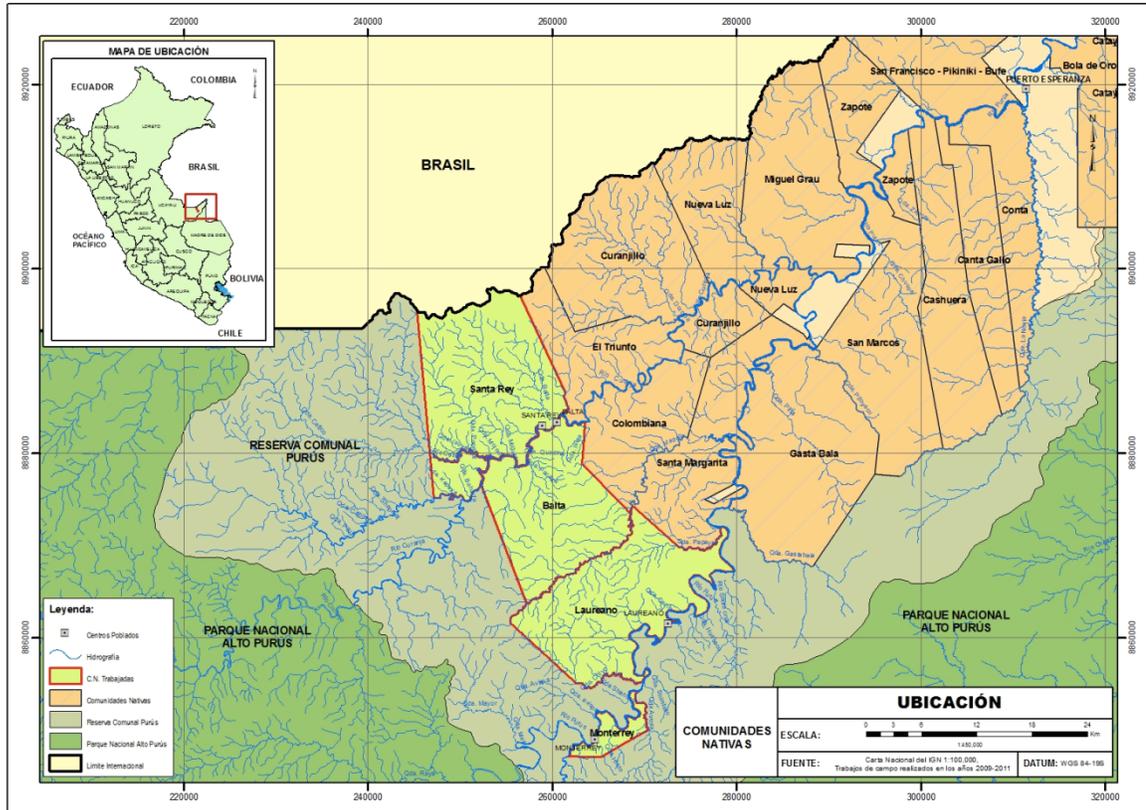


Figure 2: Map of Communities furthest away from Puerto Esperanza (capital of province). Communities of Balta, Santa Rey, Laureano, and Monterrey are in yellow. Source: UAC/ProPurús n.d. Reprinted with permission.

Alto Purús National Park

Alto Purús is a region comprised of tropical Amazon rainforest. The Arc of Fitzcarrald forms a *divortium aquarum* between the watersheds of Manu, Alto Purús, Ucayali, and Yurúa. This area is separated from the Andes mountain chain by the Ucayali River. The maximum altitude in the region is 635 meters above sea level (masl) (Pitman 2003). The Purús and Yurúa rivers are not formed in the Andes, but in this hilly region. The region is also of importance to paleontology for the fossils it harbors. In the Ucayali watershed, near Sepahua, a fossil of the giant caiman *Purussaurus brasiliensis*, a species, which measured between 14 and 18 meters, has been excavated (Pitman 2003).

Over 93% of the region is comprised of *terra firme* (upland) forest (Leite-Pitman et al. 2003). The rest of the region ($\approx 5\%$) is comprised of flooded forests, wetlands, and beaches (Pitman et al. 2003). About half of the forested landscape is comprised of thickets of giant bamboo of the genus *Guadua* (Leite-Pitman et al. 2003; Silman, Ancaya, and Brinson 2003). Some of the world's last commercially viable stands of big-leaf mahogany (*Swietenia macrophylla*) are in the Alto Purús National Park and adjacent areas. As of 2004, Alto Purús was believed to have the highest population densities of commercially viable mahogany in Peru – with an estimated 0.1 to 1 mahogany trees per hectare (Kometter et al. 2004). Without terrestrial or fluvial connection to other parts of Peru, the region has not suffered the levels of deforestation and colonization that occur in those areas with road networks.

The region has a dry season and a rainy season. In Puerto Esperanza, the current capital of the province, the average annual precipitation of the zone was 1,865.9 mm from 1964-1977 (ONERN 1980). This is more humid than Iñapari (on the border between Madre de Dios, Peru and Asis, Acre, Brazil) (1,725 mm), but drier than either Puerto Maldonado (capital of Madre de Dios) (2,259 mm) or Cocha Cashu biological research station in Manu National Park (2,300 mm) (Pitman 2003). Some 80% of the precipitation falls between October and April (Pitman 2003). Occasionally cold air masses from Argentina bring unseasonably cool weather (Pitman 2003).

Preliminary investigation of fish species in the Purús watershed (the Curanja river being the principal affluent of Purús river in Peru) found over 100 species of fish but estimated over 400 (Ortega and Rham 2003). The composition of fish species of the Purús watershed is distinct from the Madre de Dios and Ucayali watersheds (Ortega and

Rham). For example, paiche (*Arapaima gigas*) is found in the Purús watershed but not the Madre de Dios watershed (Davenport 2003). Davenport (2003) noted the relative abundance of taricaya aquatic turtles (*Podocnemis unifilis*) in Manu compared to Purús.

The region is also home to animals such as the jaguar (*Panthera onca*), harpy eagle (*Harpia harpyja*), tapir (*Tapirus terrestres*), and giant river otter (*Pteronura brasiliensis*) (Leite-Pitman et al. 2003). The endangered river turtle, *Podocnemis expansa*, also makes its home in the Purús River. Alto Purús and Manu National Parks may be the last refuge in Peru for the following globally endangered species: the black-shouldered opossum (also known as the white-eared opossum) (*Caluromysiops irrupta*), Goeldi's marmoset (*Callimico goeldii*), the bushy-tailed opossum (*Glironia venusta*), and the Peruvian fish-eating rat (*Neusticomys peruviansis*) (Leite-Pitman, Beck, and Velazco 2003, 121).

The Purús harbors an exceptional degree of diversity of avifauna. The indigenous community of Balta harbors over 425 species of birds, and for many years, this community held the world record for number of bird species in a single locality (O'Neill 2003). To this day, it remains one the most diverse places for neo tropical birds. Birdlife International considers over 2.7 million ha of the Alto Purús region to be an Important Bird Area, an area of globally important habitat for the conservation of bird species (one of 116 such areas in Peru) (Angulo Pratolongo 2009).

In 2000, by Supreme Decree No 030-2000-AG, Peru's Agricultural Ministry declared the Alto Purús Reserved Zone, comprising 5.2 million hectares. The area encompassed the headwaters of several major rivers. In 2002, the government reduced the Alto Purús Reserved Zone to 2.7 million hectares due to pressure from the logging

sector (Supreme Decree No 001-2002-AG). This reduction in public park reserves highlights the political and economic power of the logging industry to impose its will in the allocation of natural resources. In 2004, the area of the remaining Reserved Zone was officially categorized as Alto Purús National Park (APNP) comprising 2.5 million hectares, and as the Purús Communal Reserve (PCR) comprising about 220,000 hectares under Supreme Decree No 040-2004-AG.

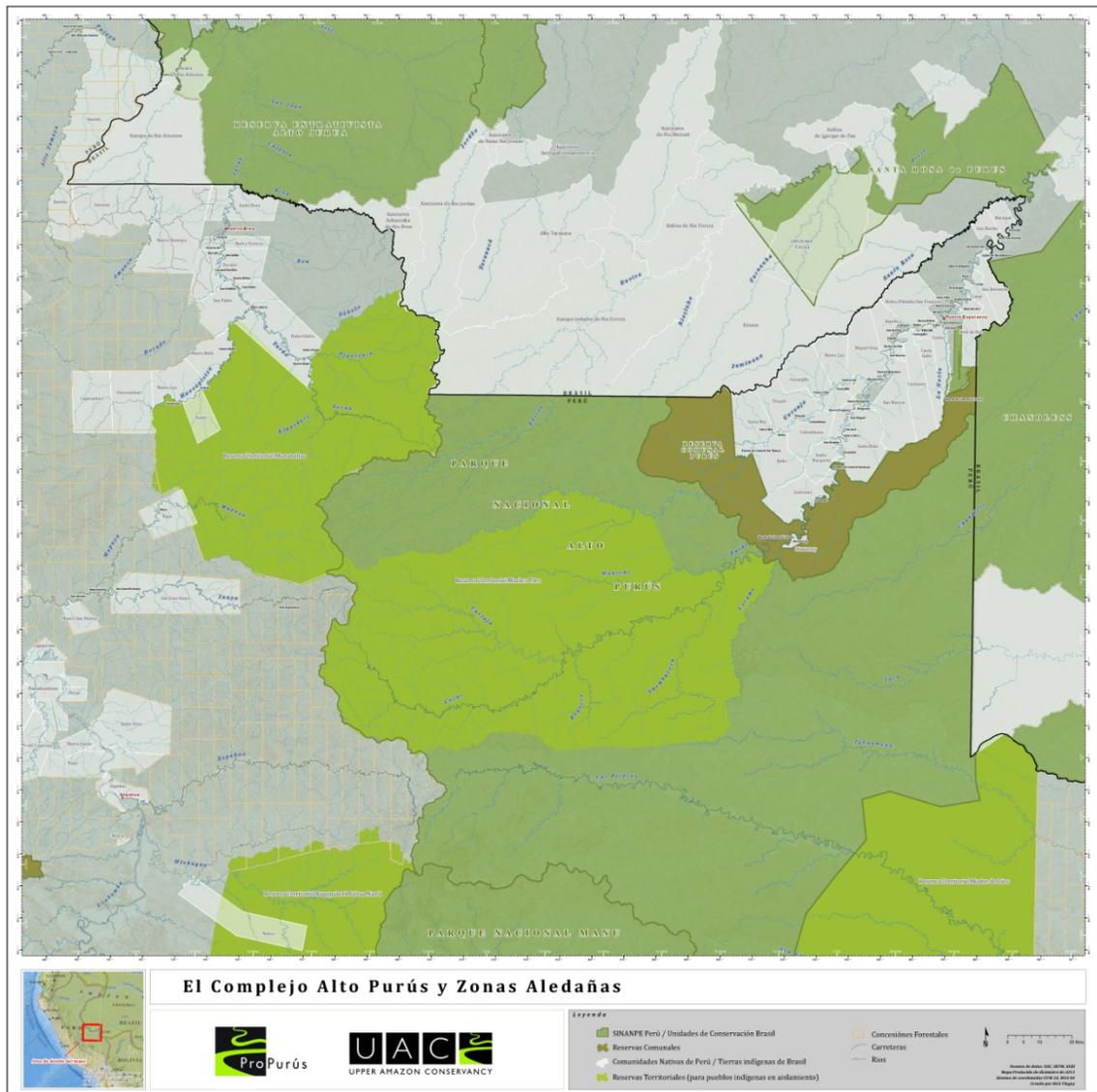


Figure 3: Map of Alto Purús Complex and adjacent areas. Source: UAC/ProPurús. Reprinted with permission.

(patrols), and ultimately approves any management plan advanced by the indigenous association.

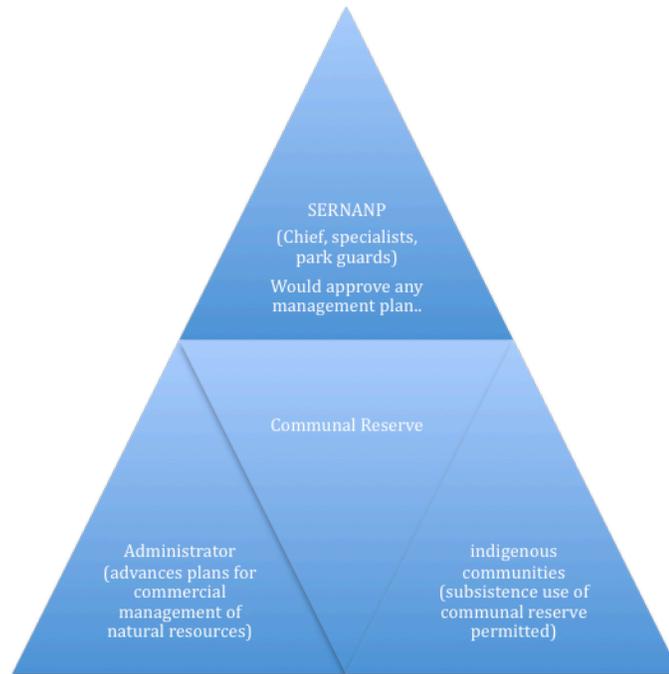


Figure 5: Conceptual management of a Peruvian Communal Reserve. Elaboration: Aaron Groth

Alto Purús National Park is superimposed upon the Mashco-Piro Territorial Reserve for Indigenous Populations in Voluntary Isolation, which was set aside by the Regional Government of Ucayali in 1998. To the northwest, the park is adjacent to the Murunahua Territorial Reserve, and to the southeast, the park is adjacent to the Madre de Dios Territorial Reserve. Indigenous populations living voluntarily in isolation represent vulnerable populations who have resisted contact with the state, missionaries, and other outsiders since the *correrias* (slave raids upon indigenous peoples) of the rubber boom (1880-1920). Reports of loggers using captured Murunahua (Chitonahau) to work in logging camps surfaced in the mid-1990s (Bedoya and Bedoya 2005). Loggers operated within Alto Purús National Park and the adjacent Territorial Reserves (Fagan and

Shoobridge 2005; 2007). During May to September 2002, 39 logging camps were operating inside the Alto Purús Reserved Zone along the Las Piedras River (Shulte-Herbüggen 2003). Logging activity impacts the groups living in voluntary isolation, exposing them to the risks of disease (to which they have no immunity) and armed confrontation. In March 2009, Round River Conservation Studies conducted an over flight of Alto Purús National Park and the Murunahua Territorial Reserve, finding logging camps along the Park's western border and in the headwaters of the Sepahua, Inuya, and Mapuya rivers (Round River 2009). These four logging camps were all operating within the boundaries of the Murunahua Territorial Reserve. Logging is not a permitted land use within protected areas or territorial reserves. Indigenous communities may practice subsistence hunting, fishing, and gathering in communal reserves; however, they may not engage in commercial extraction of timber in a communal reserve. Indigenous communities with titled land (i.e. legally recognized) can commercialize timber, but must empower a third party (due to limited economic resources). The landscape of Purús is contested territory between indigenous peoples and westerners.

Mahogany Logging in Purús Indigenous Communities

Preliminary research undertaken with UAC/ProPurús suggested a further exploration of the social and environmental impacts of selective mahogany logging upon indigenous communities was required. A number of Huni Kuin informants emphasized the negative impacts their communities had suffered as a result of selective logging of mahogany (UAC/ProPurús n.d.). These antecedents, coupled with the lack of literature concerning the social, economic, and environmental impacts of mahogany logging upon Peruvian indigenous communities prompted the present study.

An environmental history of the region must account for the extraction of natural resources such as rubber, commercial fishing and depletion of the species *Arapaima gigas* (the world's largest freshwater fish), commercial hunting for animal hides, commercialization of river turtle eggs (*Podocnemis spp.*), and most recently, logging of big-leaf mahogany (*Swietenia macrophylla*). Mahogany represents the most valuable timber species in the neotropics. This history must account for the role of indigenous communities' in the environmental history and historical geography of the area.



Figure 6: Photo of man carrying board of timber to the Purús River (January 2011). Photo credit: UAC/ProPurús . Reprinted with permission.



Figure 7: Photo of transport of wooden boards from forest interior to Purús River (June 2011). Photo credit: UAC/ProPurús. Reprinted with permission.

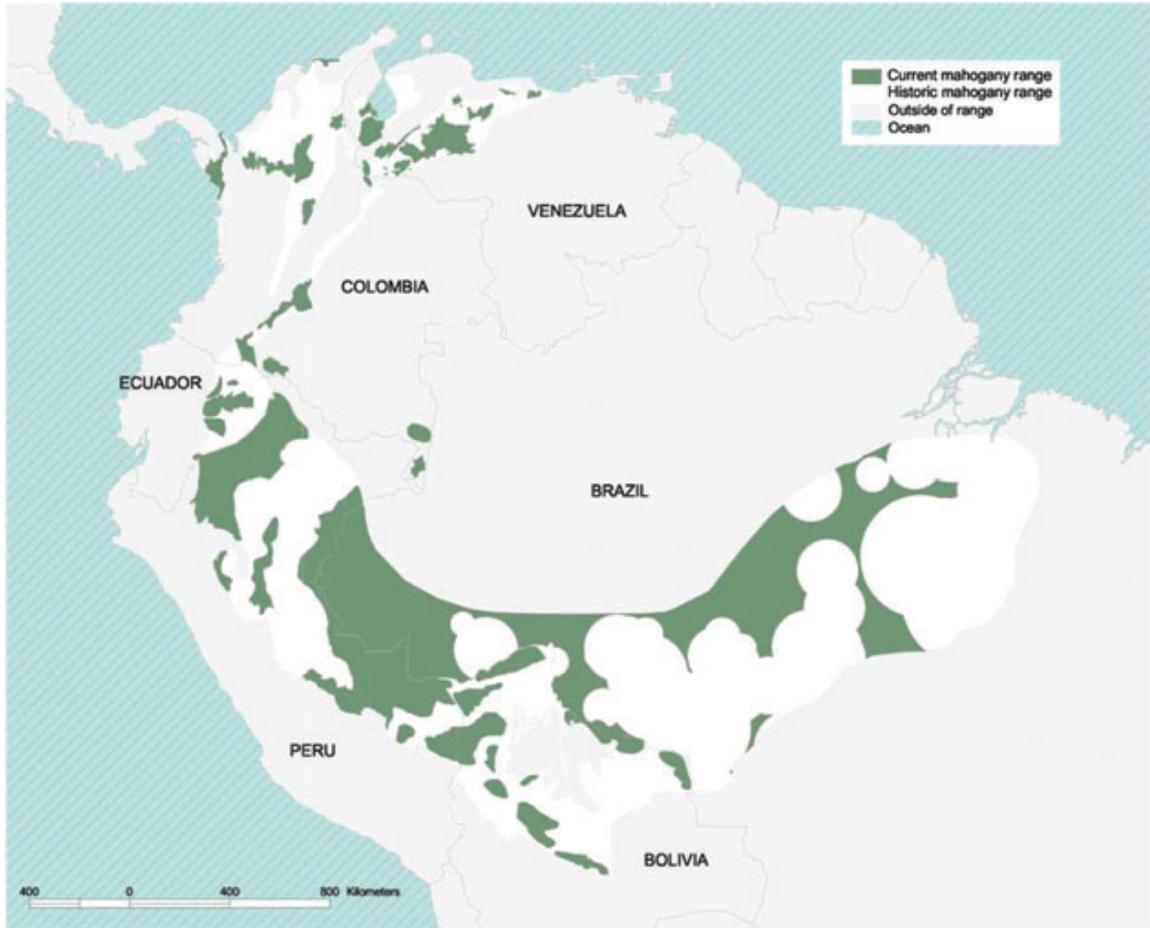


Figure 8: Distribution of existing commercial populations of mahogany in South America, shown by the darkened area within its historic range. From Grogan et al. 2010, *Conservation Letters*. Reprinted with permission.

In South America and Central America, illegal extraction of mahogany has been reported from National Parks, forest reserves, and lands reserved for indigenous people (Rodan, Newton, Veríssimo 1992, 332). During the early 1990s, one cubic meter of mahogany cost \$700 on the export market (Veríssimo et al. 1995, 39). It is an increasingly scarce resource. Scarcity is directly associated with rising prices of the raw commodity. As of 2009, mahogany was worth up to US\$1,800 per cubic meter of sawn wood at the point of export in Peru (Grogan et al. 2010, 13). This constitutes an increase of over 150 percent in nearly 20 years. This international market price is not paid to

indigenous communities – the point of sale for much mahogany. According to Fagan and Shoobridge (2007), the indigenous communities receive between 100 and 200 Peruvian soles, or US\$30 – \$60, for one mature mahogany tree worth several thousand dollars on the international market. In 1989, colonists of Thailândia, Pará, in eastern Brazil, who did not participate in the extraction of wood on their land, garnered only 1% of the final sawn value of the wood (Uhl et al. 1991). In part, the high price paid on the international market is attributable to high transaction costs and also the huge liability of potential criminal charges involved in procuring mahogany on the international market. Loggers know that the indigenous communities have little experience in commercial business transactions, lack knowledge of laws governing logging, lack wood measuring skills, and lack the political power or support to enforce laws and regulations. It is easy for loggers to advance goods at elevated prices for undervalued wood (Fagan and Shoobridge 2007).

The indigenous communities of Purús have sold to timber interests their big-leaf mahogany and other commercially valuable tropical hardwoods such as Spanish cedar (*Cedrela odorata*). While mahogany serves as a premier wood for boat building within local communities and may be used as a local construction material, it is one of the most coveted and expensive woods on the international market. Depletion of mahogany stocks throughout Latin America led to a boom in extraction of the resource in Purús (Fagan and Shoobridge 2005; 2007). The commercial value of the species depends upon available supply, costs of cutting, labor, transport, export, and finally, processing as a value-added product. Protected areas in Peru do not allow commercial forestry extraction; irregularities plague extraction of mahogany from indigenous communities' titled land. A logger holding permits for timber extraction and timber transport may use those papers

(supposedly to transport timber felled with authorization in a forestry concession or on titled indigenous community land); however, loggers extract mahogany from both protected areas and territorial reserves. While mahogany may provide a valuable source of revenue for indigenous communities, the benefits are not equally shared among community members, and the process of extraction relies upon asymmetries of power and information. From 2000-2008, there was a marked increase in mahogany extraction in southeastern Peru, which might be characterized as a “boom.” The indigenous communities of the Purús and Curanja rivers were active, if unequal, participants in this boom (Fagan and Shoobridge 2005; 2007).



Figure 9: Photo of mahogany board left to rot on a trail near the Alto Purús National Park Control Post on La Novia River May 2011. Photo Credit: UAC/ProPurús. Reprinted with permission.



Figure 10: Photo of mahogany awaiting transport on Peruvian Air Force plane, July 2011. Note the paved runway of Puerto Esperanza. Hercules aircraft arrives to fly the mahogany to Pucallpa, the Regional Capital. The runway was paved during the administration of Peru's President, Alberto Fujimori. Photo Credit: UAC/ProPurús. Reprinted with permission.



Figure 11: Photo of plane being loaded with mahogany in 2006. Photo credit: UAC/ProPurús. Reprinted with permission.

The objectives of this study are:

- 1) To document indigenous perceptions of the environmental and social impacts of mahogany logging.

2) To ascertain how the process of mahogany extraction affected the social relations of production amongst indigenous communities

- a. Establish if a breakdown in community reciprocity occurred, as certain members/actors gained power as a result of commodification.
- b. Establish if logging created intra-community and inter-community conflict.
- c. Determine the identity of actors/which individuals who were involved in the process of extraction.
- d. Determine who sold logging rights within indigenous communities.
- e. Determine how timber earnings were distributed.

Expected Results:

- 1) Produce qualitative and quantitative data regarding the social impacts of mahogany extraction that may serve as the basis of comparison with other indigenous communities throughout Latin America.
- 2) Produce qualitative and quantitative data regarding the environmental impacts of mahogany extraction that may serve as the basis of comparison with other indigenous communities throughout Latin America.
- 3) Produce maps made by inhabitants of the region's indigenous communities.

Throughout the colonial era, conquerors and explorers have used indigenous spatial knowledge to draw maps of indigenous territories, and these maps have been used to exploit resources (Herlihy and Knapp 2003, 303). This study may serve to document spatial information about human land use and may serve communities in the process of designing their own conservation and management plans. According to Herlihy and Knapp (2003, 308-309), participatory mapping may serve to “educate and empower

communities,” in their management of resources and territory. This participatory study is anchored in promoting social and environmental justice.

Individuals, family or household units may feel the effects of social impacts, which are experienced or felt (corporeal); furthermore, social organizations, institutions, or the community as a whole may experience social impacts (Vanclay 2002).

Research Questions

- 1) How has mahogany extraction degraded/affected the environment?
- 2) How did mahogany extraction impact the indigenous communities of Purús? How did the process of extraction affect/change the social relations of production amongst indigenous communities? With the commodification of this local resource, who was marginalized (socially and economically)? How did this create intra-community and inter-community conflict, attenuating the social relations of production? What actors/which individuals were involved in the process of extraction? Who sells mahogany within indigenous communities? How was revenue distributed?

This thesis draws from political ecology theory to explore the social and environmental impacts of mahogany extraction within six indigenous communities of the remote and biologically diverse Alto Purús region of Peru. Specifically, it uses ethnographic methods and participant mapping to examine the processes of marginalization and degradation of indigenous peoples and lands as a consequence of mahogany extraction in this region, as well as to understand indigenous responses to the extraction of this resource in the context of power asymmetries between indigenous communities, the state, and the timber industry.

II. Literature Review

Mahogany Profile: History of Extraction, (Mis)management, and Depletion

The range of mahogany “includes dry to wet climates, lowland to montane elevations, many soil types, and from floodplain to upland habitats” (Lugo 2003, v.). The tree’s density ranges from dense stands of very old trees “to stands of small-diameter trees scattered among taller vegetation” (Lugo 2003, v-vi.). The species has been classified as a pioneer species or a light-demanding climax species (Brown et al. 2003). Recruitment may occur after “multiple, small-scale disturbances” (Brown et al. 2003). Mahogany seeds dispersed at the end of the dry season may remain on the forest floor until rainfall prompts germination (Brown et al. 2003). Insufficient soil moisture due to large gaps may delay mahogany germination (Brown et al. 2003). Seedlings and saplings of mahogany may survive and grow in dry deciduous forests wherever there is sufficient soil moisture and light penetration (Brown et al. 2003). Large-scale canopy disturbance (hurricanes in Central America and Mexico and fire throughout its range) may determine seedling survival in evergreen and semi-evergreen forests (Brown et al. 2003).

Examining the history of the mahogany trade provides an important background for analysis of current patterns of extraction. Jennifer Anderson examines the colonial mahogany trade (*S. mahagoni* from the Caribbean and *S. macrophylla* from Central America), and notes that international trade in mahogany involved indigenous communities, Africans, and European colonists in the West Indies and Bay of Honduras, ship captains, merchants, carpenters, cabinetmakers and European and North American consumers “negotiating over information about and access to a dwindling natural

resource among diverse people throughout the Atlantic” (2004, 77-78). Social relations, asymmetries of power, and larger political-economic processes influenced the chain of production from tree felling, to transport, to value-added labor, and finally, to sale. The mahogany trade correlates to increasing patterns of consumption in Europe and North America and ecological consequences along the periphery of the Caribbean and Central America (Anderson 2004, 77). An elite and emerging middle class in Europe and North America considered mahogany furniture a luxury and a symbol of status. The market demand for mahogany to create elegant hardwood furniture as a status symbol for the wealthy and middle class has not abated. This demand has exhausted sources throughout the genus’ range both by selective logging and Land Use/Land Cover Change.

Big-leaf mahogany (*Swietenia macrophylla*), Cuban mahogany (*S. mahogni* L.), and Mexican mahogany (*S. humilis* Zuccarini) are listed under Appendix II of the Convention for International Trade of Endangered Species (CITES). A species listed under Appendix II, requires an exporting country to verify the origin and chain of custody (i.e. should not be removed from protected areas). Human and agricultural encroachment have reduced and fragmented the range of *S. humilis* Zuccarini, native to the Pacific coast of Central America. While never a major source of international commerce, this species was “listed in CITES Appendix II in 1973, based on a proposal from Mexico” (Rodan, Newton, Veríssimo 1992, 331). *S. mahogni* (L.) is a “prime example of extreme genetic erosion due to overexploitation of the best genotypes” (Rodan, Newton, Veríssimo 1992, 331). Over 500 years of commercial exploitation and land clearing has reduced populations and degraded the quality of those trees remaining throughout its natural range (Cuba, Hispaniola, Jamaica, the Bahamas, and the Florida

Keys) (Rodan, Newton, Veríssimo 1992, 331). In 1992, the species was listed in CITES Appendix II, as proposed by the United States and Costa Rica.

Depletion of Big-Leaf Mahogany Throughout its Natural Range and Shifting Sites of Extraction

The environmental history of the logging of mahogany throughout its range in the Americas corresponds closely to the history of European colonization of the new world and the growth of local (colonial) and global markets. Exploitation first occurred in the Caribbean and Cuba, moved to Mexico, then to Central America, and now, to the last known and most remote reserves in South America. Mexico and Central America are depleted of mahogany. Since the 17th century, Mexico has been a source of big-leaf mahogany for the international market (Whitman, Brokaw, and Hagan 1997, 37). From the colonial period to the present, 80% of Mexico's forests have been converted to other uses (Whitman, Brokaw, and Hagan 1997, 38). Northwestern Belize has been selectively logged for mahogany and Spanish cedar since the early 1800s (Whitman, Brokaw, and Hagan 1997, 87-88). Hauling method improvement allowed Belize woodsmen to access areas previously inaccessible (Camille 2000). Production levels rose dramatically starting in the early 1800s with the introduction of cattle, "tractors in the 1920s, and lorries in the 1940s" (Camille 2000). Until the early 1970s Central America dominated the world market, but now supplies less than 10% of international trade (Blundell 2004). After centuries of extensive logging in Belize, it is uncommon to find a commercial-sized mahogany tree there (Kometter et al. 2004). During Belize's history, mahogany constituted up to 70% of its exports (Camille 2000).

Supply shifted from Mexico and Central America to South America. As early as 1908, Venezuela exported mahogany to the United States, but sawn timber production

has declined since a 1971 peak due to deforestation and conversion of forests to other uses (Grogan et al 2010, 13). Columbia's commercial populations were exhausted by the 1960s due to deforestation to expand the agricultural frontier and industrial logging (Grogan et al. 2010, 13). Following mahogany's initial extraction in Ecuador in 1985, commercial populations were largely depleted by 1995 (Grogan et al. 2010, 13).

Before the construction of roads, those mahogany trees closest to major rivers and streams were harvested because of their accessibility and the transportation advantages of riverine transport of the logs. Grogan posits that as early as the 1950s, western Amazon River tributaries in Peru and Brazil were depleted of mahogany (Grogan et al. 2010, 13). As a consequence of the elimination of an easily available supply, focus shifted to construction of roads to facilitate extraction, or towards exploiting remote tributaries or indigenous lands.

The late 1960s and 1970s marked the beginning of Brazil's mahogany trade (Whitman, Brokaw, and Hagan 1997, 38). By the end of the twentieth century, mahogany was commercially extinct in the Brazilian States of Tocantins, Pará, Mato Grosso, and Rondônia (Blundell 2004, 85). The construction of over 3,000 kilometers of logging roads in southern Pará State, Brazil, allowed colonists, ranchers, and loggers, to use these existing roads, obtain legal title, and clear-cut remaining forest (Rodan, Newton, Veríssimo 1992, 335). Indeed, by early 1970s, mahogany depleted along Araguaia River in south-east Pará, Brazil, in part due to the new state highway PA-150 (Blundell 2004, 86). Commercial stocks were eliminated from Rondônia, Brazil between 1980-1985. Between 1971 and 1992, Brazil produced an estimated 5.7 million cubic meters of sawn mahogany timber, and 75% of exports went to the United States or the

United Kingdom (Grogan et al. 2010, 13). This highlights that the majority of mahogany is exported as a “raw” product and any value-added process occurs in the United States or the United Kingdom.

Extraction of Mahogany from Indigenous Lands in Brazil

Mahogany on indigenous lands is especially susceptible to illegal extraction. While 1975 marks the initiation of extraction of mahogany from Brazilian indigenous lands, the process accelerated in the 1980s (Veríssimo et al. 1995, 57). Brazil’s Federal Agency charged with managing indigenous affairs (FUNAI) mediated illegally between loggers and indigenous communities. In 26 out “[o]f 257 documented cases of mahogany extraction on [indigenous] lands in the Brazilian Amazon between 1975 and 1992, FUNAI arranged the extraction through mediation (Veríssimo et al. 1995, 57). In 99 cases loggers negotiated directly with [indigenous] peoples. Mahogany extraction without [indigenous] consent occurred “[i]n the remaining 132 cases” (Veríssimo et al. 1995, 57). This means that over 51% of documented cases of mahogany extraction on indigenous lands occurred without prior consent. These numbers reflect only documented cases, so it is possible that illicit extraction was greater than reported. In 1994, seven FUNAI officials were dismissed for corruption, by facilitating loggers’ extraction of timber on indigenous lands, presumably in a quid pro quo (Watson 1996).

In Brazil, over 2 million cubic meters were extracted from native lands between 1982 and 1992 (even though proscribed by 1988 Brazilian Constitution) (Blundell 2004, 86). Through interviews with mahogany extractors in southern Pará in 1991, it was concluded that 45% (n=24) extracted mahogany from indigenous lands (Veríssimo et al. 1995, 57). The 15 indigenous reserves of southern Pará had all suffered mahogany

extraction by the end of 1992, and “the total volume of mahogany extracted” from those indigenous reserves during this period “was at least 574,000” cubic meters (Veríssimo et al. 1995, 57). Some indigenous groups such as the Kayapó sought to sell their mahogany, but other groups resisted the temptation to sell their forests. Extraction of mahogany from indigenous territories constituted a major portion of Brazil’s mahogany exports.

In 1987, the Kayapó reservation in the eastern Amazon represented the source of 69% of the mahogany exported from Brazil (Rodan, Newton, Veríssimo 1992, 333). This extraction impacted the ability of the species to reproduce locally. In the Kayapó territories of Pará that experienced mahogany harvesting, a loss of 85% of the species’ fruiting populations occurred (Zimmerman et al. 2001). The Kayapó invested profits from gold extraction and mahogany logging in territorial protection (Zimmerman et al. 2001). Mahogany profits were reinvested in the community through aerial patrols and acquisition of communication radios and boats for the enforcement and monitoring of territory (Zimmerman et al. 2001).

While in some cases, the Kayapó facilitated logging of mahogany on their lands, the Kayapó of A’Ukre killed trespassing loggers in the early 1990s (Zimmerman et al. 2001). So too have other indigenous communities responded violently to loggers’ incursions upon their territory. The Uru-eu-wau-wau killed loggers on their land but failed to eject them or to fully prevent logging activities on their lands (Watson 1996). In 1991, the Cinta Larga killed five loggers after repeated requests to stop logging (Watson 1996). Resistance to loggers’ operations, includes destruction and confiscation of logging equipment. Notably, the Nambiquara have burned logging equipment and the

Sakiriabar have impounded machines (Watson 1996). In terms of power, access, and information, these indigenous communities are at a disadvantage vis-à-vis financially powerful, and sometimes armed, logging interests.

Populations of indigenous peoples in voluntary isolation (PIAV) are particularly vulnerable to incursion by outsiders (i.e. loggers or miners). The health risk to these populations at initial contact is great. These groups do not have modern weaponry to resist; furthermore, they lack legal standing to denounce incursions onto their territories. For example in the case of Peru, they would not have a National Identity Document (DNI), and thus could not file a police report, vote, or access government services.

Loggers have cheated Brazilian indigenous communities, constructed roads through their lands to extract timber, and in some cases, murdered indigenous people. In 2011, 51 indigenous peoples were murdered in Brazil, and according to the Indigenous Missionary Council, an arm of the Roman Catholic Church, 24 deaths are attributable to land disputes (Romero 2012). More than half of these 2011 murders occurred in Mato Grosso do Sul (Romero 2012). Murder of indigenous individuals forms an integral part of loggers' (and other actors') strategy to gain access to indigenous territory through brutal intimidation. In 1988, a local logger hired 20 gunmen to murder a group of Tikuna who had opposed his logging on their land (Watson 1996). The Tikuna had requested a meeting with police and military. In the assault, 14 Tikuna were killed and 23 wounded. Subsequently, 11 gunmen were arrested, but then released. No one was successfully prosecuted for these murders and attempted murders (Watson 1996).

Road construction facilitates further incursions by migrating pioneer settlers into otherwise remote areas. Settlers often used logging roads to penetrate and then to occupy

lands, which are then converted from forest to agriculture and pasture. Logging and ensuing colonization contributed to dramatic falls in the levels of indigenous food resources (i.e. wildlife – game availability), and high levels of malnutrition among indigenous communities whose lands were invaded or disturbed (Watson 1996). The effects of selective logging (and hunting that inevitably accompanies logging teams) on wildlife have been documented in the Las Piedras watershed (Schulte-Herbüggen 2003) and for Sepahua (Eckersley et al. 2003).

The Guajajara indigenous community sold over 12,000 cubic meters of wood for a sack of rice (Watson 1996, 78). Loggers have altered social relations in communities, favoring certain individuals with material possessions and creating tension and jealousy between community members (Watson 1996, 78). Tensions between communities may surface as they compete for high-value timber resources. The Kayapó of A'Ukre control approximately 300,000 ha, bounded by four other communities: Moikarako, Kuben-kran-ken, and Gorotire (Zimmerman et al. 2001). Boundary disputes (and thus vying for control over timber resources) between these groups precipitated seizing loggers as hostages and the seizing of machinery perceived as trespassing in the early 1990s (Zimmerman et al. 2001).

Loggers used alcohol as a bargaining tool and inducement to procure logging rights on indigenous lands (Watson 1996). Logging camps often employ indigenous women as prostitutes, and this spreads venereal disease and increases the likelihood of out-of-wedlock pregnancies (Watson 1996).

Indigenous communities with egalitarian attributes developed hierarchical and exclusive structures. Loggers created divisions and jealousies within indigenous

communities by favoring a few, select individuals when negotiating the extraction of timber (Watson 1996). Loggers entered into verbal or written contracts with very few indigenous individuals; by dealing with individuals, these loggers avoided the necessity of negotiating in good faith with the group as a whole, and thereby succeeded in cheating whole communities of a reasonable and fair exchange for communally-held natural resources (Watson 1996). In the case of Kayapó, corruption of community leaders led to community members demanding their leaders use logging profits to benefit all community members “rather than just the chief and his family” (Zimmerman et al. 2001).

Logging companies attempted to nullify ministerial acts recognizing indigenous reserves through lawsuits in the Brazilian court system (Watson 1996). Fortunately, Brazilian courts unanimously rejected this attempt to flagrantly abrogate indigenous rights. However, as demonstrated by the failure to arrest, much less convict, loggers responsible for the murder of indigenous individuals, indigenous protection under the law is incomplete and tenuous.

Decreasing Availability of Mahogany Stock

The National Council of Rubber Tappers and the Federal Police launched a joint operation in October 1993, and discovered 10,000 cubic meters of mahogany illegally logged from three extractive reserves in Acre (Watson 1996, 79). These examples highlight a lack of enforcement control. Not one scientific, sustainable management plan for the extraction of mahogany is being executed currently in Brazil, according to the Nucleus for Indigenous Rights (NDI) (Watson 1996, 79). Fiscal and logistical constraints hamper efforts at enforcement and prosecution.

Brazil suspended the commercial mahogany trade in 2001, citing social and environmental degradation. By 2010, Brazil's historic range of mahogany suffered at least a 65% reduction (Grogan et al. 2010, 14). The exhaustion of Brazil's commercially viable mahogany caused a relocation of extraction to Bolivia. In the late 1960s Bolivia began logging mahogany (Kometter et al. 2004). Bolivia was a leading mahogany exporter by 1996. Commercial stocks were rapidly depleted, and the country now supplies only about 8% of international mahogany trade. Although Santa Cruz and Beni, Bolivia still have forest cover, mahogany populations were decimated (Blundell 2004, 85).

In 2001, about 7% of mahogany's South American range was under legal protection; furthermore, 15% of its range was protected in legally recognized indigenous lands (Grogan et al. 2010, 15). Due to illegal logging in protected areas and indigenous lands, stands of mahogany may be depleted (Grogan et al. 2010, 17). About 20% of mahogany's historic range was deforested by 2001, and "an additional third of the geographic range had been selectively logged for mahogany" (Grogan et al. 2010, 18). Protected areas and titled indigenous lands may serve as a seed source for tree regeneration in areas already depleted. The depletion of mahogany throughout Mesoamerica, Brazil, and other lowland Amazonian countries led to commercial interest in Peru's mahogany.

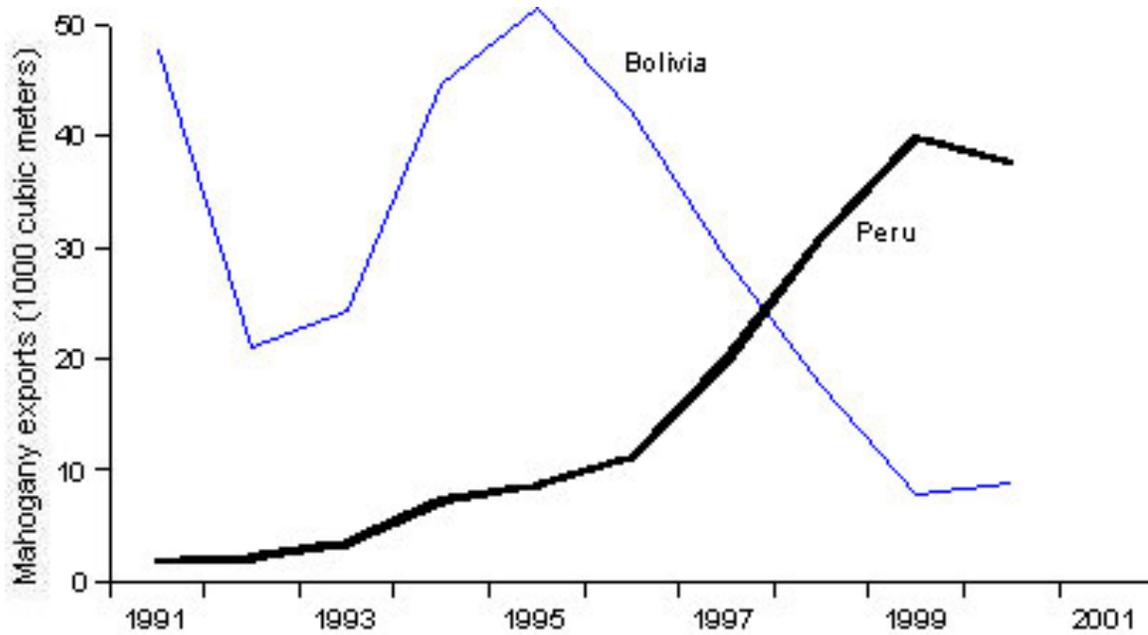


Figure 12: Exports of sawn mahogany to the United States between 1991 and 2001 from Bolivia and Peru as per CITES trade statistics derived from the UNEP-WCMC CITES Trade Database, UNEP, World Conservation Monitoring Centre, Cambridge, UK.

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Peru: The Final Mahogany Frontier

By 1998, Peru surpassed Bolivia in mahogany exports. Big-leaf mahogany has been depleted throughout its range, either through clear-cutting and burning of forests or through selective logging throughout the Americas. Prior extraction of big-leaf mahogany on the Bay of Honduras and Mosquito Coast of Central America rested upon African (slave) labor, indigenous labor and knowledge of the landscape, and European colonists. The genetic degradation and erosion suffered by small-leaf mahogany (Caribbean mahogany; *Swietenia mahogani*) serves as a cautionary tale of degradation of a species that can occur – the commercial extinction of a valuable timber species. As all the most accessible geographic sites are depleted of stock, extraction of mahogany moves inexorably into increasingly remote areas.

The case of big-leaf mahogany extraction in Peru provides an interesting case study to analyze extraction of a natural resource commodity under 1) state control of forest resources despite indigenous land title, and 2) within the context of Robbins' (2004) marginalization and degradation thesis. Certain areas of Central America, the Caribbean, and states of Brazil (i.e. R ndonia, Par , and Acre) have no remaining commercial stocks of mahogany (Grogan et al. 2010). Recovery of the species requires management, and, in order for the recovery of 2 meter diameter trees, hundreds of years. Areas closest to the major cities of Iquitos and Pucallpa in Peru, and the Department of San Martin, have been logged of commercially viable mahogany and experienced subsequent land conversion to agriculture or pasture. Genetic degradation and genetic erosion threatens the surviving members of the species. Alto Pur s is one of the most remote areas of the Amazon and hosts some of the last stands of mahogany at the highest density in the country (Kometter et al. 2004). Control of forest resources and a legacy of exploitation and debt-peonage remain important factors in indigenous communities' control of territory and resources and empowerment. Use of this resource has profound implications for the livelihoods and cultural integrity of indigenous people, the most marginalized and impoverished of Peruvian society.

According to Harry Hoy, Peruvian mahogany logs were annually rafted starting around 1900 to Manaus and Bel m (1946). From Brazil, it was shipped as "Brazilian" mahogany (Hoy 1946). Not until 1920 were saw mills erected near Iquitos in northeastern Peru (1946, 1). In the 1940s, Hoy reported that sparsely populated Puerto Maldonado (Madre de Dios Department had a predominating indigenous population) used mahogany only for firewood and local construction (1946, 5). Hoy also noted that,

the advance of capital from the mill company to the logger, allows the logger to begin operations, but keeps him in debt and obligated to the lender (1946, 5). By 1939 Iquitos exported 2,500,000 feet of mahogany – mostly to the U.S. (Hoy 1946, 9). The Amazon provided many strategic natural resources for the United States during WWII. Straight-grain mahogany was a strategic resource for the United States' use in naval and aircraft construction (PT boats, propellers) (Hoy 1946, 11). Hoy noted that in the WWII era, mahogany extraction in Peru was relatively new, but observed: “the easily available logs of the most accessible rivers have already been exploited” (1946, 13). In a prescient statement, Hoy predicted loggers would have to expand further up streams and minor water bodies (1946, 13).

A quarter of century later, Stewart White observed that due to the high transport cost of wood from eastern Peru to Lima, cedar and mahogany did not enter the international market in large volumes (1978). Other timber species constituted the major portion of wood consumed in Peru (1978, 396). Not much changed between the time of Hoy's study and White's. Capitalists in Lima loan to lumber company owners, who then in turn loan to regional patrons, under the condition that logs be delivered to their sawmills as repayment (White 1978, 396). Instead of providing the loan in cash, the lender delivers the materials required to undertake the operation at locally elevated prices due to the high cost of transport (White 1978, 397). Transport of mahogany logs is subject to dependence upon the proximity of tributaries and sufficiently high water levels, limiting the period of transport as an environmental constraint (White 1978, 401). The rainy season usually marks the time of transport of logs and boards on major rivers.

Machiguenga indigenous people inhabiting the upper Urubamba worked with logging teams in the late-1970s (White 1978). While roads, railroads, and access to markets may present the conditions necessary for clear-cutting, logging in the Urubamba is highly selective because of reliance on labor and stream hydrology for log transport (White 1978, 403). Chains of loans from the source of capital to lumber company owners, to the regional *patrones* who oversee loggers and determine sites of timber extraction, implies asymmetries of power: debt is accrued up through the chain, as goods are advanced at inflated prices. This asymmetry continues down the chain as loggers reimburse indigenous communities for timber with goods offered at highly inflated prices relative to the value of harvested resources (assuming the loggers pay communities at all rather than steal the resource).

There are irregularities in reporting the volume of wood extracted from the region. Loggers authorized to extract mahogany from forestry concessions may find their permitted concessions to be devoid of the species. Given the capitalization chain involved in the timber enterprise, the logger cannot afford the economic loss of owning a permit for extraction in an area devoid of mahogany. This induces loggers to infiltrate and illegally log protected areas and indigenous lands. Even if a logger has an annual operating plan (POA) for an indigenous community permitting the cutting of mahogany, he may extract the mahogany from another community (or forest concession), but use the official papers to make it appear as if the timber was extracted from the correct (permitted) community or forest concession. Newman Lumber of Mississippi, USA and IMT of Peru processed about 59,000 cubic meters of sawn mahogany between 1998 and 1999 (worth \$44 million, 10% more than the entire volume of exports that the Peruvian

CITES Management Authority reported during the same period (55,000 cubic meters) (Blundell 2004). This highlights the industry's irregularities and the evasion of accurate reporting in order to avoid taxation or criminal prosecution.

In Peru, as of 2004 the world's largest exporter of mahogany, the range of mahogany has decreased by 50%, and experts estimate that within the next decade it could shrink by an additional 28% (Kometter et al. 2004). The Alto Purús harbors one of the last remaining stands of commercially viable mahogany in Peru and Bolivia, and tree density for mahogany in the Alto Purús is among the highest in Peru (Kometter et al. 2004).

Access to this natural resource has generated conflict. Timber interests have not been shy in forcibly advocating for greater, unfettered access to protected areas. The last remaining large mahogany populations in Peru are found in areas of indigenous cultures living in voluntary isolation (Kometter et al. 2004). In June 2002, loggers violently protested stricter laws in Puerto Maldonado, Madre de Dios, targeting the government's National Institute of Natural Resources (INRENA) and the environmental groups such as ProNaturaleza (Kometter et al. 2004).

Impacts of Logging on the indigenous community of Alto Tamaya,

Ucayali, Peru

David Salisbury (2007) has conducted field research in the borderlands between Peru and Brazil, and documented the impacts of logging on indigenous communities as well as indigenous responses, in the context of political ecology (Salisbury et al. 2011). Asháninka working in borderland logging camps worked as hunters, chainsaw operators, cooks, or sex workers (Salisbury 2007). The Asháninka of the Alto Tamaya, Peru are

still attempting to title their land, although competing land claims (forestry concessions) hamper their efforts. The Peruvian borderland Asháninka resisted the timber industry, patronages, and debt peonage through organizing and confronting trespassers through their territory “but also through official channels in regional and national capitals” (2007, 192). During the 1980s and 1990s, Brazil’s borderland Asháninka faced similar extractive systems, but succeeded in obtaining a land title. The Asháninka community of Aptiwtxa alerted Brazilian authorities to presence of Peruvian loggers (Salisbury 2007, 222).

As in the case of Brazil, Peruvian indigenous communities have become the target of violence by loggers. When the Peruvian Asháninka community of Alto Tamaya was fired upon by unknown assailants in 2004, the community requested the Admiral of Pucallpa’s Naval base for the requirements needed to form a self-defense committee (Salisbury 2007, 209).

Relationship of the Timber Industry to Narco-Trafficking

Logging activities may be financed by narco-traffickers. “According to key informants, the majority of investors in the timber sector include international and Lima-based companies given the amount of capital needed to finance these operations. Another source of capital for timber operations allegedly comes from coca money” (Salisbury 2007, 288). High unemployment, coupled with a surplus of money acquired through illegal means, drive the *habilitación* system upon which Peru’s timber industry depends (Sears and Pinedo-Vasquez 2011, 627). Salisbury and Fagan (2013) hypothesize a relationship between mahogany loggers and coca farmers, which “revolves around the trafficking and laundering of coca paste.”

Factors Impairing Natural Regeneration of Mahogany

Selective logging may not only impair the functioning of ecosystems, it may significantly impact genetic variability of specific species. While “the species-specific impact on *Swietenia macrophylla* – its population numbers and genetic variation – may be significant,” the “direct impact of mahogany logging on the structure and function of the regional forest ecosystem has been small” (Verissimo et al. 1995, 51). The removal of 95% of specimens during logging operations is common; only individuals that are too damaged or too small are left (Whitman, Brokaw, and Hagan 1997, 39). Logging increases the inbreeding of the species, and that future harvest is threatened by the illegal and unsustainable harvest across its range (Blundell 2004). Logging of mahogany trees should take place after seed release; moreover, only a certain percentage of trees should be harvested, leaving seed trees. Logging should ideally occur following seed release to allow for recruitment.

Local populations of mahogany are specifically adapted (through genetic selection) to “thrive in connection with the particular soil types, climatic patterns, associated plant and animal species and disturbance regimes where it is found” (Whitman, Brokaw, and Hagan 1997, 42). Seedlings planted outside of their range may not survive in another range if transplanted. In one case, mahogany seeds from one area were destroyed in another range, because an ant species, to which they had developed no resistance, killed them (Whitman, Brokaw, and Hagan 1997, 42).

Factors Impairing Appropriate Resource Management

A lack of law enforcement allows widespread illegal logging, and its unsustainable harvest depletes local stocks, necessitating a shift in sources of supply.

Factors contributing to a lack of enforcement include “centralized administrative structures, low budgets, lack of effective methods to monitor and protect forests, and small, poorly trained staff” (Veríssimo et al. 1998). As of November 2003: “exporting countries must verify that each shipment was legally acquired and that its harvest was not detrimental to mahogany’s role in its ecosystem” (Blundell 2004). The extent of illegal trade is difficult to ascertain. Mahogany is easily smuggled because customs agents have difficulty making species identification (e.g. review by Canadian Customs found that about 60% of mahogany shipments incorrectly labeled as generic tropical wood) (Blundell 2004). The U.S. Lacey Act prevents the importation of illegally harvested timber. Imports to the U.S. must comply with trade and CITES regulations (Blundell 2004).

Illicit business practices require outright collusion with government officials or lax enforcement. In 1998 Escobar concluded the Columbian Government afforded little or no community participation through the implementation of its policies (1998, 68). State agencies charged with the protection of natural resources lack funding and trained personnel. The functionaries of state agencies often collude with private interests to exploit the very resources they are charged with protecting. Should the government official fail to collude with criminal entrepreneurs and enterprises, consequences may include assassination, loss of employment, demotion, or reassignment. Local indigenous communities often fear expropriation of their lands by the government, or foresee the government’s tacit approval of business’ or powerful private individuals’ usurping of their traditional territory. Even when a community holds title to their land, the government may regulate the extraction of timber on the community’s land and retain

control of the subsoil for mineral or hydrocarbon extraction. The indigenous peoples are reduced to a subsistence-level economy without true access or political and social control over valuable natural resources within their territories, which are basically co-opted by the state for reallocation to other economic interests.

Brief Environmental History of Purús

A local environmental history of Purús must account for the extraction of natural resources as well as land use/land cover changes (LULCC). Indigenous inhabitants of the region, as well as colonists, extracted latex and caucho, both *Hevea spp.* and *Castilloa spp.* (Montag 1998; Rummenhoeller 2010). Latex is rubber extracted from the *Hevea spp.* tree, and may be tapped continuously. Caucho, on the other hand, is rubber extracted from the *Castilloa spp.* tree, and requires felling. This relates to a larger system of extraction of caucho and latex that occurred throughout the Amazon (Weinstein 1983). Furthermore it relates to *correrías* (slave raids upon indigenous communities) on the part of rubber barons such as Fermin Fitcarrald and Carlos Arana and their indigenous allies (García Jordán 1993; Hill 1999). Following the collapse of the rubber boom (circa 1920), Purús' population dwindled from an estimated 3,000 inhabitants to about 400 (Rummenhoeller 2010). The region's abandonment by rubber tappers allowed indigenous communities to assert (or re-assert) territorial control in the region.

With the decline of rubber, timber and animal hides constituted Purús' most important commercial natural resources. Fidel Arévalo, who was appointed by Iquitos' customs house to install a customs house in Puerto Esperanza, estimated Purús exported 2,000 animal hides to Brazil in 1935 (Rummenhoeller 2010, 97). Without payment of Peruvian taxes, thousands of águano trees (another name for *Swietenia macrophylla*)

were exported to Brazil in the 1930s (Rummenhoeller 2010, 97). Friar Torralba said Peruvian loggers were paid low prices for their wood by Brazilian merchants, who sold their goods at high prices; however, Torralba makes no mention of the role of indigenous populations in logging during this time period (1930s-1940s) (Torralba 1978 as cited in Rubio del Valle 2013). Indigenous populations, living away from major rivers, may have deterred loggers' penetration of the forest interior.

Arévalo identified the indigenous populations who killed four loggers on the Cujar River, as the principle obstacles to the commercialization of timber and hides (Rummenhoeller 2010). Arévalo recommended the founding of small agricultural and industrial colonies, cattle ranching, missionary activity among the indigenous population (to make them useful laborers), construction of an airfield, opening a trail to the Ucayali, and mineral exploration (AHL 1936 as cited in Rummenhoeller 2010). Eventually, an airfield was constructed in Puerto Esperanza. Indeed, in Alto Purús between the 1930s and 1970s, indigenous populations emerged from the forest interiors to settle on the banks of major rivers (MINSa 2009). The Summer Institute of Linguistics (SIL) concentrated indigenous populations at Balta, San Marcos, and San Bernardo, operating hydroplanes and in the case of Balta, an airfield. Cattle ranching experienced a boom in the 1980s. There is as yet no terrestrial connection to other parts of Peru.

The outbreak of WWII and the Japanese occupation of Dutch Indonesia and British Malaysia (rubber plantations), forced the Allies to turn their attention to the Amazon as a potential source of natural latex. Between 1941-1945, the Corporación Amazónica was installed in Purús' to supply allied demand for natural rubber during

WWII (Rummenhoeller 2010, 98). When the Province of Coronel Portillo was created in 1943, Purús was declared a district (Law No. 9815).

Beginning in 1958, and continuing into the 1980s, commercial fishing of ox-bow lakes depleted the species *Arapaima gigas* (the world's largest freshwater fish) in the Purús (WWF 2009). Indigenous inhabitants often guided mestizos who were commercially harvesting the species – often in indigenous communities' territory (WWF 2009). World Wildlife Fund (WWF) attempted to re-stock the species in an ox-bow lake in the Yine community of Monterrey; however, with the rise of the river, the juvenile fish went with the current, down river. Currently, the Regional Government is executing a restocking of the species in four ox-bow lakes of the province. However, two of the ox-bow lakes selected fail to meet technical criteria for the reproduction of the species (anonymous pers. com.). Indigenous communities voiced concerns that the stocked paiche was decimating the populations of other species.

Beginning in the 1960s, Pucallpa merchants promoted the extraction of animal hides in Purús. Local *patrones* used the system of *habilitación* to encourage hunting and provision of animal hides on the part of the indigenous population (Rummenhoeller 2010, 106). In 1973, through the Agriculture Ministry's Supreme Decree 934, hunting of endangered animals was prohibited. This did not eliminate the trade in animal hides or the trade in endangered species. For the years 1976-1977, Purús extracted about 6,000 animal hides valued at approximately S/.300,000 (ONERN 1980, 204, as cited in MINSAs 2009). This local extraction relates more broadly to the hunting of caimans (*Melanosuchus niger* and *Caiman crocodilus*), giant river otter (*Pteronura brasiliensis*), and other species, for sale and export as hides and pelts throughout Amazonia (Smith

1981). The SIL missionaries accepted hides and artisan goods by the indigenous communities as payment for medicines, tools, and other commercial goods.

During the 1980s, President Belaúnde Terry continued his push for the colonization of the Amazon, advocating for occupation of national territory (often indigenous territory), and creating colonization projects. During the 1980s, the Peruvian state increased its presence in what was then the district of Purús – what had formerly been only a remote military outpost. In 1980, the Committee for the Development of Coronel Portillo (CODECOP) proposed initiating the Program of Agricultural Development for the improvement of basic services on the borderlands (Borgo, n.d.) Purús passed from district to province on 1 July 1982 when President Belaunde's signed Law No. 23416. This gave far more budgetary power to the local government.

The macroeconomic populism of President Alan Garcia allowed a great deal of agricultural credit to be extended in the Amazon. Large ranches were established along the Purús River at Fundos Livia and Sinaí (among others), and cattle were imported from Brazil. Forest clearance and cattle acquisition occurred in the context of access to agricultural credit and state support (Alvarez and Naughton-Treves 2003; Chávez et al. 2013). The neoliberal austerity of President Alberto Fujimore ended the extension of agricultural credits. Local informants say there are still wild cattle at Fundo Livia, and that one must walk for three hours, away from the river, before one encounters the forest. The rural credits and guaranteed markets (1985-1990) encouraged deforestation along the Inter-Oceanic Highway and rivers in Madre de Dios (Alvarez and Naughton-Treves 2003). In the case of Purús, deforestation was confined to the river, as no road connects

Purús to other areas of the country. It must also be emphasized that agricultural credits and state support flowed to mestizos and not to the indigenous communities.

In 1989, about 80 persons from Ayacucho, Ancash, Andahuaylas, and Puerto Bermúdez, members of the Assembly of God religious sect, settled in Palestina (formerly José Pardo) (Rummenhoeller 2010). This represents a very small part of a large-scale migration to Amazonia from the Andean highlands. Belaúnde encouraged colonization and development of the Amazon during both his administrations (1964-1968 and 1980-1985), but it is unknown if these individuals received state support for their migration. In 1990, a local mayor seeking reelection brought Asháninka from the Selva Central region (between the Andes and the Ucayali river) to settle in Pankerensi (he desired their votes for a reelection campaign) (Shoobridge 2003). Those indigenous inhabitants of the Selva Central have seen their territory invaded by the Peruvian military, foreign colonists, and landless Andean peasants since the 1840s. Any titled lands may be insufficient to allow traditional subsistence strategies (hunting, fishing, and gathering). Asháninka were certainly present in Purús during the rubber boom.

In 1977, Peru's army established a sawmill in Puerto Esperanza, near the Brazilian border. An estimated 100,000 board feet lumber was exported by Purús to Brazil during 1976-1977 (ONERN 1980, 165, as cited in MINSA 2009). The selective logging of Spanish cedar (*Cedrela spp.*) for illegal export to Brazil complemented the 1980s' cattle and agricultural boom in Purús. Those with the economic means, illegally cut timber (mainly in indigenous communities' territory) and sold Spanish cedar to Brazil (anonymous pers. com.) In 1993, the Regional Government established a sub-Regional Office in Purús. The Municipality of Purús Province operated a sawmill during the

1990s in order to build public buildings such as schools and offices (largely using Spanish cedar) (Borgo, n.d.) Only the control measures implemented by the Brazilian army in Santa Rosa halted the illegal traffic of wood from Purús to Brazil (Rumenhoeller 2010, 106).

According to Alto Purús National Park administrators, there are less than ten fertile females of the aquatic river turtle, *Podocnemis expansa* in Peruvian territory (for the Purús watershed). Indigenous communities and APNP and PCR are attempting to recover the species through the establishment of harvesting rules and the use of artificial beaches to protect turtle eggs from depredation. These turtle eggs are a valued commodity in Puerto Esperanza and Pucallpa, the regional capital. According to APNP, over 20,000 of the species *Podocnemis unifilis* have been released into ox-bow lakes. The commercialization of river turtle eggs (*Podocnemis spp.*) has been previously documented within Purús (Shoobridge 2003)(Fagan and Salisbury 2003). Extraction and exploitation of this resource has occurred since the colonial era in Amazonia; furthermore, it afforded the Allies an industrial lubricant substitute during WWII (Smith 1974; Pinedo-Vasquez et al. 2002). The recovery of the species requires the cooperation of APNP and PCR with local indigenous communities. The role of indigenous communities has been important to the assured survival of the genus *Podocnemis* in the zone. Thousands of turtle eggs have been collected from beaches and placed in artificial beaches made by the indigneous communities to protect the eggs from both natural and human depredation until they are hatched (Gil Navarro 2004).

This frontier zone operates on the periphery of the Peruvian economy; in the past, it also supplied timber on the periphery of the Brazilian Amazon economy. The Purús

River flows to Brazil. This river-highway facilitated sale of Peruvian Spanish cedar and mahogany during the 1930s and 1940s, as well as Spanish cedar during the 1980s to Brazil (without any export tariffs or taxes paid to the Peruvian government). The remoteness of the area, coupled with little state presence, has permitted narco traffickers, since at least the late 1990s, to use the Purús River as a transport route for cocaine (Salisbury and Fagan 2013).

Before continuing, it is worth discussing the state of indigenous working conditions in Purús Province. Indigenous individuals and families suffered slavery and hereditary debt-bondage throughout the 1980s (anonymous, pers. com.) For example, in one case, during the early 1980s, an indigenous individual received a pair of pants from a mestizo merchant, and was expected to work continuously for four months as payment. When the opportunity to change employers arose, the mestizo merchant vehemently objected, saying that the “Indian” must work-off his debt (anonymous, pers. com.). From 1969-1983, the Summer Institute of Linguistics and Richard Montag, commercialized indigenous agricultural products, animal products, and artisan goods in exchange for trade goods (Kensinger 1995). This relationship represented an economic alternative to debt-peonage for the indigenous communities (Kensinger 1995). The departure of SIL and Montag left the indigenous communities without any other economic alternative than to acquire basic necessities and trade goods through mestizo shopkeepers of Puerto Esperanza (Kensinger 1995).

While Peru abolished slavery in 1854, liberation still awaits many Amazonian Peruvians. In 1913 and 1914, the U.S. Congress held hearings on slavery in Peru and a case was brought before the British judiciary. These events drew attention to the slavery

imposed upon Witoto, Bora, and Andoke indigenous peoples of the Putumayo River basin by the rubber baron, Carlos Arana, who required many low-cost laborers (i.e., “slaves”) to fell and harvest the species *Castilloa spp.* Until 1988, Søren Hvalkof and others documented cases of slavery of indigenous individuals and entire families in Atalaya Province, which borders Purús Province (Hvalkof 2002; Hvalkof 2006).

Most recently, logging of big-leaf mahogany (*Swietenia macrophylla*) constitutes the province’s major economic activity (Fagan and Shoobridge 2005; 2007). Between 2000 and 2006, logging activity greatly increased in the indigenous communities of Purús (Shoobridge 2001; Fagan and Salisbury 2003; Fagan and Shoobridge 2005; 2007).

A number of laws, ministerial decrees, and directives in Peru dictate how mahogany can be logged in indigenous communities.

Table 1: Peruvian Legislation, Ministerial Decrees and Directives concerning Indigenous communities and extraction of resources

Year	Law/Decree	Summary
1933	Constitution	Recognizes indigenous communities
1974	Law 20653	This law enables native communities to register as legal entities, but restricted the amount of land that could be titled (Davis and Wali 1994, p. 487).
1978	Law 22175	This shift radically changed forestry legislation, enabling private individuals and firms to exploit national forests (Dall'Orso 1990); moreover, it was hoped that this law would facilitate business investments in the Amazon lowlands, Andean piedmont, and eastern slopes of the Andes (Veber 1998, p. 394).
1979	Supreme Decree No 003-79-AA	Implementation of Law 22175
1984	Law 295	Civil Code of Peru explicitly accounts for Indigenous Communities in the Amazon and Farming/Peasant Communities in the Andes
1993	Resolution of Legislature 26253	Peru becomes party to the International Labor Organization (ILO) Treaty 169, guaranteeing informed consent to indigenous communities.
1994	Supreme Decree 02-94-AG	Specifies the role of Regional Government Agrarian Offices have regarding titling and demarcating of indigenous lands.
1997	Law 26834	Law of Protected Areas
2001	Supreme Decree 038-2001-AG	Guidelines for implementation of Law 26834. Specifies that Communal Reserve should have a local association of rural/indigenous communities to manage the reserve. Park Service would still do patrols, biological monitoring.
2001	Supreme Decree 052-2001-AG	Prioritizes requests from indigenous communities for timber harvest.
2005	Law 28495	Law creating National Institute for Development of Andean, Amazonian, and Afro-Peruvian Communities.
2006	National Institute of Natural Resources (INRENA) Directive 27	The office of Forestry and Wildlife of Peru's National Institute of Natural Resources regulates export permits for timber that is under CITES
2006	INRENA Managerial Resolution 232-2006	Approval of terms of reference for Forestry Management in Native Communities with commercialization of timber at small, medium and large scales.
2007	Internal Resolution 132-2007-INRENA	The office of Forestry and Wildlife of Peru's National Institute of Natural Resources provides guidelines for supervising the harvesting of timber and NTFP in indigenous communities
2008	Resolution of Legislature 29474	Peru's Congress ratifies the International Tropical Timber Agreement
2008	Law 1085	Creation of OSINFOR as authority for control and vigilance of timber and wildlife extraction in Peru
2008	Law 1013	Establishes Environment Ministry (and, SERNANP, the Protected Areas Service) as having an annual budget for managing the protected areas system.
2010	Supreme Decree 019-2010-AG	Defines actions and fortifies mechanisms of cooperation between CITES administrative authority (Ministry of Agriculture's Direction of Forestry and Wildlife) and scientific authority, Environment Ministry (MINAM)
2011	Supreme Decree 009-2011-AG	National Plan Against Corruption in the Forestry and Wildlife Sectors

Year	Law/Decree	Summary
2011	Resolution 026-2011-AG-DGFFS	Approval of quota of mahogany for export by Peru's administrative authority.
2012	Supreme Decree 006-2012-AG	Approval of guidelines for implementation of Seed Law. National Institute of Agricultural Innovation (INIA) is in charge of certifying seeds and seed management plans.
2013	Supreme Decree 09-2013-MINAGRI	Peruvian Forest Service (SERFOR) created as national forest authority; plan, control and vigilance.

Peru's 2000 Forestry Law No. 27308 allowed forestry concessions of up to 50,000 ha for 40 years, with possibility of renewal. Importantly, the law prohibited for 10 years, the extraction of mahogany or Spanish cedar in the watersheds of Purús, Yavarí, Tamaya and Putumayo. Furthermore, the law prohibited the wasteful practice of cutting commercially valuable timber with a chain saw (into boards). Congressmen with links to the logging industry asked Peru's Constitutional Tribunal (TC) to invalidate the law prohibiting extraction of mahogany and Spanish cedar in the four watersheds, arguing it would infringe upon forestry permits already granted. In 2002, the TC rejected the argument, and upheld the right of the state to protect threatened and endangered species.

Four months later, office of INRENA's legal advisor, issued a report, concluding that the logging prohibition did not apply to those concessions in the specified watersheds, if they had an approved Forestry Management Plan and had incurred no infractions (EIA 2012).

In 2007 Lizárraga, INRENA forestry chief issued a resolution that nullified annual operating plans in the specified watersheds and suspended all authorizations for transport of timber (EIA 2012). He was later forced to resign after pressure from timber industry, and his actions were reversed.

III. Conceptual Framework

Political ecology and environment history share mixed methods for research (archival, ethnographic methods, and methods of the bio-physical sciences) and both are concerned for social justice and subaltern (subordinated or oppressed) groups.

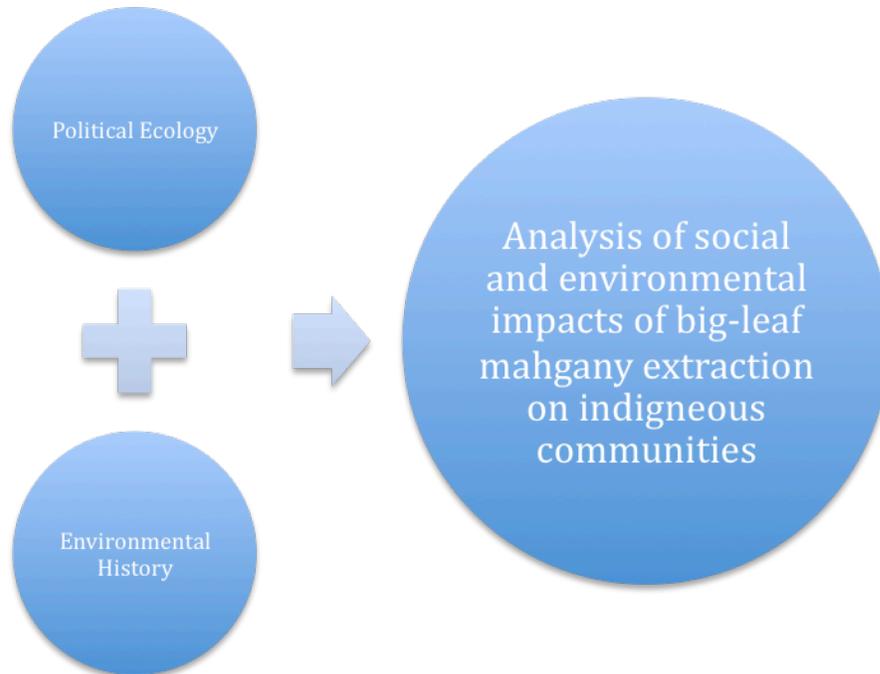


Figure 13: Conceptual Framework. Elaboration: Aaron Groth

Environmental History

Environmental history seeks to analyze the intersection of human action and social relations with other life forms and physical processes affecting land use and land cover. How has the landscape changed? How have uses of the land changed? History cannot concern itself only with human beings. Animals, plants, and microorganisms are often omitted entirely in historical narratives, or they are merely mentioned in passing (Cronon 2013). Ecosystems, climates, and geophysical processes also affect human life, but have not yet been fully considered in historical narratives.

While the study of the biotic and abiotic environment provides important tools for chronicling environmental change, relationships of power must also be explored and examined. Even as environmental historians use the bio-physical sciences to chronicle and narrate environmental history, some scholars critically assess bio-physical science. They view science not as objective but “as socially constructed through historical processes”; therefore, scientists may be seen as historical actors (Carey 2009, 230). Dendrochronology, palynology, and ice core samples represent some additions to the methodologies used by environmental historians; archival research, interviews, participant-observation and ethnography, as well as attention to subaltern groups continue to prove indispensable in constructing environmental histories.

Economic exploitation and extraction of primary resources forms the focus of many environmental histories. Too often this approach has marginalized the role and voice of subaltern communities (particularly indigenous communities). To understand past human-environment interactions, it is important to understand social relations and power dynamics (Carey 2009, 237). J. Anderson’s historical work on the depletion of Small-leaf Mahogany in the Caribbean and Big-leaf Mahogany in the Bay on Honduras provides an example of an historical framework to examine mahogany extraction while highlighting social relations. Indigenous peoples have been cast as victims of the capitalist economy, creation of state protected areas, and nation building processes that removed them from (or confined them to) their lands and denied them customary or usufruct rights to local resources. Indigenous people are not merely victims; they are “active participants in the reproduction of their society and homelands” (Carey 2009, 233).

Local populations and subaltern groups should be considered “active historical participants who interacted with outsiders, debated about how to use resources and manage environments, and sometimes even facilitated extractive economies” (Carey 2009, 239). Recognizing this allows us to see how social relations and power struggles contributed to the creation of new environments and landscapes.

Political Ecology

Loss of global biological diversity and cultural diversity is unabated and proceeds at alarming rates. Colonial empires sought to control labor and natural resources and contributed to the loss of biological and cultural diversity in their subject realms. Governments and global capitalism, represented by the sectors of industrial agriculture, fishing, timber, mining, hydrocarbon, and other extractive economies, coupled with illicit cultivation of drugs and drug processing, threaten to deplete and degrade earth’s remaining relatively intact terrestrial and marine ecosystems.

Political ecology draws upon a Marxian tradition, but has also benefitted from environmental history, post structural theory, ‘post’-colonial theory, feminism, and social theory. As a critical science, political ecology directly challenges the narratives and discourses advanced that attribute the causes of environmental degradation to “ignorant peasants” and overpopulation. Furthermore, it questions the underlying assumptions about the benefits of the green revolution. Peet characterizes political ecology as the sustained critique of previous geographic notions of human-environmental relations (1998, 95). To its great credit political ecology “has done battle with the deeply flawed new-Malthusian theories of population growth and environmental degradation” (Walker 2006, 385).

Political ecology affords a paradigm to understand the dialectical relations between nature and society. Its great strength is its heavy emphasis on uncovering multi-scale, structural processes that impact human-environment systems. Main themes and approaches of political ecology include: 1) a focus on “production (farming, fishing, herding) as a key social-environmental process;” 2) empirical approaches which use both archival and field-based methods 3) concern for the marginalized and the disenfranchised; 4) an “interest in traditional environmental knowledges;” and 5) understanding and interpreting the “landscape as an object of explanation” (Robbins 2004, 21-22). As Walker notes, “political ecology is today’s most prominent inheritor of traditions in geography with deep historical roots in the study of both biophysical ecology and social science” (2005, 80). Political ecology is far from a unified subfield, but its adherents actively engage in continual critique. Keen interest in natural resource use and social justice converge in the study of political ecology.

Focus on local environmental issues, coupled with the local community’s articulation with regional, national, and international economies, is part-and- parcel of the approach undertaken by political ecologists. Political ecology combines the concerns of ecology and a broadly defined political economy. Blaikie and Brookfield (1987) rejected the framing of soil erosion around overpopulation, market failure, and mismanagement by local populations engaged in “overgrazing” and swidden (“slash and burn”) agriculture. The state and core-periphery model represent “external structures” influencing land management (Blaike and Brookfield 1987). Social construction of resources by classes, groups, and society represents a “constantly shifting dialectic between society and land-based resources” (Blaike and Brookfield 1987, 17).

Furthermore, Blaikie and Brookfield recognize that land “degradation is perceptual and socially defined” (1987, 26). Land degradation is both a cause, and result, of social marginalization. The land manager (individual, household) may be induced to make increasing demands upon natural resources in order to create a surplus. The land manager’s relationship with the environment requires consideration of economic, historical, and political contexts.

Blaikie and Brookfield emphasized the role of the state in supporting dominant groups and classes, reinforcing accumulation by these dominant groups, and marginalizing the losers through “taxation, food policy, land tenure policy and the allocation of resources” (1987, 17). A self-perpetuating cycle ensues in which poverty, coupled with poor management, induces environmental degradation, which in turn leads to more poverty. Blaikie and Brookfield also argued for regional or spatial accounts of degradation, linked through “chains of explanation”, local decision-makers to spatial variations within the environment. The local condition must be examined in relation to regional and global scales. One must accept a plurality of perceptions, definitions, and rationalities rather than uncausal theories of explanation (Blaikie and Brookfield 1987, 16). The land manager’s relationship with the environment requires consideration of economic, historical, and political contexts.

Political ecologists seek to delineate asymmetrical power relations, social and environmental injustice, and assess conflict over resources. Robbins proffers the degradation and marginalization thesis: local production systems are commodified via increasing integration in regional and global markets. Profit seeking leads to an increase in demand, leading to degradation and marginalization. Unfortunately, for local

communities, this may lead to increasing poverty and, cyclically, increasing overexploitation of natural resources (Robbins 2004, 131).

Degradation may consist of loss of natural productivity, loss of biodiversity, loss of usefulness, and creating or shifting risk ecology (Robbins 2004, 92). Demonstrating loss of natural productivity requires a measure of conditions over time in a specific location, “or a comparative spatial assessment under varying uses” (Robbins 2004, 92). Declining biodiversity may lead to serious and sustained declines in productivity; however, this too is difficult to prove. The landscape must be sampled using representative plots to substantiate this claim (Robbins 2004, 94). “Loss of usefulness” is an anthropocentric manner of assessing degradation – one subject to competing visions. Through ecological change, “normal risk situations are made acute or shifted to specific people or groups” (Robbins 2004, 96).

A second assumption of the thesis is that individual producers/extractors bear the greatest costs and risks under competitive global trade regimes and unregulated markets. “The result is a pattern of appropriation and accumulation of natural capital, transformed into currency, at locations away from the site of production” (Robbins 2004, 132). A major feature of the social ecology of the Amazon basin rests in extraction of primary products and the accumulation of capital outside the Amazonian region (see Bunker 1985 for Brazil and Haring 1986 for Peru).

Cultural ecology is an approach to the study of a particular culture, with specific material and symbolic practices, and the natural environment. Julian Steward and other adherents of cultural ecology and ecological anthropology influenced the thinking of political ecologists. While concern with resuscitating indigenous knowledge and

management practices is important, understanding the context of that knowledge is paramount. Adoption of new technologies is a necessary and inevitable strategy for cultural survival. Indigenous populations have been integrated for hundreds of years with the global economy, and have been influenced by new technologies. Traditional knowledge and management practices constitute part of an alternative development strategy.

When researching traditional knowledge and management practices, one must consider the role of territory and culture. Escobar is an anthropologist who has conducted extensive fieldwork with Afro-Columbian communities of the Pacific rainforest. He asserts that “[t]he struggle for territory is [...] a cultural struggle for autonomy and self-determination” (2001, 162). Afro-Columbian communities inhabit the central and southern region of Columbia, and have enjoyed relative isolation. Occupying the Pacific rainforest, these river communities may use the resources of several river basins. The territory these communities occupy “is seen as the space of *effective appropriation of the ecosystem*, that is, as those spaces used to satisfy community needs for social and cultural development” (Escobar 1998, 71). Lack of organization hampers the defense of their territory. These communities’ livelihoods and territories are threatened by incursion of the state, timber, mining, and agro-industrial interests into their territory (Escobar 1998, 68). This highlights environmental conflict between local communities, governments, and businesses. Hetch and Cockburn’s 1989 classic *Fate of the Forest* documented the Brazilian state and elites’ actions to occupy and exert control over the Amazon, and the resistance of the rural populace (indigenous and non-indigenous).

Protection of territory requires community organization. The region-territory of these Afro-Columbian communities “is conceived of as a *political construction* for the defense of the territories and their sustainability” (Escobar 1998, 71). The local principles of “autonomy, knowledge, identity, and economy” undergird a reorientation of biodiversity discourses (Escobar 1998, 72). Furthermore, “for these communities ‘nature’ is not an entity ‘out there’ existing outside human history, but that it is deeply produced in conjunction with the collective practice of humans that see themselves as integrally connected to” their territory and livelihoods (Escobar 1998, 72). For these Afro-Columbian communities, as well as for indigenous groups and other traditional societies, separating nature and society runs counter to their cosmologies and worldview. Escobar concludes: “[t]he social movement of [Afro-Columbian] communities can be described as one cultural and ecological attachment to a territory, even as an attempt at creating new existential territories” (1998, 75). A community’s cultural cohesion is possible through exercising control over their territory and resources. Governments, businesses, and capitalism more broadly do not permit the minimum conditions for the existence of traditional communities. This connects back to marginalization. Political ecology and environmental history’s concern for the subaltern coupled with both field-based and archival methods inform this case study.

IV. Methods

This research received approval by the University of Missouri's Internal Review Board (IRB) to document the environmental and social impacts of mahogany extraction among indigenous communities along the Purús River in Peru. The methodology included organizing and facilitating focus groups; community mapping; participant observation; semi-structured interviews with community leaders and with government officials; use of GIS and GPS; archival research; and ethnography. My original research plan called for concentrating on the communities of Balta and Santa Rey on the Curanja River, as I have rapport with these communities through extended fieldwork in 2011 with the Upper Amazon Conservancy (UAC) and its sister organization, ProPurús. More recent fieldwork in Peru was conducted from 16 December 2013 – 25 January 2014, with time spent in Purús from 26 December 2013 through 16 January 2014.

Given that the most recent mahogany extraction has occurred in the middle Purús, I modified my research plan to visit Zapote, Cashuera, Bufeó, San José, Conta Gallo, Conta, and San Francisco *en situ*. Meeting with indigenous leaders representing FECONAPU and ECOPURUS, I was able to attain information concerning San Bernardo, San Martín, San Ramón, Gasta Bala, and Santa Margarita communities. In the office of ProPurús, I met with members of the communities of Santa Rey, Balta, and Columbiana. I applied a focus group methodology, requesting that each group respond to a series of nine questions and draw a map of their community, detailing sites of mahogany extraction and its ecological and social impacts. I participated in community events, and I engaged community members in the research.

Individuals from the following institutions were interviewed: Peru's Forestry Division (DGFFS); Protected Areas Service (SERNANP); Ucayali's Regional Forestry (DEFFS-U); Provincial Municipality of Purús (MPP); the Regional Government office (sub-region Purús); forestry and wildlife regulators (OSINFOR); the National University of Ucayali (UNU); and the National Agricultural University (UNALM).

This study employed snowball sampling and purposive sampling. The purposive sampling technique is a type of non-probability sampling (also known as key-informant). Specifically, it is effective when one needs to study a certain cultural domain, relying on knowledgeable (local) experts. It is a unique method in that the researcher decides what needs to be known. The researcher then finds people who can and are willing to provide the information they have attained by virtue of knowledge and/or experience (Tongco 2007). It is important to note that when using purposive sampling, the interpretation of results is limited to the population under study. This bias must be divulged and clearly stated, so that general conclusions are not inferred. This method is limited by the knowledge and skill of the key informant. Any inconsistencies in data should ideally be clarified by a subsequent field visit.

The salient difference between snowball sampling and purposive sampling is that purposive sampling may, or may not, use the source of an informant as an informant as well (Tongco 2007). Are the findings limited to the sample alone? Can one generalize to a wider population, one that shares the socio-demographic characteristics of the sample? Or is the sample's generality limited only to a population that has undergone similar social experiences (Biernacki and Waldorf 1981)? The extent to which snowball

sampling is dependent on social networks may influence the results and conclusions of the study.

Specifically, the snowball sampling method was used to gain access to government personnel, NGOs, and academics. Researchers have employed both purposive sampling (Alvarez and Naughton-Treves 2003) and snowball sampling (Vuohelainen et al. 2012; Quaedvlieg et al. 2014) in Peru.

Use of a tape recorder was planned; however, government officials seemed uncomfortable when I asked about tape recording – in one case saying they would have to ask their supervisor. Given that officials did not desire to be quoted “on the record,” I took notes during semi-structured interviews instead of tape recording. Key informants in the field also advised against using a tape recorder among the indigenous communities. Extraction of mahogany and its sale may serve to launder money from more illicit sources (i.e. coca). Given the amount of governmental collusion in the illegal harvesting of timber resources, it’s not surprising that many of the officials I interviewed did not wish to be officially quoted and thereby risk either their jobs or reputations.

Any qualitative researcher must consider social desirability response/bias; the interviewee may provide answers that are socially desirable and strive to present themselves in a more positive frame. One study, focused upon the U.S., concluded there was little evidence of interviewees providing socially desirable responses (Collins, Shattell, and Thomas 2005). This study was not designed to specifically investigate social desirability bias, but rather relied upon secondary sources reviewing over 300 pages of transcripts (Collins, Shattell, and Thomas 2005). “[S]ocial desirability response tendencies appears to be more prevalent in other cultures, mandating researcher

modification of methodology” (Collins, Shattell, and Thomas 2005). For this reason, the focus groups were organized so as to promote participation and engagement of community members – the community members drew maps and responded to questions using poster paper.

A researcher may also gather information, engaged in “(1) direct observation and deliberate recording in the field,” (2) analysis of primary and secondary sources, and (3) passive reception of “unsolicited input from a variety of informants” (Salisbury and Fagan 2013). These methods taken together allow for a greater “triangulation” and verification of information, and have been employed in this study.

V. Results

The most important results include: the community mapping process as a participatory tool, and its importance to fostering discussion between community members regarding natural resources. The building of a skid trail by loggers in order to extract mahogany with a tractor represents the first timber haulage infrastructure in the region; the potential for inter-community conflict may be heightened by the skid trail. Another striking finding is the abandonment of a community due to fears of government fines, administrative processes, and criminal charges. Logging impacted traditional social structures, and loggers impregnated indigenous women. Notable environmental impacts mentioned include: damming of streams for log transport negatively impacted aquatic life and caused streambed erosion; the depletion of game occurred due to the presence of logging teams (subsisting on game in the forest).

Communities' involvement in logging operations and the compensation they received (or goods they were advanced) may have altered agricultural production patterns, reducing both area under cultivation and number of crops sowed. We visited only one reforestation project executed on indigenous land (informants mentioned no others). It is also apparent there was a complete lack of transparency on the part of the part of some loggers, as communities have no knowledge of the number of trees felled on community land or the amount of timber dispatched by their communities. Communities became indebted to loggers, face fines and administrative processes from OSINFOR, owe taxes to Peru's revenue department (SUNAT); furthermore, the *apus* (the headman of the village) are subject to criminal prosecution.

Community Mapping Process

In each of the six communities visited en situ, the entire community participated in the focus groups and community mapping. Two Huni Kuin field assistants translated questions and acted as interpreters in the communities. The questions and map making generated a lot of debate and questions within the community. Normally, the *apus* would run the meeting, and, if necessary, divide the community into groups. A number of community leaders, including the *teniente gobernador* (local lieutenant governor), municipal agent, and mother's club president participated in each community visited. Also the *apus* (or his designee) would be deferred to in order to resolve confusion or answer a question if unknown by certain group participants. Deference was given to elders in answering many questions and they were carefully listened to during the map-making process. Men participated in map-making and focus group question responses more than women (who were more passive). In one community, two indigenous bilingual schoolteachers and a park guard of APNP were the groups' leaders – drawing maps and writing responses.

Literacy was certainly a deciding factor in determining if the participant's role was drawing the map and writing down question responses, or contributing through explanations, dialogue, and story-telling. Due to the young age of many indigenous inhabitants, many were children during the mahogany boom (2000-2008). These maps served to show the relative location of communities to sites of mahogany timber extraction, the sites of logging camps, trails, and streams. The participatory mapping process and focus group discussions generated discussion about the impact of the logging camps (and loggers) upon game and impact of log transport on streams and hydro

biological resources. In some cases they revealed sites “reserved” as locations of seed-bearing mahogany (further research required to ascertain whether this is a legacy of forestry management plans or the result of community decision-making about land use). These focus groups also revealed that communities throughout the lower and middle Purús sold wood (mainly Spanish cedar) to Puerto Esperanza and Brazil during the 1980s during the last “boom” in logging.

In the case of Balta, Santa Rey, and Columbiana, only a few families were present in the office of ProPurús to make the community map and respond to questions. During these sessions, elders were listened to very carefully. Women contributed to the conversation, especially when asked to participate by a male family member. Literacy was a determining factor of participation: for different communities a pastor or a post-secondary student made the maps and wrote down group responses to questions.

In the case of San Martin, San Bernardo, Santa Margarita, San Ramon, and Gastabala, information was obtained through the leadership of FECONAPU and ECOPURUS. Women were absent from this meeting, although both organizations have women in the organizations’ leadership. The men represented in these meetings include schoolteachers and a former indigenous mayor of the province.

While it cannot be gauged how useful the participants think the maps would be in managing and protecting forest resources, the process generated a great deal of community conversation and debate. In one community, debate emerged regarding the actual legal territorial limits of their community with a neighboring community. The value of the maps lies, in part, in the process that produced them. However, undoubtedly,

the content of these maps complemented focus group responses to questions as well as interviews with key informants in communities.

The maps made by participants are not included in the present thesis due to concerns of how the information therein contained may be used by loggers and the government. Perhaps in the future, community members will permit publication of their maps.

Abandonment of Community due to Fear of Government Retribution

One of the most serious social impacts of mahogany logging was the abandonment of one indigenous community due to fears of government fines, threats of confiscation of community property, and criminal charges, according to their family members in other communities. In August 2006, through unanimous approval at a community meeting, the community revoked the power of a logger to act on behalf of the community for failing to pay them what was owed for timber extracted (they were paid for far less timber than was actually extracted) and otherwise breaking the agreement with the community.¹³ According to local informants, loggers then absconded with indigenous community's land title, which has yet to be recovered 8 years later. Despite these indigenous responses to a logger's violations of the contract, the state issued fines to the community, initiated administrative processes against the community, and filed criminal charges against the *apus*. This precipitated the flight of the inhabitants of the

¹³ Acta de Asamblea General. Comunidad Indigena [redacted]. 14 August 2006. It should be noted that the meeting minutes were stamped and signed by the *apus* of the community, the *teniente gobernador* (local lieutenant governor), the municipal agent, and Mother's Club President.

indigenous community to Brazil. It is important to note, the *apus* requested FECONAPU seek legal assistance for the community in December 2012, before fleeing.¹⁴

Logging Impacted Internal Social Structure

The internal social structure of these communities was impacted through the extraction of mahogany, as there was not a concomitant redistribution of benefits from mahogany extraction to all community members. Certain individuals (particularly chiefs and their families) benefitted more than other community members.

According to key informants, not only did loggers give liquor to indigenous communities as an advance payment, but also the indigenous communities (the men) used about 60% of the earnings from timber sales to purchase alcohol (anonymous pers. com.). This disrupted families, production strategies, and generated health problems (Purús has extremely high rates of liver cancer) (anonymous pers.com.). Beer is expensive, costing about 5 nuevo soles (about \$1.70) per 12 oz. can or 12 nuevo soles (about \$4.00) per 700 ml bottle, so many indigenous men consume *canina*, a cheap, low-quality Brazilian drink, derived from sugar cane.

Another social impact is loggers' sexual relations with indigenous women. The Huni Kuin refer to themselves as "real people" and the most common matrimony is between cross-cousins, an emic model of marriage (Kensinger 1995). Huni Kuin keep marriage within the tribe. Hence, out-of-wedlock children of these sexual unions will not have the benefit of male economic support or future potential marriageable partners if their fathers are (absent) and community outsiders. The cost of loggers sleeping with Huni Kuin is not so much a matter of disrupting cross-cousin marriage, as it is a break

¹⁴ Oficio s/n emitido por el Presidente de la comunidad indígena [redacted] al Presidente de FECONAPU. 11 December 2012.

down of cultural norms in general. Furthermore, the cost of raising children is borne by the Huni Kuin without paternal support.

Public censure of former leaders for enriching themselves at the expense of the community occurred in several communities. Without naming names, one current *apus* said former *apus* had “robbed” the community of their resources for personal gain.

One *apus* had invested mahogany profits in a peque-peque motor and freezer for the community instead of benefitting himself or his family. Community members lauded this act because the group as a whole benefited. In the late 1980s one community *apus* called upon the local police commissioner to intervene in the case of loggers of stealing wood from the community; they succeeded in confiscating the wood.

This suggests that there may be endogenous mechanisms to control corruption within the communities.

Aquatic Life and Streambeds Impacted by Damming of Streams for Log Transport

Apart from reduction in availability of game, aquatic life in streams was perceived as diminished due to logging practice of *tapaje*, or damming of streams to allow logs to be floated to the river during the rainy season (October-April). This process contributed to streambed erosion and affected all aquatic life (apparently all species of fish, caiman and anaconda) – impacting the availability of fish for subsistence. Furthermore, focus group participants emphasized contamination caused by the loggers – spilling of oil and gas into watercourses, plastic and other refuse thrown into streams or left littered about in the forest. Informants did not further comment on the consequences of streambed erosion.

Availability of Game for Communities Impacted by Logging Activities

Subsequent to logging activities, the availability of game diminished according to many communities' informants. Notably, some communities reported that in over five years, there had been no specimen of white-lipped peccary (*Tayassu pecari*) hunted. The peccary is a historically important game animal for indigenous peoples of the Amazon.

According to local informants located in communities of the "Medio" Purús (between Puerto Esperanza and the confluence of the Purús and Curanja rivers), game (mammals, birds, and reptiles) is scarce and one must travel far away from the community for a successful hunt. Traveling distances greater than six hours from the community would be considered "far." Teams of loggers and their equipment may frighten away wildlife, and moreover, the loggers hunt game for their own subsistence. That constitutes competition for local game resources, which puts additional pressure upon animal populations available for harvest by the indigenous subsistence communities. According to local informants, herds of *huangana* (white-lipped peccary) (*Tayassu pecari*) have been absent in Purús for at least five years. An indigenous community chief, also President of the Purús Communal Reserve Public Policy and Management Committee, admitted the cutting of fruit and palm trees near the community (cutting by individuals of the indigenous community harvesting fruits and palms) could have contributed to the fact that game became scarce.

Hunting by indigenous communities on the middle Purús River affords an opportunity to sell game meat to urban Puerto Esperanza. From November 2000 to July 2001, the indigenous community of Nuevo Belén hunted eight times its minimum protein requirement, and the indigenous community of Pikiniki hunted two times its minimum

protein requirement, leading researchers to conclude that hunters of Nuevo Belén sold game meat in Puerto Esperanza (Pacheco and Amanzo 2003). In 2000, communities of middle Purús spent a greater amount of time finding game than communities of Alto Purús and Curanja (Shoobridge 2001). The economics of harvesting and marketing wild game may lead to unsustainable harvest levels. However, the price paid to the hunters for the game is often insufficient to purchase the required basic necessities or sufficient gas for a return trip up river. All of the local indigenous communities along the Purús River are increasingly dependent upon gasoline engines to power their canoes. Gasoline is a very expensive commodity in the Amazonian basin. Often the indigenous communities request gas from the municipality, regional government, or NGOs in order to return to their communities.

At the time of my fieldwork in January 2014, gasoline sold for \$10.00 per gallon. Most indigenous peoples earn wages or remuneration for their natural resources at such low prices that they can't afford the transportation or fuel costs associated with the harvesting and marketing of the game stock. The need for additional cash to purchase this new "necessity" (fuel) creates additional pressure upon local food resources of community members who may over exploit the resource in an effort to earn more cash or goods. While this may appear a loss-making activity, indigenous communities require basic necessities, and consider trips to Puerto Esperanza necessary to acquire goods.

Agricultural Production Patterns Altered by Logging Activities

Several key informants suggested that agricultural production patterns were altered (i.e., there was a decrease, both in the amount of land cultivated and in the number of crops cultivated) due to communities receiving foodstuff, cash, and availability of

credit (albeit at usurious rates). It is not uncommon for an individual to be advanced goods on credit at a rate of 50%-100%. These rates seem to exceed short-term credit rates available elsewhere in Peru (certainly those available to middle-income and affluent individuals living in urban areas). The failure to cultivate sufficient land and crops to meet subsistence needs was disastrous for at least one community in which hunger ensued (anonymous pers. com.).

Only One Example of Reforestation in an Indigenous Community

The Purús reforestation committee paid Canta Gallo indigenous community to plant mahogany and two other species of trees, ishpingo (*Amburana cearensis*) and capirona (*Calycophyllum spruceanum*), totaling approximately 50,000 saplings. This represents the only action of reforestation taken in the region. Loggers attempted to maximize profit in the context of indigenous communities' lack of participation and exclusion from decision-making. I examined this re-forested mahogany grove with my local informants during the 2014 field research. I found that ten years later, some trees had survived, while others succumbed to disease or were shaded out. While some plantation failure is normal, the informants did not believe the failure rate was unusually high. In some cases, the young trees were cleared to open swidden plots for subsistence agriculture.

Skid trail revealed through community mapping (later verified en situ)

Before leaving Puerto Esperanza to undertake fieldwork in the indigenous communities, I met with leaders of FECONAPU and ECOPURUS, and used the focus group and community mapping methodology in the ProPurús field office. San Martin is

a Huni Kuin Community without title to their lands. Their map reveals a skid trail for a tractor to haul mahogany.

This did not appear to be a cleared and graded road. Informants of San Martin stressed both hardwood and softwood species of trees available as an economic alternative to mahogany extraction. Species mentioned include: copaiba (*Copaifera spp.*), huayruro (*Ormosia spp.*), shihuahuaco (*Dipteryx odorato*), lagarto caspi (*Calophyllum brailiense*), capirona (*Calycophyllum spruceanum*), ishpingo (*Amburana cearensis*), cedro altura (*Cedrela montana*), and catahua (*Hura crepitans*).

The Sharanahua communities of Gastabala, San Ramon (an annex of Gastabala without their own land title), and Santa Margarita drew a map of their neighboring communities. They showed parcels of territory, previously under annual operating plans, proposed by World Wildlife Fund (WWF). Some mahogany extraction occurred without a POA. These community members drew maps showing areas of seed producing mahogany trees. They also stressed that mahogany extraction affected only 25% of their territory – leaving 75% unharvested. In the unharvested areas, commercial volumes of mahogany remain, according to informants.

One key informant is incredulous to this information, stating that Santa Margarita encroached (i.e. trespassed) onto Columbiana's land to extract wood (anonymous pers. com.). This implies that the Sharanahua of Santa Margarita entered the Huni Kuin community to extract wood, having exhausted more accessible sources. While both Sharanahua and Huni Kuin belong to the Pano language family, they are still culturally and linguistically distinct communities. Sharanahua communities engaged in extensive

business with loggers prior to Huni Kuin communities entering the logging business (anonymous pers. com.).

Borgo acted as a facilitator with the Culina (Madija) of San Bernardo. José Borgo Vasquez has over 35 years experience in the zone working in various public posts and government agencies in Purús. He is the field Coordinator of ProPurús for the Purús watershed, and has rapport with the communities. Most Culina are illiterate, and none have associate, technical, or professional degrees. Did loggers operating in Culina territory cross into Brazilian territory? The indigenous people certainly think so. The Culina of this community (who have kin in Brazil and are more proximate to Santa Rosa, Acre, Brazil than to Puerto Esperanza, Peru) believe Brazilian authorities distrust the Peruvian indigenous community because of incursions by Peruvian loggers into Brazilian territory, crossing the Shambuyacu stream. This territorial crossover parallels the finding of Salisbury (2007): that Peruvian loggers crossed into Brazilian territory from the Alto Tamaya.

After meeting with indigenous and government leaders, we (myself, José Borgo Vasquez, Jario Samuel Roque, and Edwin Tachiana Puricho) first visited the Culina of Zapote on the Purús River. Their *apus* was not there, so we arranged a meeting with his designee. We learned during the meeting that they had permitted the extraction of 29 trees for 10,000 nuevo soles (approximately \$3,300) in cash and 1,500 nuevo soles (about \$500) in food and other goods in 2010. The community was upset that the chief had spent 6,000 nuevo soles (about \$2,000) in Puerto Esperanza, capital of the province, on land for a community house. Illiteracy and language (no Culina-speakers among research/field assistants) proved a major obstacle to conducting this particular focus

group. Maps and responses to questions were generated only with the assistance of field assistants transcribing oral responses. All maps indicated a road (the road is in Zapote's titled community land, but San Martin is situated closer to the road). It was hard to gauge what the indigenous communities think the consequences of this skid trail construction will be.



Figure 14: Photo of the “Lady killers camp” or “Camp of Mercenaries and Womanizers” (on the titled land of Zapote, but proximate to San Martin, January 2014). Photo credit: Aaron Groth.

“The mercenaries and womanizers camp” marked the road’s beginning at the edge of the Purús River. The road was made during the dry, “summer” months of June and July 2013. This development is particularly significant, as it is the first logging road documented in the Purús; an agricultural tractor was used in lieu of a forestry tractor, according to local informants. The district of Breu in the neighboring province of Atalaya, headwaters of the Yurua River, had logging roads, including one over 100 km in

length (Salisbury and Fagan 2013). Pinedo-Vasquez (2011) has documented logging road systems and extraction using animal traction and small tractors near Pucallpa. These forest areas have fluvial and terrestrial connections to Pucallpa, signifying that these roads serve the interests of commercialization of timber. The skid trail in Purús represents the first significant development of logging transport infrastructure in the region.



Figure 15: Photo (January 2014) of logging skid trail constructed during dry season 2013 (June/July) from Purús River northward to Santa Rosa River (border with Brazil). Photo credit: Aaron Groth.

Potential for Inter-Community Conflict may be Heightened by Skid Trail

A Huni Kuin (a Panoan-speaking people) community, used this road, which lies in the titled territory of Zapote (Culina, an Arawak-speaking people) to undertake a multi-day hunting trip (pers. observ.). The Huni Kuin traveled upstream from their

community and crossed to the opposite riverbank. The road provided access to the forest between the Purús and Santa Rosa River, separating Peru and Brazil. The road facilitated easy access (i.e., trespass) onto a proximate, but culturally and linguistically distinct native community, and enhanced the probability of tension and physical conflict between them. Was it necessary for the Huni Kuin to obtain permission to hunt in another community? Only further field research can answer this question.

Conta, San José (considered an annex of Conta, but with its own *apus*), Cashuera, and Contagallo all depend upon La Novia River for access to their most valuable stands of the timber species, big-leaf mahogany. These three communities also border the Purús Communal Reserve.

At the invitation of the *apus* of Bufeó, we next went to Bufeó, a Huni Kuin community downriver. This community has a medicinal plants garden and a black caiman (*Melanosochus niger*) living in a nearby ox-bow lake. About half of the buildings had been abandoned and were collapsing. Many members of the community had departed for Brazil. Brazil gives a pension to its indigenous population whereas Peru does not. An old Huni Kuin recounted collecting rubber on the Envira River. Both juvenile and mature individuals of *Hevea brasiliensis* (the rubber tree which permits continuous tapping) were encountered within a fifteen-minute walk of the community. This community is restricted from timber harvest by OSINFOR for a period of three years due to discrepancies found between their POA and amount of timber actually extracted.

The community of San José said only Conta benefitted as the titled landowner. Here is a discrepancy, because, according to other sources, individuals in San José were

paid as “materos” (woodsman paid to locate mahogany trees). *Materos* find trees for logging teams to cut down, and are typically paid about 30 nuevo soles (about \$10 USD) for locating a mahogany tree. The map of San José indicates that community members may have served as materos within the community of Conta (location trees). Some mestizos have their farms on the east bank of the river. No informants mentioned conflicts between mestizos and indigenous individuals concerning the extraction of mahogany. San José and Conta are the only communities visited (during this field visit) that have organized communal vigilance committees and adult men serve as volunteer park guards for the Purús Communal Reserve. San José lies on the west bank of the La Novia River, and while there is an APNP control post further upstream, the community (with support of neighboring communities) has built an office/house for their vigilance committee. The area’s other vigilance committees are organized near the limits of the PCR, Balta and Santa Rey on the Curanja River, and Gastabala, Laureano, and Monterrey on the Alto Purús River.



Figure 14: Big-leaf mahogany (January 2014). Photo credit: Aaron Groth

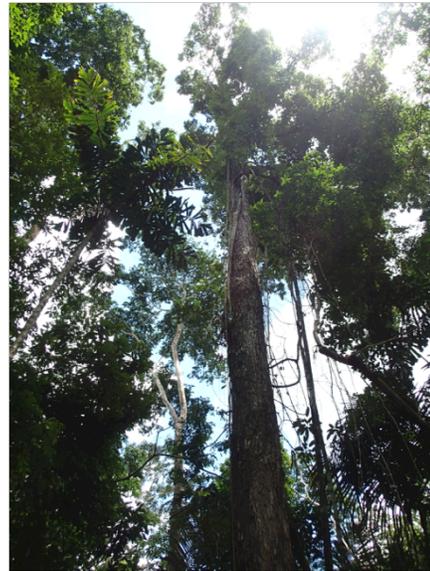


Figure 17: Big-leaf mahogany (January 2014). Photo credit: Aaron Groth

Table 2: Year beginning commercial extraction of big-leaf mahogany

Indigenous Community	Location	Ethnicity	Year Starting Timber extraction	Year Ending
San Martin	middle Purús	Huni Kuin	1995	
San Bernardo	lower Purús	Kulina	2003	
Santa Margarita	Alto Purús	Sharanahua	1982	2005
Gasta Bala	Alto Purús	Sharanahua	1982	2005
San Ramon	Alto Purús	Sharanahua	1982	2005
Santa Rey	Curanja	Huni Kuin	2004	2008
Zapote	middle Purús	Kulina	2000	
Cashuera	middle Purús	Huni Kuin	2007/2006	
Bufo	middle Purús	Huni Kuin	2001	
San José	La Novia	Huni Kuin	2000	
Balta	Curanja	Huni Kuin	1997; again 2004	
Columbiana	Curanja	Huni Kuin	2002	
Canta Gallo	middle Purús	Huni Kuin	1995	
Conta	middle Purús	Huni Kuin	1989	
San Francisco	middle Purús	Huni Kuin	2004	

Source: Focus Groups

Table 3: Use of mahogany before commercialization

Indigenous Community	Location	Ethnicity	Use of mahogany before commercialization
San Martin	middle Purús	Huni Kuin	bark used as a dye for cotton; sale to Municipality of Purus
San Bernardo	lower Purús	Kulina	bark used as dye for traditional clothing
Santa Margarita	Alto Purús	Sharanahua	sold wood without forestry authorization
Gasta Bala	Alto Purús	Sharanahua	sold wood without forestry authorization
San Ramon	Alto Purús	Sharanahua	sold wood without forestry authorization
Santa Rey	Curanja	Huni Kuin	boat construction; bark used as a dye for artisan goods
Zapote	middle Purús	Kulina	boat construction
Cashuera	middle Purús	Huni Kuin	boat construction; bark used as a dye for cotton
Bufo	middle Purús	Huni Kuin	boat construction; bark used as a dye for cotton
San José	La Novia	Huni Kuin	boat construction; bark used as a dye for cotton; seat-making; paddles/oars
Balta	Curanja	Huni Kuin	boat construction; bark used as a dye for cotton
Columbiana	Curanja	Huni Kuin	bark used as a dye for cotton; furniture-making
Canta Gallo	middle Purús	Huni Kuin	boat construction; bark used as a dye for cotton; furniture-making
Conta	middle Purús	Huni Kuin	boat construction, paddles; bark used as a dye for making hammocks, traditional dress (cushmas), bags, and headresses
San Francisco	middle Purús	Huni Kuin	bark used as a dye for cotton

Source: Focus Groups

Big-leaf mahogany in Huni Kuin is termed “Ischinanti.” Mahogany bark was traditionally used for dyeing cotton hammocks and cushmas (traditional dress). The indigenous communities used the wood to make dugout canoes, paddles, and furniture. Wood (both mahogany and non-mahogany) forms an important commercial asset of communities, one that has been sold since the 1980s to the Provincial Municipality of Purús, mestizo merchants in Puerto Esperanza, and some exported to Brazil. It appears loss of traditional knowledge occurred, as the oldest members of the focus groups had to

be asked about traditional uses of mahogany. No informant suggested that the traditional uses of mahogany are limited or no longer possible.

Table 4: Does the community possess a copy of the Annual Operating Plan?

Indigenous Community	Location	Ethnicity	Does the community possess a copy of the Annual Operating Plan (POA)	Observations
San Martin	middle Purús	Huni Kuin	No	Community does not have land title
San Bernardo	lower Purús	Kulina	No	unknown to community
Santa Margarita	Alto Purús	Sharanahua	Yes	WWF
Gasta Bala	Alto Purús	Sharanahua	Yes	WWF
San Ramon	Alto Purús	Sharanahua	No	Community does not have land title; annex of Gasta Bala
Santa Rey	Curanja	Huni Kuin	Yes	
Zapote	middle Purús	Kulina	Yes	
Cashuera	middle Purús	Huni Kuin	Yes	
Bufeo	middle Purús	Huni Kuin	No	Title shared with Pikiniki and San Francisco
San José	La Novia	Huni Kuin	No	Community does not have land title; annex of Conta
Balta	Curanja	Huni Kuin	No	Patrones have the POA
Columbiana	Curanja	Huni Kuin	Yes	
Canta Gallo	middle Purús	Huni Kuin	Yes/No (Discrepancy)	
Conta	middle Purús	Huni Kuin	No	
San Francisco	middle Purús	Huni Kuin	Yes	Title shared with Pikiniki and Bufeo

Source: Focus Groups

The significance of the community not having a copy of the plan suggests that they are not equal partners in the harvesting of timber on lands to which they hold title. The community could also use the plan to verify that loggers were adhering to the plan (felling of specific numbers of individuals, etc.). The lack of access to a copy of the POA demonstrates marginalization from decision-making and management.

Table 5: How many mahogany trees were felled in your community? How many mahogany trees were left to rot in your community?

Indigenous Community	Number of mahogany trees were felled in community?	Number of mahogany trees left to rot in community?	Observations
San Martin**	Unknown	Unknown	80% harvested; 20% left to rot
San Bernardo	Unknown	Unknown	Logger did not inform community of number of trees extracted
Santa Margarita	Unknown	***	Estimate 75% of territory NOT logged
Gasta Bala	Unknown	***	Estimate 75% of territory NOT logged
San Ramon**	Unknown	250***	Estimate 75% of territory NOT logged
Santa Rey	Unknown	20	Estimate; Only the loggers know
Zapote	28-30*	8	2010
Cashuera	15	2	the two trees were left in 2007; 8 burned 2011
Bufo+	65	16	
San José**	100-200*	60-70*	Estimate
Balta	120	50	Estimate
Columbiana	27	120 beams	
Canta Gallo	96-109*	20-22*	Estimate; Community did not control
Conta	300-350*	85 to >100	Estimate; another group said unknown
San Francisco+	150	100	Estimate
TOTAL Estimate	801- 865	551 - >568 (+120 beams)	

*discrepancy between groups within a community

**community without title; in case of San Jose, totals subsumed by Conta; in the case of San Ramon, totals subsumed by Gasta Bala

***250 estimated felled and left to rot between Gasta Bala, Santa Margarita, and San Ramon

+The communities of San Francisco-Pikiniki-Bufo share title to the land (San Francisco and Bufo are considered as having separate totals due to divided geographic space between their communities)

Lack of Transparency on the Part of Loggers and Communities' Lack of Knowledge of Number of Individuals of Mahogany Felled and the Amount of Timber Extracted

The communities did not know exactly how many trees were extracted or how many were left untouched by loggers in the forest, or how many were cut, but left to rot in the forest. For these communities, an estimated 801-865 mahogany trees were cut.

Estimates were derived from focus groups both en situ and in the ProPurús office.

Furthermore, an estimated 551-568 mahogany trees were left to rot in the forest. In the case of Columbiana, 120 beams of mahogany were left in the forest, unable to be sold due to illegal/irregular harvest (they had been caught and fined by Peru's forestry and wildlife regulator, OSINFOR). Illegal or irregular harvest is not typically a barrier to selling mahogany in Peru given the ease with which legal papers can be obtained through bribes of forestry officials. A former leader of the Sharanahua community of San Marcos echoed the sentiments of Columbiana inhabitants in his lament at the amount of mahogany and Spanish cedar left to rot in the forest of his community. These two communities stressed that they have marketable mahogany and Spanish cedar (already felled in some cases already cut into boards); however, they do not have permission to sell the timber due to OSINFOR's suspension of logging rights and the forestry authority's canceling of timber transit papers. The administrative process and fines preclude harvesting of timber and non-timber forest products under approved management plans.

Many trees have internal rot that significantly reduce their value or make them unmarketable. Those trees once felled represent a loss of seed source and genetic material. In some cases, however, timber was wasted; two-thirds of one tree (no internal rot) was not cut into boards, and left to rot in the forest during 2002 in Columbiana (Fagan and Salisbury 2003).

Table 6: Payment in cash or goods? Receipt?

Indigenous Community	Cash	Goods (in general)	Receipt, Proof of sale, Official record of transaction	OBSERVATIONS
San Martin	x	x	None	
San Bernardo		x	None	
Santa Margarita		x	None	
Gasta Bala		x	None	
San Ramon		x	None	
Santa Rey	S/.5,000	x	None	S/.0.50 per board foot
Zapote	S/.10,000	S/.1,100- S/1,500	Discrepancy: 2 groups yes; 1 group no; 1 group no answer	28-30 trees (2010); down payment with food; cash following sale of mahogany
Cashuera	x		Yes	
Bufo	x	x	None	(soccer uniforms were the clothing); S/.0.50 per board foot
San José	x	x	No Response*	individually paid; cash advance, then food and gas; one of the two groups held that Conta had derived all benefit
Balta	S/.8,000	x	No Response*	
Columbiana	x (2005-2007)	x (2002)	None	
Canta Gallo	x	x	Discrepancy: 2 groups yes; 1 group no	
Conta	x	x	No Response*	
San Francisco		x	No Response*	

Source: Focus Groups

Table 7: Goods advanced to indigenous communities

Indigenous Community	Food	Gas	Clothing	Peque-peque Motor(s)	2 nd hand shotguns	Battery	Sound System	machetes	rubber boots	fishing nets	boat
San Martin	x	x	x	x	x						
San Bernardo	x			x	x						
Santa Margarita											
Gasta Bala											
San Ramon											
Santa Rey	x	x		x	x						
Zapote				x							
Cashuera											
Bufo			x	x	x	x	x				
San José	x	x									
Balta	x	x		x	x			x	x	x	
Columbiana	x										
Canta Gallo					x						x
Conta	x			x							
San Francisco	x	x		x	x						

Source: Focus Groups

Food, peque-peque motors, second-hand shotguns, and gasoline (about \$10 USD/gallon) were the most cited forms of non-cash payment.

Table 8: Social and Economic Impacts

Indigenous Community	Logger relations with indigenous women	Conflict between annex and titled community	Unpaid bills in name of community	Loggers took resources and community did not benefit
San Martin	2	Conflict with Zapote		
San Bernardo				
Santa Margarita				x
Gasta Bala				x
San Ramon				x
Santa Rey				
Zapote				
Cashuera				
Bufo				
San José		Conflict with Conta		
Balta				
Columbiana				
Canta Gallo				
Conta			x	
San Francisco				

Observe as well, the conflicts noted between an untitled annex and the titled community. Loggers often allow indigenous communities to buy their basic necessities on credit from merchants in Puerto Esperanza. A Sharanahua informant of San Marcos lamented that the community has a 35,000 nuevo soles (about \$12,000 USD) debt with a local shopkeeper. Huni Kuin informants in Conta also said they were indebted to shopkeepers in Puerto Esperanza for the goods advanced before the wood was sold.

The highest echelon of local, regional, and national government officials in the Province makes about 3,000 nuevo soles (about \$1,000 USD) per month. A tenured schoolteacher makes approximately 1,500 nuevo soles (about \$500 USD) per month. Some Sharanahua and Huni Kuin have become schoolteachers or technicians. A lower echelon employee of the municipal public works department makes approximately 600

nuevo soles (about \$200 USD) per month. Indigenous men were paid 20 nuevo soles (about \$7 USD/day) to haul mahogany boards from the river to the runway (Fagan and Salisbury 2003). If someone worked 5 days a week for a year at that salary they would earn approximately \$5,200. However, at times, no employment may be available. Any community member earning a wage is expected to share resources with extended family members. The amount of debt owed seems far greater than the ability of indigenous communities' to pay. Sharanahua informants of Santa Margarita, Gasta Bala, and San Ramon stated the loggers took the resources and the community did not benefit.

Table 9: Government Sanctions

Indigenous Community	Debt with SUNAT	Criminal charges	Fines with OSINFOR	Logging rights suspended for 3 years
San Martin				
San Bernardo	x	x		
Santa Margarita				
Gasta Bala				
San Ramon				
Santa Rey	x		x	
Zapote	x		x	
Cashuera	x			
Bufo	x			x
San José				
Balta	x			
Columbiana	x	x (exonerated)	x	
Canta Gallo	x		x	
Conta			x	
San Francisco	x	x	x	x

Source: Focus Groups

In one case, OSINFOR issued a fine exceeding 140,000 nuevo soles (about \$45,000) with threats of confiscation of community property. Communities owe taxes on timber sold outside of the Amazon. The loggers never explained to the communities about taxes (anonymous pers. com.). Although the loggers possessed the communities'

land titles and contracts, they never paid taxes owed on behalf of the communities (anonymous pers. com.). This means that loggers get all the profit clean (anonymous pers. com.).

Table 10: Environmental Impacts

Indigenous Community	Reduction in availability of game	Aquatic life affected by damming creeks	Contamination of creeks and soils
San Martin			
San Bernardo			
Santa Margarita			
Gasta Bala			
San Ramon			
Santa Rey	x	x	
Zapote	x		
Cashuera	x		
Bufo			
San José	x		
Balta	x	x	
Columbiana	x	x	
Canta Gallo			
Conta	x	x	x
San Francisco	x	x	

Source: Focus Groups

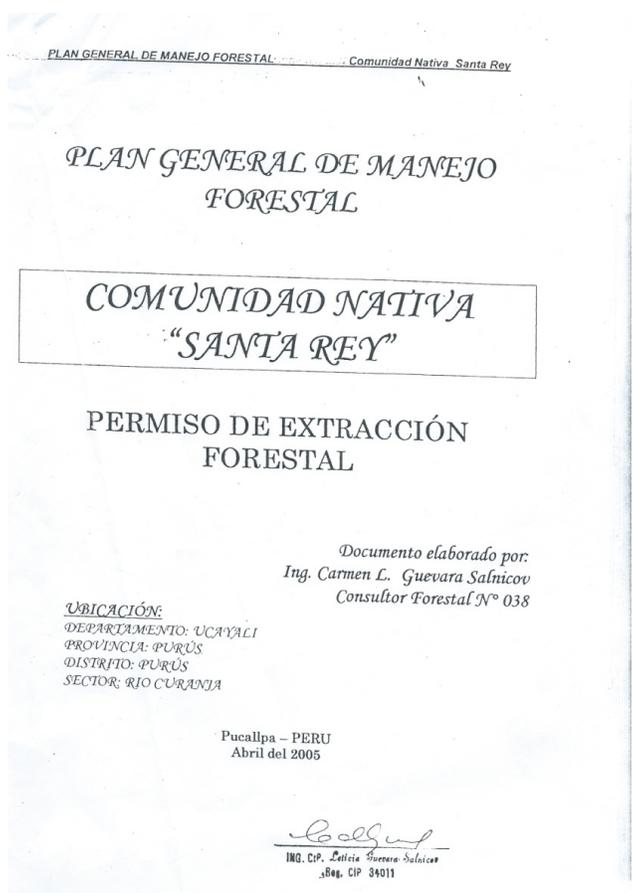


Figure 18: Cover of General Forestry Management Plan of Santa Rey indigenous community. Authorization for Timber Extraction. Note how the document was elaborated by a Forestry Engineer in Pucallpa in April 2005. Photo: Aaron Groth.

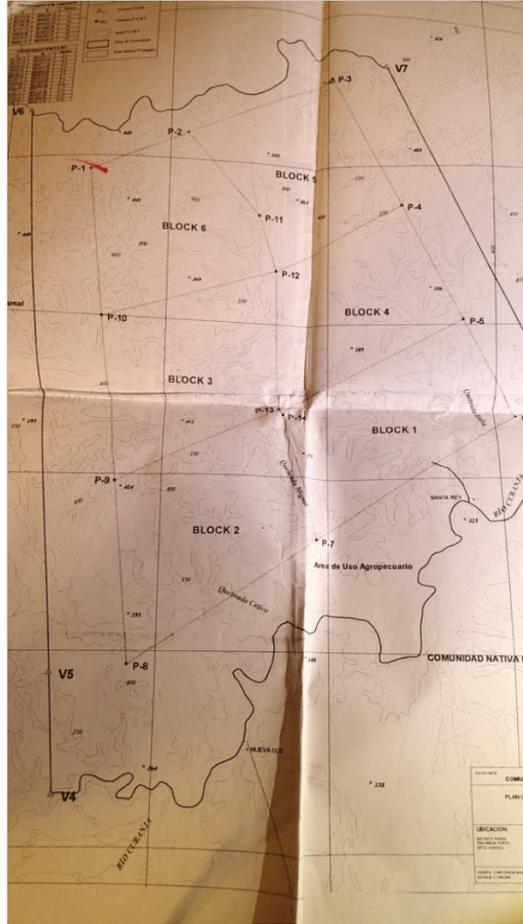


Figure 19: Map made by Forestry Engineer, dividing up Santa Rey into six timber extraction blocks. The area closest to the river is the agricultural zone. Photo credit: Aaron Groth



Figure 20: Photo: mahogany board, evidently cut by chain saw (January 2014). Note it is illegal to cut mahogany with a chain saw; furthermore it is very wasteful of wood. Photo credit: Aaron Groth.



Figure 21: Photo of mahogany being loaded on to a Peruvian air force plane (FAP) – Grupo (Group) 8 (January 2014). Photo credit: Aaron Groth.

VI. Discussion

Despite an official legislative, statutory, and regulatory prohibition on logging of mahogany and Spanish cedar in the Purús watershed, the Peruvian government actively facilitated the logging and transport of these woods. The indigenous communities do not know how many trees of mahogany were extracted from their territories. Given the remoteness of the region from national and international markets, the mahogany must be flown out of Purús, often via “Grupo 8” of the Peruvian air force (FAP) or occasional Army (EP) and National Police (PNP) flights. A local informant attests the role played by officials in facilitating transport of mahogany to Pucallpa (2000-2008). The local military garrison (UMAR-6) rented its truck to the loggers to haul mahogany from the Purús River port in Puerto Esperanza to the airstrip (anonymous, pers. com.). Mahogany which had been cut into boards in the forest interior with a chain saw (against Peruvian law), was “cleaned” in either the sawmill of the municipality or the sawmill of the regional government located in Puerto Esperanza (anonymous, pers. com.). The wood is flown to Pucallpa, once in Pucallpa, mahogany is put on trucks and exported from the Port of Callao on the Pacific coast. Cutting mahogany into boards with a chain saw wastes a lot of high value timber, and was prohibited under the country’s 2000 Forestry Law. It appears local extraction and production systems underwent a transition to overexploitation of natural resources responding to government facilitation and increasing integration into regional and global markets.

I came across no literature citing the abandonment of an indigenous community due to fears of government retribution. Their flight to Brazil may embolden loggers, mestizo colonist, or other indigenous groups (i.e. the Asháninka of the Selva Central) to

occupy their lands. All titled (and untitled) indigenous communities on the Curanja River belong to the Huni Kuin ethnicity.

OSINFOR has leveled fines, in some cases exceeding 130,000 nuevo soles (approximately, \$45,000 USD). These fines are issued with a warning of confiscation of community property. Furthermore, criminal charges have been brought against a number of indigenous communities' *apus* for violations of logging laws and regulations. Moreover, these communities owe taxes to SUNAT (Peru's revenue department). Amounts owed to OSINFOR are astronomically larger than whatever benefit the community was able to garner. What has been the role of the Peruvian state in supporting dominant groups and classes, reinforcing accumulation by dominant groups, and marginalizing indigenous communities through "taxation, land tenure policy, and the allocation of resources" (Blaikie and Brookfield 1987, 17)? Capital accumulation certainly did not occur in the indigenous communities.

Indigenous communities lack basic wood measuring skills, do not understand national laws governing logging, and have little experience in business negotiation (Fagan and Shoobridge 2007). Conversations with inhabitants of Conta and a Sharanahua informant of San Marcos confirmed their communities had become indebted to loggers. The loggers advanced overpriced goods to community members in exchange for undervalued wood (Fagan and Shoobridge 2007). In some instances, the debt was crushing in nature.

The current *apus* of one community accused former *apus* of robbing the community. Inhabitants of one community complained their *apus* had used 6,000 nuevo soles (over \$2,000 USD) to purchase land without consulting the community. This

parallels Watson's (1996) investigation which concluded Brazilian loggers negotiated with only the village headman and/or selected individuals of the community. This unequal sharing of timber harvesting proceeds affected communities' internal social structure.

One *apus* was lauded for purchasing a freezer and two peque-peque motors for the community because it benefited the community at-large.

The building of a logging road and the operation of an agricultural tractor during the dry season of 2013 may foreshadow future intensification of logging activity in the Alto Purús. In January 2014, a Brazilian logger who operates logging teams and forestry tractors in the adjacent province of Atalaya expressed his desire to initiate logging in Purús with forestry tractors. He said he wanted to be the first, because no forestry tractors operate in Purús Province (anonymous, per. com.). The lack of fluvial connection to other parts of Peru, and the lack of local or regional road networks, has so far served to protect the Purús from deforestation, colonization, and land use/land cover changes that have occurred along roads in the Amazon. While woodsmen in Belize used cattle to transport mahogany starting in the early 1800s (Camille 2000), there exists no recorded use of cattle or oxen in the Purús. In the 1920's, the introduction of tractors (and the introduction of lorries in the 1940s) greatly expanded the range of woodsmen operating in Belize (Camille 2000), leading to degradation. Does the creation of one logging road foreshadow future intensification of this method of extraction in the region? Only time will tell.

A number of key informants in Purús mentioned that loggers either gave liquor directly to the indigenous communities or members of the indigenous communities

acquired liquor through cash received (or credit advanced). Again, this parallels Watson's findings of Brazilian loggers using liquor as either leverage or an inducement to acquire logging rights in communities at rock-bottom prices.

When Ucayali's Regional Forestry Department (DEFFS-U) visited indigenous communities in Purús in June 2013, the indigenous communities expressed their concern about the administrative processes that they were under (fines levied by OSINFOR), and that these institutions (DEFFS-U and OSINFOR) have no permanent presence in the region.

While literature substantiates indigenous claims that logging reduced availability of game, some key informants reflected on the role of communities in felling palms and fruit trees near the community – thus reducing sources of food for game as well as for community residents. During 2011, indigenous informants expressed concern regarding the felling of palms and fruit trees near communities and the impacts this had on wildlife and availability of edible, wild fruits (UAC/ProPurús n.d.).

During the 2013-2014 research, and during research in 2011, Indigenous communities mentioned not only that loggers scared away game, but also contaminated streams and soil through the spilling of gas and oil (UAC/ProPurús n.d.).

This study seems to affirm the second assumption of the marginalization and degradation thesis: individual producers/extractors bear the greatest costs and risks under competitive global trade regimes and unregulated markets. “The result is a pattern of appropriation and accumulation of natural capital, transformed into currency, at locations away from the site of production” (Robbins 2004, 132). Uhl and colleagues found that those colonists not involved directly in logging, garnered only 1% of the value of the

wood (1991). In Purús, this study (as well as Fagan and Shoobridge 2005; 2007; UAC/ProPurús n.d.), determined communities received between 20 and 50 centimos (\$0.08-\$0.17) per board foot. These communities became indebted to loggers through extraction.

Limitations of the Research

Using Robbins' criteria of what constitutes degradation, in the case of Purús, it is difficult to substantiate processes of degradation due to lack of quantitative data (2004, 92). Proof of loss of natural productivity would require a measure of conditions over time in a specific location. We do have documented declines of the species *Podocnemis expansa* and *Arapaima gigas*; however, proving loss of natural productivity throughout the forest ecosystem of Purús is no easy task. Between 1905-1910, Rummenhoeller estimates the number of *Castilloa spp.* trees cut at 16,455 (2010, 95). Because extracting rubber (caucho) from this species required felling trees, extraction was displaced from the Purús watershed to the Las Piedras watershed (Rummenhoeller 2010, 95). The decline of the species was not so great as to preclude harvesting during WWII.

In the case of mahogany, according to Ignacio Lombardi, contracted by the Environment Ministry as the scientific authority for determining the export quota of mahogany, in those areas of the country still retaining forest cover, there is natural regeneration of mahogany occurring (pers. com.). The Department of Loreto was excluded from consideration of export quotas because most mahogany trees are below the minimum cutting diameter (Lombardi pers. com.). Lombardi visited a number of communities in Purús and determined there was natural regeneration of mahogany occurring (pers. com.). However, natural regeneration does not assure that the genetic

variation is optimal. In areas heavily deforested and subject to land use/land cover change (i.e. San Martin Region), loss of mahogany may be irreversible.

Following the rubber boom, timber and hides were the principal exports of the Purús region. In the year 1932 the logger Tomás Torrejón extracted 5,000 logs of águano (another name for mahogany) for the “Hore” Commercial House in Manaus, Brazil (Rummenhoeller 2010). In 1935, 1,217 logs were encountered in Puerto Esperanza (AHL 1936, as cited in Rummenhoeller 2010). Friar Torralba (1978) reported that by 1940 the boom of selling Spanish cedar and mahogany reached its apogee. Until the late-1960s and 1970s, with the diffusion of chainsaws, prior timber extraction relied upon steel axes and saws (Rubio del Valle 2013). The role of indigenous communities during this time period in the extraction of timber is as yet unwritten. Were sixty years sufficient for the recovery of the species? Were those species closest to the major rivers and streams felled during this period, leaving large trees only further afield (far from the major rivers) – mostly accessible far up streams for extraction during the 2000s?

Between 2003-2007, Peru’s forestry authority facilitated and permitted the felling of an estimated 2,293 mahogany trees and 933 Spanish cedar trees (Rubio del Valle 2013, 18). Not all of these trees were felled in the 23 titled indigenous communities (comprising some 300,000 ha); a great number were felled in protected areas and territorial reserves for indigenous populations in voluntary isolation (Rubio del Valle 2013, 18). Peruvian government authorities, at local, regional, and national levels disregarded the ban on mahogany logging in four watersheds, and issued exorbitant fines, claimed taxes were owed by indigenous communities, and filed criminal charges against

indigenous *apus* in the context of this extraction. If degradation cannot be proven, this certainly highlights processes of marginalization.

The majority of communities desire to continue logging, and emphasize (in the case of Gasta Bala, San Ramon, and Santa Margarita) that 75% of their territory was not impacted by logging. Most communities wished to continue logging on their lands in order to obtain basic necessities. Little or no cash economy exists in the indigenous communities. Indigenous individuals are advanced goods at inflated prices for undervalued timber and non-timber forest products, and many fall into debt.

The landscape must be sampled using representative plots to substantiate declining biodiversity, which is difficult to prove. Remember, declining biodiversity may lead to serious and sustained declines in productivity (Robbins 2004, 94).

Communities have expressed consternation at the decline of availability of game due to logging. During 2011, Balta and Santa Rey residents believed that game was starting to recover since the departure of loggers from communal territory (UAC/ProPurús n.d.). “Loss of usefulness” is an anthropocentric manner of assessing degradation – one subject to competing visions. It should be emphasized that residents of the Huni Kuin community who used the new logging road for hunting and penetrating Zapote’s territory all the way to the Brazilian border, said logging scared away wildlife, and made hunters travel greater distances to find game.

Recommendations for Further Research

A number of indigenous communities insisted that loggers’ use of *tapaje* (dams) to get logs from stream headwaters to a major river (Purús, Curanja, or La Novia) resulted in streambed erosion and adversely affected aquatic life (especially fish,

caimans, and anacondas). While the effects of logging on streams have been documented in other parts of the world, this author could find no peer reviewed study regarding this subject in the subject area of Purús. Logging impacts on streams and waterways of the Amazon is as yet unwritten, from an academic perspective.

In 2004, Canta Gallo indigenous community was paid by the reforestation committee to plant mahogany and two other species of trees. While some specimens succumbed to disease or were shaded, inhabitants of Cantagallo, in order to create new swidden plots, intentionally cut some of the trees they had earlier planted. What were the decision variables leading to this course of action? Long-term monitoring of this reforestation project and measuring mahogany growth and survival could be an interesting research project.

A number of key informants believe that indigenous agricultural production patterns were altered due to communities' receiving foodstuff and cash in exchange for timber rights. One key informant recounted how various indigenous communities suffered hunger after failing to plant sufficient staple crops (i.e. banana, manioc, corn). This requires further investigation, as no quantitative data exists regarding the area under cultivation throughout the years.

The communities of Purús wish to continue harvesting timber. What does this commercialization portend for traditional beliefs of the Huni Kuin? Lagrou (1998) found that the Huni Kuin believe that trees are imbued with spirits and songs must be sung when passing a lupuna (*Chorisa integrifolia*) tree to placate the forest owner and spirit inhabitants of the trees. Her work is worth citing at length:

Ni ibu is the "owner" of the forest, that means that as planter of all wild trees he is their father and will therefore continue to function as their guardian. Songs are sung to ask permission of this master of the forest, as well as of all its invisible subjects, the inhabitants of the lupuna tree, to pass by in peace (Lagrou

1998).

In huge trees, such as the lupuna tree (xunu) and the cumaru (kuman), and other, less impressive trees such as the pau d'arco (Wxu), and the copaiba tree (buxix), Yuxin are active even when the tree is left in peace. This is due to the fact that these trees house complete communities of disembodied yuxin. A village as big as a city is said to exist on top of the lupuna tree. Along with the ni yuxin (the yuxin of the trees, embodied in the "flesh" of the trees), there are the yuxin of the dead, who stay in the trees temporarily on their way to their final dwelling place in the sky village of the Inka. (Lagrou 1998)

How does the harvesting of trees for commercialization affect traditional beliefs?

Are certain areas of communities considered off limits for resource extraction? Are

certain areas of communal territory considered sacred? Are the areas of reserved

mahogany indicated on community maps a vestige of top-down forestry management

plans or the result of community decision-making about natural resources?

VII. Conclusions

How might GIS serve indigenous communities to better manage their resources? Modern maps and mapping technology would serve the interests of indigenous communities: “for organizing information about their territories; for reaffirming and defending their property rights, their cultural rights, their history; and for planning the future management and development of their territories” (Smith et al, 2003, 367). The work of UAC/ProPurús with indigenous communities includes mapping of natural features and resources. Indigenous informants used GPS to record natural features and natural resources in their communities during 2009-2010, and that data was used in a GIS to make maps (UAC/ProPurús n.d.). Community mapping may serve to complement use of GIS. Indigenous communities of the region have not yet been trained in use of GIS. Community mapping is a valuable tool for assessing resources, and one that allows local involvement. The community mapping process may prove vital for community planning and internal regulation of land use. Analyzing spatial information about human land use may serve communities in the process of designing their own conservation and management plans.

According to Herlihy and Knapp (2003, 308-309), participatory mapping may serve to “educate and empower communities,” in their management of resources and territory. Land titling may serve to protect community territory from exogenous actors who deplete local timber and game resources. Design and implementation of resource-use norms between inhabitants of the same community and between inhabitants of neighboring communities requires the development of community-based institutions for

the management of resources with uneven spatial and temporal distribution throughout territory.

Community mapping with indigenous communities serves to complement ethnographic methods and semi-structured interviews to understand social and environmental impacts of extractive activities (i.e. logging). “There is no theorization or methodology that can substitute for empirical field-based research in frontier environments” (Salisbury 2007, 290). This study of mahogany extraction focuses upon indigenous communities within a particular watershed of the upper Amazon, and documents processes of marginalization and degradation and indigenous responses to these forces. Previous studies have emphasized logging in the borderlands between Peru and Brazil (Salisbury 2007; Salisbury et al. 2011).

The lack of a fluvial and terrestrial connection to the rest of Peru serves to protect some of the last commercially viable mahogany stands in the region. Furthermore, the lack of a road serves to protect at least two groups in living voluntarily in isolation, including the Mashco-Piro and Curanjeños. Peruvian Congressman Carlos Turbino seeks passage of a law to construct a highway from Iñapari, Madre de Dios, Peru on the trans-oceanic highway to Puerto Esperanza. This proposed road would bisect the Madre de Dios Territorial Reserve, APNP, and PCR, covering over 270 km (Dourojeanni 2003; Appling and Salisbury 2012). Despite, the fact that the proposed law had not passed Congress and pronouncements against any road building from Peru’s Ministry of Environment, Ministry of Culture, and Ministry of Transportation and Communication, the local municipality gave money to a pro-road group to illegally begin construction of the road and attempted to bribe indigenous leaders into garnering indigenous

communities' support for the road's construction (Global Witness 2013). In depth interviews with (n=33) indigenous inhabitants in the communities of Monterrey, Laureano, Santa Rey, and Balta during 2011 revealed overwhelming opposition to road construction with (n=29) individuals voicing their opposition (UAC/ProPurús, n.d). Those four individuals in favor of road construction stressed the need for prior consent with all indigenous inhabitants of Purús (UAC/ProPurús, n.d). Roads facilitate colonization of Amazon lands and extraction of resources such as timber and gold (Heredia 1989). About 75% of forest damage in the Peruvian Amazon occurred within 20 kilometers of a road (Oliveira et al. 2009). Any road constructed would not only threaten timber resources in the region, but colonization and usurpation of indigenous lands would inevitably follow. Construction of roads will be devastating to the species, to the ecosystem and to the people, as it has proven in other areas (i.e. Pará and Rôndonia, Brazil).

The pilfering of forests – degrading them through selective logging – threatens communities' long-term financial resources. Logging of tropical forests has not only compromised the ecological integrity of forests, it has impacted indigenous communities and their livelihoods. Grogan (et al. 2010) posits protected areas and indigenous communities of the Amazon may serve as a seed stock for recovering the mahogany throughout its range. Unfortunately, selective logging inside protected areas and territorial reserves for indigenous populations in voluntary isolation has occurred in multiple sectors of Alto Purús National Park (Fagan and Shoobridge 2005; 2007), including the western edge of APNP and within the Murunahua Territorial Reserve (Round River 2009) as well as on the Las Piedras river (Schulte-Herbrüggen 2003). The

Peruvian state has not only failed to halt incursions of loggers into protected areas and territorial reserves, but in some instances has actually facilitated the exploitation.

The Kayapó of Brazil have succeeded in reinvesting their profits from mahogany into community development and defense of territory. In the Kayapó territories of Pará that experienced mahogany harvesting, 85% of the fruiting populations for that species were lost (Zimmerman et al. 2001). Conservation International-Brazil worked with the Kayapó of A'Ukre to build and jointly manage the Pinkaiti research station and establish an 8,000 ha biological reserve containing an undisturbed population of mahogany (Zimmerman et al. 2001). The Kayapó of A'Ukre exclude trespassing loggers and control and monitor the area; thereby, protecting this biological research reserve from both loggers and members of the community (Zimmerman et al. 2001). The Pinkaiti research reserve protects one of the last natural stands of mahogany in Pará; furthermore, it may be the only example of a protected population of *S. macrophylla* throughout the species range (Zimmerman et al. 2001). The Kayapó have enjoyed international notoriety since the 1970s, gaining official recognition of their traditional lands (Zimmerman et al. 2001). Zimmerman (et al. 2011) posits their role was instrumental in “redrafting the 1988 Brazilian Constitution to protect the rights of all indigenous peoples within Brazil” (Zimmerman et al. 2001).

The indigenous communities of the Purús and Curanja Rivers never garnered the profits from mahogany that the Kayapó of Brazil enjoyed. Overflights (aerial patrols) of the Alto Purús region are not paid for with the proceeds of mahogany logging by indigenous communities in Peru, they are financed by non-governmental organizations. While some motors and boats were purchased with proceeds from mahogany sold or

traded for wood, these items were not acquired with the motivation of patrolling and defending community territory. Furthermore, these items have been threatened with confiscation by the Peruvian state due to fines for logging irregularities. No Alto Purús community has established a biological research reserve on their titled lands. The local, regional, and national governments have not undertaken participatory land use planning or ecological and economic zoning within the 23 titled indigenous communities comprising about 300,000 ha. Given the complaints manifested by various key informants as well as during interviews and focus groups, communities of Purús reject the corruption of *apus*. If extraction of another natural resource occurs, perhaps the communities will demand a concomitant redistribution of benefits.

While the role of indigenous populations in managing forest landscapes and species is considered, their role is also considered in archeology. In the case of the Maya civilization, large areas may have been cleared for agriculture, “but agroforestry systems must have also existed which provided seed stock for regenerating forests [and the specie *S. marcrophylla*] once these landscapes were abandoned” (Steinberg 2005). Remnants of forest, like the Pinkaiti research station of A’Ukre are vital to managing populations of mahogany as well as providing seed stock for deforested and degraded areas such as Pará. The indigenous communities of Laureano, Monterrey, and Bola de Oro, organized by ECOPURÚS are currently managing harvests of seed-bearing mahogany trees. UAC/ProPurús donated scaling equipment to ECOPURÚS. For their proposal, “Sustainable use of seed-bearing mahogany trees in the indigenous communities of Purús-Ucayali,” ECOPURÚS received First Place in the Category of Eco-businesses and Bio-commerce as part of the 2013 National Environmental Citizen Award, organized by

the Ministry of Environment (Luján 2013). ECOPURÚS relies on funding from non-governmental organizations. At the time of research, the renovation of their office halted with the rebuilding of the frame and roof due to lack of funds – leaving no exterior walls or rooms. What equipment they had acquired over the years was being stored in a former leader’s house. This highlights the financial precariousness of a prize-winning Administrator of a communal reserve. Unfortunately, those communities who owe fines and/or have had their logging operations suspended cannot participate in this project. This harvesting occurs in the context of state control and state approval of management plans.

Small-leaf (Caribbean) mahogany (*Swietenia mahogany*) extraction in the West Indies serves as a cautionary tale regarding the harvesting of big-leaf Mahogany. Only a few individual specimens remain, as the loss of genetic material was so great due to harvesting. This represents a clear case of degradation, which also faces big-leaf mahogany stock.

Both Peru and Mexico harbor an amazing amount of biological and cultural diversity: both are recognized internationally for their mega-biodiversity and cultural diversity (large populations of indigenous peoples). Furthermore, both countries have instituted reforms to privatize community property regimes and modernize their cadastral system. This has implications for both indigenous livelihoods and biodiversity.

Since Spanish colonization, Mexico has lost over 80% of its forest cover. Cattle ranching along the Gulf of Mexico during the 1970s decimated Mexico’s tropical rainforest, reducing the forest to only 10-15% of its original distribution (Toledo 2003). About 60% of Mexico’s forests are dry forests, and thus not important sources of timber

for export. In 1992, Mexico liberalized their Constitution, raising questions about the survival of Mexico's community property regimes established in the wake of the Mexican Revolution. Specifically, the Mexican state instituted a program of national certification of rural lands, PROCEDE, to facilitate the privatization of Mexico's ejidos (community property regime that gave land to landless peasants following the Mexican Revolution) and indigenous communities. Since the 1940s, about 80% of Mexico's forestlands were transferred by the state to these community property regimes (Bray and Merino-Pérez 2002). In 1992, the Mexican state made sure that the community property regimes would no longer be "inalienable" (Smith et al. 2009). Mexico's National Forestry commission offers payments for environmental services to communities who have certified their lands – those who have not are ineligible for compensation (Smith et al. 2009).

Peru has suffered substantial loss of coastal forests (i.e. Tumbesian tropical dry forests) and Andean forests (i.e. tropical-montane cloud forests [TMCF] and *Polylepis* spp. forests). Deforestation occurs along rivers and roads in the Amazon, and selective logging of vast tracts of tropical forests impacts indigenous communities and protected areas. Still, compared to Mexico, Peru maintains a larger proportion of its tropical rainforest. Indigenous communities in Peru did not receive communal land rights until 1974. A 1978 law stripped communities' of rights to their forest resources – returning ownership of forest resources to the hands of the state. Peru's 1979 Constitution guaranteed community property regimes as inalienable, imprescriptible, and guaranteed against seizure. However, in Peru's 1993 Constitution, indigenous communities are only recognized as imprescriptible – not inalienable or guaranteed against seizure. Many

indigenous communities that received title to their lands in the 1970s or 1980s are now processing requests for an expansion of territory due to population growth.

Unfortunately, many of these requests for both recognition and expansion are not processed, as hydrocarbon, mining, and forestry concessions have been granted in the adjacent area (Tipula 2013; Salisbury 2007).

Since the early 1800s, Peru's Amazon economy has relied upon a system of *habilitación*, whereby debt and greater risk are pushed down from capital lenders to the extractors. Indigenous communities do not receive fair compensation for their timber, and suffer large fines and administrative sanctions for loggers' violation of government approved management plans. In contrast, Mexico has implemented a system of Community Forestry Enterprises, which attempts to involve local communities in all stages of production: extraction, timber processing, marketing, etc. The salient difference between the forestry systems of Peru and Mexico is that Mexico attempts to manage forests through a common property regime and social inclusion, while Peru relies upon a system that obviates community ownership of forests (reserved for the state) and excludes them from participation in decision-making and management. These differences have profound implications for rural livelihoods.

Recommendations

- 1) Build the human and financial capital of individual indigenous communities through the sale of non-timber forest products. Similarly the inter-ethnic indigenous federation (FECONAPU) and ECOPURÚS (co-administrator of the PCR) require the building of human and financial capital. Ideally ECOPURÚS could establish financial solvency through commercialization of non-timber forest

products in both the PCR and individual communities. These communities and institutions require three things: training in basic forest management, access to technical expertise when needed for planning and control of harvest operations, and an advocate for them in forestry and resource matters.

- 2) The Peruvian state should encourage indigenous communities to act as a seed source for other areas of the country (and region). Peru requires a system of seed certification/verification. The Forestry Stewardship Council (FSC) certification, while international recognized, is very expensive. Perhaps a “stamp” given by both SERNANP and FECONAPU/ECOPURÚS could provide legitimacy. This “stamp” could serve to indicate that the seeds are from Purús and sustainably harvested. At the same time, the government needs to ban the sale of unverified seeds. Seed projects may perversely encourage illegal felling of trees to obtain seeds. This has happened before in the Purús region.
- 3) Work with both FECONAPU and ECOPURÚS to encourage management and land use planning of communal territory and propose commercial harvest of tree seeds with scaling equipment. Besides mahogany, the region boasts a number of commercially valuable timber species. The limitation of seed harvest is that for genetic reasons, the best use of seeds is local. Trees are often highly adapted to local soil and climate.
- 4) Indigenous communities must always be provided with a copy of the forest inventory and annual operating plan (POA) in order to be able to control the amount of timber leaving the community.

- 5) Members of indigenous communities and other rural extractors should be trained in measuring wood so they can accurately estimate the value of the raw commodity and its probable re-sale value on the local and the international market. Fore-armed with this knowledge, indigenous communities can demand fair compensation for the commercial value of this important natural resource.
- 6) Create a “blacklist” of loggers who are known to have worked illegally and unethically in the past.
- 7) Confronting illegal harvest of timber requires the following: 1) agencies that are staffed, trained, equipped, and financed; 2) cooperation among the various agencies; 3) effective anti-corruption efforts; and 4) a responsive legal system. When Peru’s new Forest Service (SERFOR) conducts the first national forest inventory, they could collect DNA samples from different sites for the purposes of future enforcement. The Peruvian Navy could aggressively exercise its exclusive authority to intercept water born shipments of timber in transit while on Peruvian waterways. Since post-cutting audits do not prevent illegal activities, OSINFOR could audit pre-cutting with logging company representatives (in addition to post-cutting audits). This may serve to prevent laundering of wood/illegal timber harvest.
- 8) Peru’s government agencies and universities could adopt the extension forestry model used in the United States and Mexico. Rather than locating government administration and regulatory offices far from communities, forestry extension professionals and technicians could meet with indigenous people in their communities and go into the field with them when necessary.

- 9) Peru's government should reflect if the indigenous communities' administrative processes (PAU), fines with OSINFOR, debt owed to the revenue department (SUNAT), and criminal charges against communities' *apus* are just and fair given that these communities assume an undue financial burden and criminal liability for a resource over which they exercise little political, economic, or social control. This issue requires the involvement of the nation's ombudsman (Defensoría del Pueblo). Lift administrative processes (PAU) over sanctioned communities to permit commercial harvesting of mahogany seeds (with scaling equipment – not felling the tree) and other non-timber forest products.
- 10) The regional government must execute projects that prioritize addressing basic needs while benefitting rural communities. Most rural communities lack access to health care, access to potable water, and access to sanitation. Regional governments failing to meet basic needs could be sanctioned.
- 11) Peru should consider how the Mexican model for forest management by indigenous communities could be used to address the problems identified here.
- 12) Promulgate a new form of Indigenous land title that has some teeth (e.g., surface, subsurface resource rights; the right to manage property according to Indigenous property regimes); this must be accompanied by state or NGO resources to supply the human capital and legal assistance needed in implementation.

APPENDIX A

Grupos Focales:

- 1) ¿En que año empezó de vender caoba?
- 2) ¿Como utilizo la caoba antes de comercializar?
- 3) ¿La Comunidad tiene copia de POA?
- 4) ¿Cuántos árboles de caoba cortaron?
- 5) ¿Cuántos árboles han dejado pudrir por el monte?
- 6) Pago en efectivo o trueque? ¿Qué recibieron? ¿Comunidad recibió boletos/recibos o algún comprobante?
- 7) ¿Con que madereros/empresas han trabajado?
- 8) ¿Qué problemas dejaron los madereros o empresas?
- 9) ¿Qué recursos puedan sacar la CCNN de manera sostenible?

APPENDIX B

Judicial Notification from Purús's Mixed Provincial Court inculcating three individuals, including an *apus*, a charge for crimes against natural resources, depredation of legally protected flora and fauna, and a charge of ideological falsehood against public legal authority.

Corte Superior de Justicia de Ucayali – Poder Judicial
Juzgado Mixto de la Provincia de Purús
NOTIFICACION JUDICIAL

EXPEDIENTE : 059-2010-PE
INCUPLADO : [REDACTED]

AGRAVIADO : EL ESTADO
DELITO : CONTRA LOS RECURSOS NATURALES – DEPREDACIÓN
DE LA FLORA Y FAUNA LEGALMENTE PROTEGIDAS
DELITO : CONTRA LA FE PÚBLICA – FALSEDAD IDEOLÓGICA
SECRETARIA : KARIN SEGURA FLORES.

DESTINATARIO : [REDACTED]
DOMICILIO : COMUNIDAD NATIVA [REDACTED] - PURUS

Por medio de la presente cumplimos con notificar la RES. N° 04, de fecha 01-09-2011, a fojas 01; Fdo. Dr. Pascual del Rosario Cornejo, Juez, Karin Segura Flores, Secretaria. Puerto Esperanza 02-09-2011.

KARIN SEGURA-FLORES
SECRETARIA JUDICIAL (n)
JUZGADO MIXTO DE LA
PROVINCIA DE PURUS

APPENDIX C

OSINFOR issued fines to indigenous communities exceeding 130,000 nuevo soles (about \$45,000 USD). (Two page document).



PERÚ Presidencia del Consejo de Ministros

Organismo de Supervisión de los Recursos Forestales y de Fauna Silvestre
OSINFOR

Sub Oficina de Ejecución Coactiva

EXPEDIENTE : 100-2012
AUXILIAR COACTIVO : J. BEDRIÑANA
CÓDIGO : 302012

RESOLUCION DE EJECUCION COACTIVA

OBLIGADO : COMUNIDAD NATIVA [REDACTED]
DOMICILIADO : Comunidad Nativa [REDACTED] Purús, Purús,
Departamento de Ucayali
ENTIDAD : Organismo de Supervisión de los Recursos Forestales y
de Fauna Silvestre
Av. Javier Prado Oeste Nro.692-Magdalena del Mar
MATERIA : Procedimiento de Ejecución Coactiva

El Ejecutor Coactivo del Organismo de Supervisión de los Recursos Forestales y de Fauna Silvestre, Abogado Marcos Juan Morales Lozano ha proveído lo siguiente:

RESOLUCION NUMERO DOS:

Magdalena del Mar, once de octubre del año dos mil doce;

VISTOS: Los actuados en el presente Procedimiento, estando a lo que se expresa; y
CONSIDERANDO; **Primero**.- Que, mediante Resolución de Ejecución Coactiva Número Uno de fecha tres de setiembre del año dos mil doce, se inició el presente Procedimiento de Ejecución coactiva contra el obligado COMUNIDAD NATIVA [REDACTED] requiriéndole para que en el plazo de siete (07) días hábiles cumpla con cancelar el monto de **S/. 130,378.00 (Ciento Treinta Mil Trecientos Setenta y Ocho y 00/100 Nuevos Soles)** su deuda pendiente, materia de autos, bajo apercibimiento de trabarse las Medidas Cautelares correspondientes; **Segundo**.- Que, no obstante, el obligado COMUNIDAD NATIVA [REDACTED], a la fecha, mantiene deuda pendiente, correspondiente a la multa impuesta en la Resolución de Sanción N° 030-2012 de fecha veinticuatro de febrero del año dos mil doce, materia de autos, por la suma ascendente a **S/. 130,378.00 (Ciento Treinta Mil Trecientos Setenta y Ocho y 00/100 Nuevos Soles)**; tal y como se corrobora con el reporte del Sistema de Gestión que obra en autos, lo cual es exigible coactivamente; **Tercero**.- Que, el Ejecutor Coactivo en cualquier momento podrá Trabar la Medida Cautelar correspondiente, a fin de garantizar la deuda materia del presente procedimiento; y de conformidad con lo dispuesto en los artículos 3°, 32° y 33° del TUO de la Ley N° 26979, Ley de Procedimiento de Ejecución Coactiva, D. Supremo N° 018-2008-JUS, así como el artículo 21° y 132° de la Ley del Procedimiento Administrativo General – Ley N° 27444 de aplicación supletoria en el caso de autos,
RESUELVE: **PRIMERO**.- TRABAR LA MEDIDA CAUTELAR DE EMBARGO EN FORMA DE DEPOSITO CON EXTRACCION DE BIENES; por la suma de **S/. 10,000.00 (Diez Mil y 00/100 Nuevos Soles)**; sobre los bienes muebles, maquinarias, enseres, equipos y vehículos de propiedad del obligado COMUNIDAD NATIVA [REDACTED], que se encuentren en el predio ubicado en la Comunidad Nativa [REDACTED] Purús, Purús, Departamento de Ucayali, solicitando el apoyo de la fuerza pública y disponiendo el descerraje de ser necesario, con cargo a señalar fecha y hora para el día de la diligencia, designándose en el acto al Depositario; **SEGUNDO**.- TRABAR LA MEDIDA CAUTELAR DE EMBARGO DEFINITIVO EN FORMA DE RETENCIÓN, hasta por la suma de **S/. 120,378.00 (Ciento Veinte Mil Trecientos Setenta y Ocho y 00/100 Nuevos Soles)**; sobre los bienes, valores y fondos en cuentas corrientes, depósitos, sobregiros, custodia y otros que tenga en forma individual, mancomunada o solidaria del obligado COMUNIDAD NATIVA [REDACTED], en los bancos y entidades financieras tanto en sus oficinas

JENNY HILUSKY BEDRIÑANA CORCOVA
Auxiliar Coactivo

MARCOS J. MORALES LOZANO
Ejecutor Coactivo



PERÚ

Presidencia del Consejo de Ministros

Organismo de Supervisión de los Recursos Forestales y de Fauna Silvestre OSINFOR

Sub Oficina de Ejecutoria Coactiva

principales, agencias y sucursales, en moneda nacional y/o extranjera, notificándose a los representantes legales de dichas instituciones para que cumplan con la medida y pongan a orden y disposición de la ORGANISMO DE SUPERVISIÓN DE LOS RECURSOS FORESTALES Y DE FAUNA SILVESTRE (OSINFOR), las retenciones que efectúen hasta completar la suma señalada, o comunicar la imposibilidad de ésta en el plazo máximo de cinco días hábiles de notificada; sin perjuicio de realizar la diligencia de toma de dicho; **TERCERO.- REQUERIR** al obligado **COMUNIDAD NATIVA** [REDACTED], para que en el plazo de siete (07) días hábiles, cumpla con cancelar su deuda pendiente de pago ascendente a la suma de S/. 130,378.00 (Ciento Treinta Mil Trecientos Setenta y Ocho y 00/100 Nuevos Soles); **BAJO APERCIBIMIENTO DE PROCEDER A LA EJECUCIÓN FORZADA DE LA MEDIDAS CAUTELARES DE EMBARGO TRABADAS Y ASIMISMO, COMUNICAR AL OBLIGADO QUE ENCUENTRA REGISTRADO EN LAS CENTRALES DE RIESGO SU CONDICIÓN DE MOROSO A NIVEL NACIONAL**; notificándose. Fdo. Marcos Juan Morales Lozano, Ejecutor Coactivo; Jenny Miluska Bedriñana Córdova, Auxiliar Coactivo. Lo que notifico a Ud. conforme a Ley.



[Signature]
MARCOS J. MORALES LOZANO
Ejecutor Coactivo



[Signature]
JENNY MILUSKA BEDRIÑANA CORDOVA
Auxiliar Coactivo

El presente acto tiene vigencia desde el día de su notificación y contra el mismo no cabe recurso administrativo alguno, conforme a ley.

Lugares de pago.- Todas las oficinas del BANCO DE LA NACION, indicando lo siguiente: TRANSACCIÓN 9660 / MULTA CÓDIGO 0211 – OSINFOR. Una vez pagado, enviar una copia del comprobante de pago al correo soec@osinfor.gob.pe, señalando el número de la REC o Expediente, su fecha, y el nombre del deudor.

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VITA

Aaron Groth was born in Janesville, Wisconsin. In June 2002, he graduated from Joseph A. Craig High School in Janesville, WI. In May 2004, he obtained his Associate of Arts and Science (A.A.S.) Degree from the University of Wisconsin Colleges/UW-Marathon County in Wausau, WI. Subsequently, he finished his Bachelor of Arts Degree in History and International Studies in May 2006 at the University of Wisconsin-Madison with a Certificate in Environmental Studies. Following graduation, he served as a Community-based Environmental Management Peace Corps Volunteer in Peru from September 2006 through December 2010. In 2011, he worked as a Community Conservation Specialist with Upper Amazon Conservancy/ProPurús in Purús, Ucayali, Peru. After over five years in Peru, he returned to the United States to pursue a M.A. in Geography at the University of Missouri-Columbia with Graduate Certificates in Geographic Information Science (GIS) and Conservation Biology. Since August 2012, he has undertaken community service as a MU Paul D. Coverdell Peace Corps Fellow and held an academic appointment as a Graduate Teaching Assistant in the Department of Geography. After receiving his M.A., Aaron plans to pursue a Ph.D. in Geography at the University of Texas at Austin starting in the fall of 2014.