The Role of NGOs in Mitigating the Impact of the Interoceanic Highway

By Sam Goodman

Abstract

The opening of the Interoceanic Highway in 2011 linked Peru's Pacific ports with Brazil's Atlantic coast. While the road stands to benefit both nations' economies, it cuts directly through tropical rainforest, fragmenting fragile ecosystems, threatening the livelihoods of indigenous tribes in the region and providing greater ease of access to gold mining. This paper provides an overview of the environmental, economic and social impact of the highway from a political ecology perspective and looks at mitigation strategies adopted in the department of Madre de Dios in Peru. It goes on to argue the importance of grassroots organizations in slowing down the positive feedback loops that are accelerating deforestation in Latin America. Of particular interest is the work of Camino Verde, a small non-governmental organization (NGO) in the area, dedicated to protecting biodiversity, supporting indigenous rights and promoting sustainable land-use practices. Interviews were conducted with 17 important stakeholders in Madre de Dios, including NGO directors, farmers, government officials, biologists and forest technicians. As this paper will show, a grassroots organization such as Camino Verde can fill an important niche by promoting alternatives to unsustainable land-use practices and has the potential to slow down the driving forces of deforestation and environmental degradation in the region.

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Introduction

In December 2004, Presidents Alejandro Toledo of Peru and Luiz Inácio Lula da Silva of Brazil reached an agreement to construct the 1,600-mile Interoceanic Highway that would connect the two countries (Katrina et al. 2005). The Interoceanic Highway crosses formidable Andean and Amazonian terrain to form a direct connection between Peru's Pacific ports and Brazil's Atlantic coast. The road opens up trade routes for Peru, Brazil and Bolivia and the increased access to markets stands to benefit these nations' economies. Peru's ex-President Toledo estimated that the construction of the highway would result in a 1.5 percent annual growth in Peru's gross domestic product (Selamat 2012).

However, the highway cuts directly through tropical rainforest, fragmenting fragile ecosystems, helping increase deforestation rates and threatening livelihoods of indigenous groups along the road. Of particular concern is the department of Madre de Dios in Peru, a region home to some of the Amazon's most biodiverse hotspots, such as Manu National Park and the Tambopata National Reserve (Fernandez 2013, Gourlay 2010, ACA Conservation Corridors). In addition, Madre de Dios is the most culturally diverse region in the Peruvian Amazon and is home to 19 different ethno-lingustic groups (Gray 1997). This historically isolated region has become highly vulnerable to rapid population growth and unsustainable land-use practices, which can be linked in part to the construction of the Interoceanic Highway.

In response to criticism over the construction of the Interoceanic Highway, Toledo declared, "To make an omelet, you have to break some eggs" (Bridgers 2006). In order to promote sustained economic growth and improve communication and

transportation networks, Peru and Brazil were willing to undertake this massive infrastructure project, which leaves previously isolated areas vulnerable to new threats. Arguably, the decision to construct the highway demonstrated that the Peruvian and Brazilian governments cared more about economic growth than environmental concerns.

Although the environmental and social concerns associated with the highway are well documented, the highway itself is not necessarily an inherently destructive force. According to tropical ecology expert and conservationist Adryan Forsyth:

> The road can be a destructive force or it can be a positive force. I don't think there's any doubt that every country needs a certain amount of road networks. And I think the road doesn't have to be a disaster. It only has to be a disaster if it's simply treated as a way to have a free for all exploitation of the landscape and simply allow people to come and do whatever they want to maximize their profit (Garcia-Navarro 2009).

Conservationists in Peru have focused on mitigation strategies to offset some of the negative effects associated with the construction of the Interoceanic Highway. With the Peruvian government failing to control the destructive activities causing deforestation and environmental degradation in Madre de Dios, non-governmental organizations (NGOs) play an important role in promoting sustainable land-use practices and protecting the livelihoods of vulnerable populations. Mitigation projects designed by many of the larger NGOs stand to minimize the "chaotic development and massive deforestation" that threatens to jeopardize the region (Kirkby et al. 2010). The Greenoxx Global Environment Program's Madre De Dios REDD Project, the Amazon Conservation Association's Manu-Tambopata Conservation Corridor initiative and the longstanding Castaña Corridor project serve as excellent examples of large-scale projects to promote the sustainable management of forests and minimize biodiversity loss.

While well-funded NGOs have the resources to undertake massive projects, small, grassroots organizations have better capacity to work with local communities to convince landowners to adopt more sustainable land-use practices. Small-scale NGOs will need to play a critical role in promoting responsible stewardship of the land and protecting indigenous knowledge and rights. Camino Verde is an example of a small organization with the potential to offset some of the destructive impact of the Interoceanic Highway. Located in the farming community of Baltimore along the Tambopata River in Madre de Dios, Camino Verde is a U.S.-registered non-profit dedicated to "protecting and understanding biodiversity in the Peruvian Amazon, protecting indigenous rights, autonomy, and wisdom and spreading sustainable ways of life and encouraging fair, sustainable development" ("Camino Verde News"). Camino Verde has undertaken a variety of projects in the community of Baltimore related to agroforestry, reforestation, the conservation of primary forests and the development of a living seed bank. Leading by example, Camino Verde is demonstrating that there are economically viable alternatives to the papaya plantations, logging operations and gold mining practices that have become prevalent in Madre de Dios.

This paper uses William H. Durham's (1995) model of the political ecology of deforestation in Latin America to help clarify the role of the Interoceanic Highway in creating population pressures in Madre de Dios and to explain the link between the construction of the highway and unsustainable land-use practices that are the driving forces of deforestation and environmental degradation in the region. The impact of the Interoceanic Highway in Madre de Dios is examined, as are some of the current mitigation strategies in place. It is argued here that grassroots organizations, and NGOs

in general, need to play a particularly important role in mitigating the impact of the highway because the Peruvian government, for the most part, has appeared unable and unwilling to undertake this task. Despite its shortcomings, Camino Verde is critical to slowing down the positive feedback loops that are causing deforestation as expressed in the Durham model that are being exacerbated by the Interoceanic Highway.

Interviews were conducted with 17 key stakeholders between May 26, 2013 and November 20, 2013. Five interviews were conducted with Camino Verde's employees on site in Baltimore. In addition, interviews with a tour guide, hotel owner, farmer, government official, ichthyologist, forest technician and three other local NGO employees were conducted in the city of Puerto Maldonado. Three more interviews with a Montevideo-based NGO employee, Washington-based NGO employee and Camino Verde board member were conducted remotely via Skype. Each interviewee was asked 10 to 15 questions regarding his or her role in the region, the positive and negative impacts of the highway, optimal mitigation strategies for reducing the impact of the highway and the importance of an organization such as Camino Verde for the community of Baltimore.

Chapter one provides a general overview and historical background of the Madre de Dios region as well as the Interoceanic Highway. Chapter two looks at the environmental, social and economic impacts of the highway from the perspective of the interviewees. Chapter three analyzes mitigation strategies for reducing the impact of the highway. Chapter four analyzes the importance of grassroots organizations in the Amazon from a political ecology perspective. Chapter five examines how the mission of a grassroots organization can help people transition to more sustainable land-use

practices and play a role in reducing environmental, social and economic effects brought about by the paving of the Interoceanic Highway. The concluding section provides some additional analysis for a blueprint towards a sustainable future in Madre de Dios.

This paper is intended for anyone interested in studying the importance of grassroots organizations as well as larger NGOs in reducing the environmental and social impact of major infrastructure projects. In addition, it is intended for people interested in studying the driving forces of deforestation and environmental degradation in Madre de Dios from a political ecology perspective. I hope that it will help to draw attention to the rapid ecological and social changes now underway as a result of the completion of the highway.

Chapter 1: Overview of Madre de Dios and the Interoceanic Highway

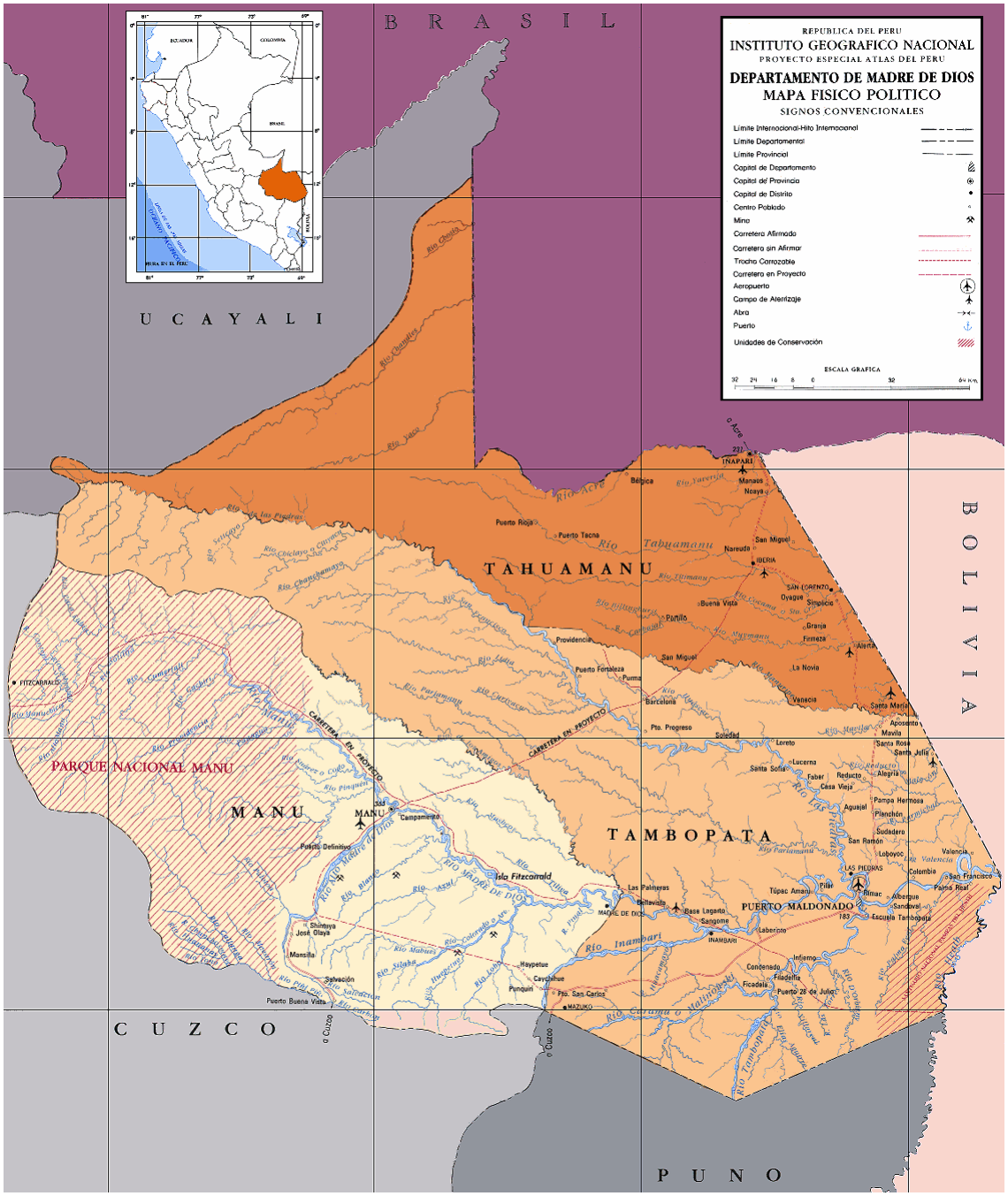
Study Area

The department of Madre de Dios consists of approximately 85,000 km^2 of lowland rainforest located in Southeastern Peru's Amazon River Basin (Swenson et al. 2011). Madre de Dios borders the Peruvian departments of Puno, Cusco and Ucalayi, as well as both Brazil and Bolivia, forming the MAP region. This tri-national frontier region consists of Madre de Dios, the Brazilian state of Acre and the Bolivian department of Pando (Cabello 2010).

Madre de Dios is divided into three provinces: Manu, Tahuamanu and Tambopata, which are subdivided into municipal districts (Gray 1997). Puerto Maldonado, the capital city of Madre de Dios, is located in the Tambopata Province and serves as the central hub for economic activity in Madre de Dios. Puerto Maldonado is located at the intersection of two primary rivers in the area, the Madre de Dios and Tambopata.

Baltimore, the farming community home to Camino Verde, is located on the Tambopata River, 60 kilometers southwest of Puerto Maldonado. Baltimore is located adjacent to the Tambopata National Reserve, a 274,690-hectare, federal protected area (Boyd 2013, Kirkby 2002). Baltimore is accessible from Puerto Maldonado by boat or from a combination of trails and secondary roads linked to the Interoceanic Highway.

Map of the Department of Madre de Dios



Source: www.observatorioturisticodelperu.com

Madre de Dios is considered to be the most culturally diverse region in Peru. It is home to several indigenous communities that comprise 19 ethno-lingustic groups and seven language families (Gray 1997, Little and Leach 2013). Approximately 10,000

indigenous people live in Madre de Dios (Little and Leach 2013). Until the first wave of colonization in the 1800s, indigenous populations had virtually no contact with outsiders (Little and Leach 2013). In the 20th Century, indigenous populations were often at odds with colonists. A recent surge in immigration from the Andean highlands and elsewhere has made these indigenous populations increasingly vulnerable to the threat of outsiders, and this has continued to help shape Madre de Dios' ever-evolving cultural identity.

Due in part to its historic isolation and relatively low population density, Madre de Dios is considered to have some of the best-preserved forest in Peru and Amazonia in general. Madre de Dios is recognized by biologists to be one of the world's most biodiverse regions (Fernandez 2013, Gourlay 2010, ACA Conservation Corridors). In the Tambopata National Reserve alone, 587 bird, 91 mammal, 94 fish and 127 reptile or amphibian species have been identified (Tickell 1993). Madre de Dios is also home to six protected areas as well as 14 private conservation areas, including one located on Camino Verde property (SERNANP 2013).

Despite its capacity to support such an extraordinary amount of plant and animal life, Amazonian soil is considered to be poor and fragile. Only four percent of soil is classified as fertile by agronomists (Revkin 2004). According to Camino Verde executive director Robin Van Loon, while much of the Amazon is not ideal for agriculture, the Tambopata Province in Madre de Dios is considered a comparatively fertile microregion. This can be attributed to the rich mineral sediments flowing from the Tambopata River's headwaters in the Andes. The Tambopata region has become an ideal place for farming communities such as Baltimore.

The economy of Madre de Dios is reliant on extractive activities. According to one study of the Tambopata region, agriculture, cattle ranching, Brazil nut harvesting, logging, gold mining and private reserves comprise the principal land uses apart from public protected areas and ecotourism (Kirkby et al. 2011). The recent population boom in Madre de Dios coupled with the increase in extractive activities has made the area increasingly vulnerable to threats of deforestation and environmental degradation.

Regional History

Before the arrival of colonists in Madre de Dios, indigenous groups relied upon traditional methods of forest use for subsistence. Traditional land uses were dependent upon nomadic farming practices, which required shifting location over time. Slash-and-burn agriculture dominated the landscape, with farmers commonly shifting fields within three years (Moran 1993). While contemporary slash-and-burn agricultural practices in the Amazon have a negative connotation, traditional agricultural methods generally had a low-impact on the land (Moran 1993).

The Madre de Dios economy changed during the first colonization period in the 1890s, when a rubber boom swept through the region and outsiders became interested in the region's resources (Gray 1997, Little and Leach 2013). Rubber production in Madre de Dios subsided in the early 1900s, following a collapse in global rubber prices, but the region was changed permanently (Ricalde 1993). The rubber boom in Madre de Dios put the region on the national radar and established it as an economy reliant on extractive activity. Following the collapse of the rubber economy, people turned to gold mining, logging and Brazil nut harvesting as sources of income (Ricalde 1993).

While the region become more reliant on extractive practices, immigration into the region was gradual (Gray 1997) and land-use changes in Madre de Dios were relatively moderate until the paving of the Interoceanic Highway (Asner et al. 2010). After the first wave of colonization, Madre de Dios remained out of the national spotlight until a gold boom swept the region in the 1950s (Alvarez 2003). The construction of the road connecting Puerto Maldonado and Cusco in the mid-1960s brought about a wave of immigration (Alvarez 2003). New arrivals from the impoverished Andean highlands poured into Puerto Maldonado and communities along the highway in hopes of better economic opportunities.

An increase in gold prices in 1973 once again changed the nature of Madre de Dios, cementing gold mining's status as the primary source of income as well as a driving force of deforestation and environmental degradation (Gray 1997, Rubio 2010). Small-scale mining became an increasingly popular activity in the area, serving as an economic opportunity for impoverished immigrants from the Andean highlands and elsewhere as well as indigenous communities. Currently, Madre de Dios is the third largest producer of gold in Peru and gold mining in Madre de Dios accounts for 70 percent of Peru's artisanal gold production (Brooks et al. 2007).

In recent years, farmers in Madre de Dios have begun to transition away from traditional subsistence agricultural practices and have become more reliant on cash crop production. The agricultural landscape changed considerably in the 1980s with then-President Alan Garcia's macroeconomic policies aimed at "providing easy access to agricultural credit and land titles, promoting farmers' cooperatives and offering guaranteed markets for products like rice" (Coomes 1996). These policies coupled with

land ownership turnover and rising crop prices attracted an influx of new farmers to the region (Nascimento and Drummond 2003). Between 1985 and 1990, rice, maize and cattle production increased 30 percent, 72 percent and 29 percent respectively in Madre de Dios (Naughton-Treves 2004). This boom in colonist farmers and their reliance on cash crops and modern agricultural practices have helped drive up deforestation rates in recent years (Coomes 1996).

The Interoceanic Highway has further altered the agricultural landscape of the region. According to Van Loon and Ursula Leyva Carbone, the executive director of Camino Verde Tambopata, Camino Verde's Peru-based sister organization, farmers' markets have expanded following the paving of the Interoceanic Highway and agricultural production in Madre de Dios has continued to evolve with a recent boom in papaya plantations and other monoculture crops over the last few years.

History of the Interoceanic Highway

While talks of a highway connecting Peru and Brazil's coasts have taken place since the early 1960s, the two nations formally agreed to construct the Interoceanic Highway in December 2004 to provide a large roadway that would traverse the Andes and the Amazon and connect the two nations' coasts (Katrina 2005, Curran 2013, Naughton-Treves 2004, Tickell 1993). Brazil had spent decades building roads through its Amazonian interior, completing its section of the highway by 2002. For Peru, this was one of the largest infrastructure projects in the nation's history (Navarro-Garcia 2009), requiring the paving of roads through the nation's Andean highlands and Amazonian frontier, costing over $800 million (La Republica 2012). The construction of the

highway would open up much of Peru's interior. According to one estimate, 20 percent of Peru's national population would become integrated by the paving of the highway (MTC 2005).

Part of the construction of the highway required the paving of the road connecting Cusco and Puerto Maldonado, which was built in the 1960s. Before this road was surfaced, travel between these two cities was difficult. It could take up to two weeks to travel from Cusco to Puerto Maldonado in the road's early days. The paving of the Interoceanic Highway cut the timing of this trip down to eight to 10 hours, permitting greater interaction between Puerto Maldonado and the rest of Madre de Dios and the Andean highlands. The Interoceanic Highway greatly improved communication and transportation networks for Peru and Brazil's Amazonian interior. In the neighboring Brazilian state of Acre, for example, distance from the nearest port was decreased by 2,500 kilometers, since Peru's Pacific ports were considerably closer to the state than the nation's Atlantic coast (Mendoza et al. 2007).

The construction of the 722-meter Billinghurst Bridge in Puerto Maldonado, spanning the Madre de Dios River, was the final component of the Interoceanic Highway (Hamilton 2006). The inauguration of the Billinghurst Bridge in December 2010 and subsequent opening of the highway in 2011 signaled that this grand dream had become a reality (Collyns 2011). With the highway standing to fuel both economic growth and environmental degradation, the bridge serves a symbol of both hope and trepidation for Peru.

Demographic Shifts in Madre de Dios, Puerto Maldonado and Baltimore

Compared with the rest of the country, the Peruvian Amazon is remote. The Amazon River basin covers half of Peru, yet only five percent of Peruvians call the rainforest their home (Spellerberg 1998). The economic opportunities coupled with the paving of the Interoceanic Highway have helped facilitate a population boom in the region in recent years. Migrants from the impoverished Andean departments such as Cusco, Apurimac and Puno are arriving in Puerto Maldonado and elsewhere in Madre de Dios in droves via the Interoceanic Highway in search of gold mining and other livelihoods.

The population boom has been a cause of concern for the area's residents. The uncontrolled development and growth in economic activity have put an enormous strain on the region's fragile soils. Competing land-use practices are driving up real estate values in Puerto Maldonado and elsewhere. According to Javier Huinga, a subsistence farmer who lives along the Tambopata River, Madre de Dios was not prepared to deal with the massive immigration linked to the Interoceanic Highway

The influx of immigrants has led to a noticeable erosion of indigenous cultures as a result of interaction with their highland counterparts. According to Van Loon, "People here describe the phenomenon that the indigenous culture of the region is rather 'meek and shy' whereas the highland culture of Southern Peru is proud and very nationalist in character. You can see that in Puerto Maldonado with the sort of traditional food, culture, etc. being pushed to the wayside by highland culture."

The effect of the population boom in Puerto Maldonado has been substantial. Serving as the hub for gold mining and other extractive activities in the region, the city is

growing at an astounding rate. According to Donald Traeris, the owner of the Anaconda Lodge located on the outskirts of Puerto Maldonado, "I go to the city once or twice a week and every time I see something new. It is pretty fast growing."

While the department of Madre de Dios as a whole is experiencing a population boom, the farming community of Baltimore is experiencing something of an exodus. While there are approximately 30 families who own property in Baltimore, only about half of them actively manage the land. As several Baltimore residents remarked, the closing of the primary school, economic opportunities in the city, rising property values and lack of interest in working the land have all been contributing factors for residents selling their land to neighboring ecotourism lodges and migrating to the city. The recent exodus in Baltimore has led to a loss of a sense of community in the area with so few people actively managing the land. The school is closed, the community meeting center is seldom used and the community's soccer field is overrun with jungle undergrowth.

Political Ecology and the Link between Deforestation and the Interoceanic Highway

Political ecology is a broad interdisciplinary field seeking to "link macro-level political economic processes with micro-level aspects of human ecology" (Dodds 1998). This school of thought seeks to examine the control and exploitation of natural resources through a political lens by examining power relations among stakeholders (Delang 2005). Political ecology has been used to help explain trends in environmental destruction in Latin America, a region whose economic and social history can be described as "a long engagement with extraction" (Bebbington 2009). Frontier colonization and unsustainable land-use practices have been the driving forces of deforestation in Latin America and

many scholars have used political ecology's theoretical framework to explain this process (Carr 2009).

In *Political Ecology and Environmental Destruction in Latin America*, William H. Durham (1995) uses a political ecology framework to develop a model of two positive feedback loops revolving around capital accumulation and impoverishment to explain the underlying causes of deforestation and environmental degradation in Latin America. According to Durham, capital accumulation fuels deforestation when commercial production schemes expand into a region due to market demand and a favorable legal environment exists for these practices to take place. He goes on to point out that "when conditions are favorable, there is a positive feedback effect: successful deforestation produces funds that fuel its own acceleration." The feedback loop related to impoverishment is linked to the capital accumulation feedback loop "through the accelerating scarcity of land for household agricultural production and other uses, through the displacement of forest inhabitants from their homes, or not infrequently, through both of these changes at once."

William Durham's Model of
Political Ecology of Deforestation in Latin America

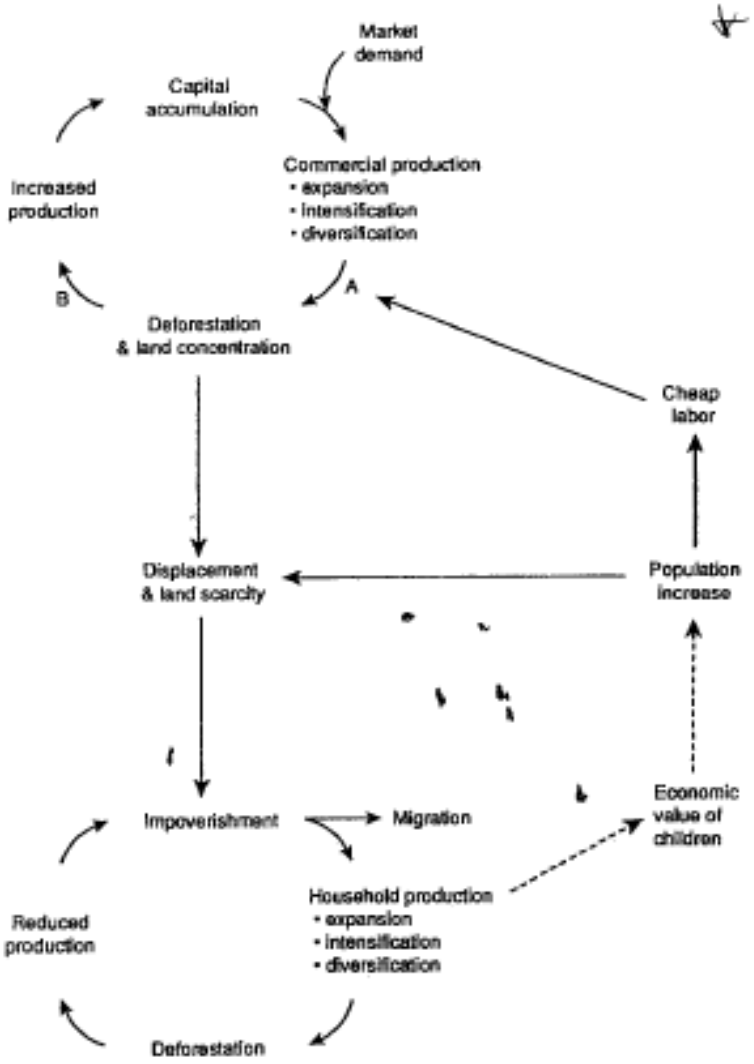


Fig. 1. The political ecology of deforestation in Latin America. This highly simplified sketch is an attempt to synthesize the main arguments of this volume concerning structural causes of environmental destruction in Latin America. The figure emphasizes two positive feedback loops—one corresponding to capital accumulation and the other to impoverishment—that promote deforestation, a form of environmental destruction discussed in all of the chapters. The loops are linked together by interdependent effects on population, resources, and environment. Dashed arrows indicate relationships suspected but not investigated in this volume. "A" refers to low input costs; "B" to production subsidies from nature and the state. The figure assumes market involvement and associated cultural values throughout the population(s) represented.

Source: Painter and Durham (1995)

The link between the construction of the Interoceanic Highway and consequential deforestation and environmental degradation can be explained in part by Durham's model. The market demand for gold, agricultural products, timber and other products and the lack of enforcement in Madre de Dios have helped fuel the capital accumulation feedback loop in the region. The Interoceanic Highway provides greater ease of access for gold miners and has opened up markets for farmers and loggers, helping fuel the capital accumulation positive feedback loop. The Interoceanic Highway has also helped fuel the impoverishment positive feedback loop, providing easier access for immigrants coming from impoverished Andean highlands and elsewhere to Madre de Dios. The expansion into Madre de Dios is putting tremendous pressure on the Amazon's fragile soils.

Chapter 2: The Impact of the Interoceanic Highway

Introduction

With 53 percent of its rural population living in poverty, Peru has every incentive to pursue economic growth opportunities (Boyd 2013). Undertaking a massive infrastructure project such as the Interoceanic Highway has demonstrated that Peru is committed to prioritizing economic growth and improving its transportation networks. While the positive effects of the Interoceanic Highway are significant, the social and environmental impact associated with the road has been considerable. Increases in illegal gold mining activity, agricultural production, logging, crime and threats against indigenous populations can all be linked to the construction of the Interoceanic Highway.

The Destructive Nature of Highways

As ecologist Thomas Lovejoy put it, "Roads are the seeds of tropical forest destruction" (Laurence 2012). Road development typically results in significant changes in land use in the surrounding areas. Highways cutting through tropical rainforest leave surrounding areas more accessible to destructive activities such as logging, mining, agriculture and hunting. Paved highways in tropical rainforest, such as the Interoceanic Highway, are particularly troublesome, since they often lead to the development of secondary roads, causing further degradation to the surrounding ecosystem (Laurence 2012).

In a study of the impact of highways, "Ecological Effects of Road and Traffic: A Literature Review," Ian F. Spellerberg (1998) examined the ecological effects of highways. According to Spellerberg, road construction often directly leads to a net loss

of habitat and biota as well as changes in hydrology. In addition to the immediate effects resulting from the construction of the road, Spellerberg lists several short-term effects following the completion of a new road and long-term effects that a road has on the surrounding ecosystem, which include ecosystem fragmentation, road kill, water contamination resulting from runoff, litter, emissions and bank erosion.

Environmentalists fear that increased use of the Interoceanic Highway in the coming years will promote large-scale logging, cattle ranching and gold mining operations in some of the more isolated forest areas along the road (Tickell 1993). The lack of action by the Peruvian government to mitigate the impact of the highway and prevent illegal activity has been particularly troublesome. According to Peruvian biologist Pedro Sentero, "The problem is that Peru has some very good laws on the protection of flora and fauna, but the issue is those laws are not enforced. The government is in charge of making sure those laws are observed, but it does nothing, practically speaking" (Garcia-Navarro 2009).

In the Amazon, large-scale infrastructure projects are typically followed by increases in deforestation rates and environmental degradation in affected areas. The results of one study show as much as three-quarters of deforestation in the Amazon between 1978 and 1994 occurred within 50 kilometers of a major road (Wood and Porro 2002). Case studies of Brazil's infrastructure projects in the Amazon River basin tell a particularly frightening tale and there is great concern that Peru will follow Brazil's example.

Before the construction of the Trans-Amazonian Highway, Brazil's Amazonian interior was sparsely populated. In 1960, only 200 miles of paved roads were to be found

in the Brazilian Amazon and there were only two major population centers (Revkin 2004). Brazil's Trans-Amazonian Highway was completed in the 1970s with the goal of opening up remote Amazonian territory to the rest of the country (Navarro-Garcia 2009). The Brazilian government used the slogan "a land without people for people without land" to encourage impoverished citizens living on the coast to move to Brazil's interior (Revkin 2004). The construction of the Trans-Amazonian highway and other Brazilian infrastructure projects in the Amazonian interior led to mass migration into the cities and opened up the land to farming, ranching and logging, "leading to almost unchecked deforestation" (Navarro-Garcia 2009).

It remains to be seen whether Peru will follow Brazil's model. There is still a stark contrast on the border of Brazil and Peru between the "still conserved" Peruvian Amazon and the "vast agricultural and ranching plains" of Brazil (WWF "Sustainability in the Trinational Frontier"). The rise in gold mining, modern agricultural practices and logging in Madre de Dios in recent years have given good reason for concern about the region. A lack of planning by the Peruvian government for the highway has caused worry that the highway will generate a boom in unsustainable land-use practices.

The negative effect of the Interoceanic Highway is noticeable in Madre de Dios and elsewhere. The fear that "chaotic development and massive deforestation" (Kirkby et al.2010) would overtake the region has started to become a reality.

Economic Impact

The construction of the Interoceanic Highway stands to assist Peru and Brazil's economies by improving transportation networks in the nations' interiors and providing increased ease of access to each other's ports. With the completion of the Interoceanic Highway, Brazil is poised to take advantage of Peru's Pacific ports to increase trade with China, already its biggest trading partner, and other nations in the Far East (NPR 2009). Madre de Dios, in particular, could benefit from improved transportation networks. Madre de Dios is home to one of the fastest growing economies in Peru and shows no sign of slowing down with its increased access to domestic and international markets resulting from the paving of the Interoceanic Highway.

In addition to benefiting Peru and Brazil, the highway is expected to bring significant economic assistance to other South American nations. By improving infrastructure in South America's interior, the Interoceanic Highway will be able to create a positive impact on neighboring nations' economies. Bolivia is poised to benefit greatly, with its borders located within close proximity of the Interoceanic Highway. The construction of East-West corridors will likely serve as a key component to regional infrastructure integration for South American nations in the 21st Century.

In 2012, Peru and Brazil ranked 53rd and 84th respectively on the Global Enabling Trade Index (Lawrence et al. 2012). This could change as the development of the Interoceanic Highway is expected to affect the international trade market. The Interoceanic Highway opens trade routes and allows South America's interior to become more accessible to key international trade markets. China, in particular, stands to benefit from the highway with its "insatiable appetite for raw materials" (Toler 2012).

Previously, the majority of Brazilian products traveling to Asian markets had to be directed through the Panama Canal or Straights of Magellan. By opening the Transoceanic Highway, China and other Asian markets now have improved access to key commodities grown in the Amazonian interior, such as sugar, coffee, soybeans and iron ore. In addition, Peru and Brazil now have better access to Asian products. The Interoceanic Highway reduces travel distance from South America's interior to China's port cities by thousands of miles.

The Interoceanic Highway stands to reduce transportation time and lower freight costs between Peruvian cities such as Puerto Maldonado and Cusco (Ochoa 2010). The improved infrastructure network in Madre de Dios has helped lessen transportation costs and has had a significant effect on the prices of goods in Puerto Maldonado and elsewhere. Several people interviewed indicated that the drop in prices of certain goods and lower transportation costs to Cusco and elsewhere were among the primary benefits of the highway. Food products coming from Cusco are arriving faster, fresher and more cheaply than before.

The population boom that has engulfed Puerto Maldonado and other areas has led to a rise in real estate values in and around the city. Economic growth partnered with unprecedented population growth in the area has caused land to become increasingly scarcer and, consequently, property values are surging. People are investing heavily as the economic boom and rise in property value show no sign of slowing down. According to Leyva Carbona, "I bought a piece of land in 2007 or 2008 and I paid $4,000 for it. It was really expensive for 600 square meters. Now that land is $25,000 and it is one kilometer away from the city."

Although the highway was recently completed and many of the changes expected to take place will occur over a number of years, it should be noted that the trade between Peru and Brazil by means of the Interoceanic Highway has been limited so far. Brazilian businesses and tourists were expected to have a dominant presence in Puerto Maldonado and elsewhere following the inauguration of the Interoceanic Highway. According to the Christopher Kirkby, the executive director of Fauna Forever, a conservation-oriented NGO based in Madre de Dios, "There really is not the huge influx of Brazilian trucks that were predicted. It's still pretty much national commerce going on here…Brazil exporting lots of its western Amazonian products westward to coastal cities in Peru. That has not really happened. It will eventually, I think. It just has not happened yet."

While the Interoceanic Highway will likely bring economic prosperity to Peru, Brazil and other nations, it will come at a cost. The road could threaten the heart of the Amazon Basin if proper measures are not taken to mitigate environmentally destructive activities.

"The positive is growth if you think growth is good," said Traeris. "The negative is that it will destroy the forest left and right. If you go to Brazil you will see what happens."

If environmental degradation can be minimized, the potential economic benefits could outweigh the negative effects. The economy in Madre de Dios as well as Peru as a whole has been growing rapidly. Economic opportunities in Puerto Maldonado are abundant largely as a result of the construction of the highway.

Gold Mining

While gold mining has been present in Madre de Dios since before the rise of the Inca Empire (Brooks et al. 2007), illegal gold mining operations, which account for 90 to 98 percent of total mining activity in Madre de Dios (Webster 2012), are growing at an unprecedented rate. The importance of small-scale mining operations in Madre de Dios cannot be overstated. Gold mining serves as the principal economic activity and driving force of deforestation and environmental degradation in Madre de Dios. According to the Peruvian government, there are approximately 30,000 illegal gold miners operating in Madre de Dios (Boyd 2013). While Van Loon and others attribute the recent rise in global gold prices to be the primary explanation for the surge in gold mining operations in recent years, they acknowledge the highway plays an important role in incentivizing miners to come to the area.

According to Van Loon:

> There is a very clear relationship between the construction of the Interoceanic Highway and gold mining. There is greater ease of access to important gold mining areas and greater ease of access to the region as a whole by potential gold miners from other regions. This is because, frankly, most of the gold miners are from other regions, which has meant that the improvement of the Interoceanic Highway and its completion has helped propel the growth of gold mining as an industry in the region.

By establishing itself as the sixth-largest gold producer in the world (Boyd 2013), Peru stands to provide economic opportunities for many residents in Peru's interior. Peru's Ministry of Environment has estimated that small-scale, informal mining practices move $2 billion annually in the country (El Comercio 2013). Peru's illegal mining operations have overtaken illegal drug trafficking operations as the largest illegal operations in the country (Boyd 2013, El Comercio 2013). For many people living in

impoverished rural communities, small-scale mining is the only economically viable opportunity (PBS 2011). Migrants from the Andean highlands arrive in Puerto Maldonado and other Amazonian outposts hoping to make their fortune in gold mining.

Environmental problems resulting from mining activity are considerable. According to the Carnegie Institution scientist Greg Asner, "The gold rush exceeds the combined effects of all other causes of forest loss in the region, including from logging, ranching and agriculture" (Tegel 2013). Forest cover is removed to make room for mining operations and runoff from the operations adversely affect the health of the surrounding ecosystem by contaminating the soil and water. In a study of two mining zones in Madre de Dios, deforestation in these mining zones increased six-fold from 2003 to 2009 (Swenson et al. 2011). Illegal mining operations have led to mass deforestation of approximately 50,000 hectares in the Madre de Dios River Basin (El Comercio 2013). Mining activity is so destructive that Peru's former Minister of the Environment, Antonio Brack, called for 80 percent of the department of Madre de Dios to be closed to mining activity (Collyns 2011).

In describing the devastating effects of gold mining operations in Madre de Dios, Van Loon said:

> We are talking about entire forests being slashed and burned, with no regard for even whether there are valuable timber trees in the forest. Entire ecosystems and entire habitats are being completely destroyed. And then in come the bulldozers, in come the suction pumps and basically the sterile subsoil ends up on top of the tiny layer of fertility. Both of which are contaminated with diesel fuel and mercury.

Illegal mining operations have even begun to infiltrate Peru's protected areas. According to one government park official working in the Tambopata National Reserve, a protected area located in close proximity to the Interoceanic Highway, illegal mining

operations grew steadily between 2007 and 2009 until government officials forcibly kicked them out of the reserve and established multiple posts in the park to monitor gold mining activity. Illegal gold mining has continued to be a problem in the Tambopata National Reserve since illegal gold mining activity is believed to have destroyed at least 1,500 hectares inside the reserve and six thousand hectares in the reserve's buffer zone (Boyd 2013). Some of the other protected areas in Madre de Dios have also uncovered illegal mining operations within the boundaries of the reserves. A lack of enforcement by the regional government ensures that mining operations will continue to grow in Madre de Dios unless they are properly regulated.

Mercury contamination has been a major issue in Madre de Dios. According to a recent study conducted by the Carnegie Amazon Mercury Ecosystem project, the average mercury concentrations found in adults in Puerto Maldonado was 2.7 parts per million (CAMEP 2013). This is nearly three times the reference limit given by the World Health Organization. The study also found that 60 percent of fish sold in Puerto Maldonado contained mercury levels that were above the international mercury reference limit, a troublesome statistic since 92 percent of participants interviewed in the survey admitted to eating local river and lake fish on a regular basis (CAMEP 2013). One of the other findings of this recent study was that between 2009 and 2012, mercury levels rose 90 percent among fish species in Madre de Dios (CAMEP 2013). Unless measures are taken to reduce the use of mercury in gold mining, these troublesome statistics only figure to get worse.

Ecosystem Fragmentation and Biodiversity Loss

In *The Routes of Man*, Ted Conover (2011) examined the Interoceanic Highway as it was in its earlier stages of development and explored the impact the road will have on wildlife and local communities. He concluded his section on the highway with a brilliant analysis of the sloth's habitat in the region as an example of the impact of fragmentation. In discussing the road's construction, Conover (2011) wrote, "While the Wasai's *perezoso* (sloth) might still make its way across the river, I don't think it could ever make it across the road."

Bisecting an ecosystem with a 7.4-meter highway (Schexnayder 2007) is bound to have an adverse effect on wildlife and vegetation. In one of the early studies of the Interoceanic Highway, Dourojeanni (2006) projected that disorderly occupation and unsustainable land-use practices following the road's construction would generate social and environmental problems that would compromise future generations. The anticipated poverty resulting from the construction of the Interoceanic Highway in the coming years will likely help feed Durham's model of deforestation, fueling the impoverishment positive feedback loop and accelerating deforestation rates, resulting in substantial biodiversity loss in the region.

Unless proper measures are taken to minimize ecosystem fragmentation and biodiversity loss, the remaining forest in Madre de Dios is in great jeopardy. In 1989, the Tambopata Reserve Zone was selected as a site for the Tambopata Macaw Project due to its location "in the center of a huge uninhabited tract of pristine tropical lowland forest" (Tambopata Macaw Project). The Tambopata Macaw Project has served as one of the most important areas in the world for research on the ecology and conservation of

macaws and parrots. However, due to disturbance from the Interoceanic Highway's traffic, the Tambopata Macaw Project is contemplating relocating. With so little pristine Amazonian rainforest remaining, it is clear that conservation policies must be enforced to protect the Tambopata Reserve Zone from the threat that the Interoceanic Highway poses.

In his studies of the Malay Archipelago, naturalist Alfred Russel Wallace (1898) wrote that the presence of "civilized man" would inevitably "disturb the nicely-balanced relations of organic and inorganic nature as to cause the disappearance, and finally the extinction" of the native species. As David Quammen (1996) pointed out in *The Song of the Dodo*, Wallace linked the "slow pageant of evolution to the speedy juggernaut of human caused evolution." If the Peruvian government cannot properly enforce conservation efforts, Wallace's premonition may come true for the areas located within close proximity of the Interoceanic Highway.

Logging

The Interoceanic Highway leaves areas of pristine forest susceptible to unsustainable logging practices. The Amazon Basin is home to mahogany and other valuable hardwoods that can be exported to markets such as the United States, China and other markets for a premium price. Logging is a major source of income for people living in and around Puerto Maldonado. The opening of the Interoceanic Highway has created incentive to expand logging operations in the region and the effect of logging in relation to the highway is already noticeable (Naughton-Trevis 2004).

In regards to the growth of the logging industry following the inauguration of the Interoceanic Highway, Kirkby remarked:

> The timber centers of Alegria, further up towards Iveria, are all flowering as people were predicting. Maybe not quite so fast as they were predicting, but nevertheless they are on the road towards more significant development in terms of the timber industry. The highway is bringing down the costs of transportation of timber. So that is something, the number of timber trucks going up and down the highway.

Deforestation rates in Madre de Dios were extremely low until the mid-1960s, when the road was established to connect the Andean Highlands with Puerto Maldonado (Naughton-Treves 2004). The construction of the Interoceanic Highway has further increased deforestation rates in recent years. Recent studies using satellite imagery, airborne-laser technology and ground-based surveys show significant increases in deforestation and environmental degradation in lands along the Interoceanic Highway (Naughton-Treves 2004).

The Peruvian government has made significant changes in its law in recent years to promote better forestry management practices, but has in many respects failed to force these laws (Smith 2006). In general, the failure by the government to enforce these laws has allowed business to continue as usual in Madre de Dios and elsewhere in Peru.

Tropical rainforest removal poses a significant threat to climate change as forest canopy serves as a major carbon dioxide sink. It is estimated that 10 to 15 percent of carbon dioxide emissions worldwide result from the deforestation and degradation of tropical rainforests (Asner et al. 2010). Approximately 50 percent of all greenhouse gas emissions in Peru can be attributed to the destruction of forests and other changes in land-use patterns (USAID 2011). If there is any hope of mitigating the effects of climate

change on the behalf of Peru, conservation efforts to reduce deforestation rates in the remaining Amazonian rainforest must remain a priority.

If proper measures are not taken to protect Peru from unsustainable logging, mining and agricultural practices, the country's remaining Amazonian forest will be at risk. In the past ten years, Peru has lost more than 1 million hectares of tropical forest (USAID 2011). According to one study, planned energy, hydrocarbon and mining projects coupled with other human activity could reduce Peru's forest cover by 56 to 91 percent by 2021 (USAID 2011).

Agriculture

The Interoceanic Highway has cut down travel time and transportation costs for farmers. Before the paving of the Interoceanic Highway, farmers had difficulty establishing a market for their products other than the city of Puerto Maldonado. Now they are able to export their fruit to Cusco, Arequipa and other major population centers in Peru. Farmers are able to sell more products than ever before thanks to this increased access to markets.

The increased access to markets resulting from the paving of the Interoceanic Highway has led to a growth in farmers coming into Madre de Dios in hopes of expanding their commercial operations. According to Kirkby, "Almost anywhere now, you see huge fields of papayas grown. These papayas are not generally being consumed just locally. They are being exported to other cities in Peru. That is the first real noticeable thing that is a direct result of the highway I would say."

Monoculture productions stress the fragile Amazonian soils and require heavy use of agrochemicals that have become more and more popular as subsistence-farming practices have begun to disappear. Papaya plantations have become prevalent in Madre de Dios in recent years, especially following a collapse in papaya production in the Central Amazon. Madre de Dios serves as a focal point for papaya growers for the expansion of their industry.

Social Impact

Much of the concern regarding the construction of the Interoceanic Highway would be social issues brought about by the highway in Puerto Maldonado and elsewhere in Madre de Dios. Large-scale infrastructure projects in Peru are often implemented without taking into consideration their potential social impact on neighboring communities (Mendoza 2007). People expressed worry that the highway would lead to an increase in undesirable problems such as crime, prostitution, drug trafficking, traffic issues and disease. Some of the fears expressed by residents have already come to fruition. According to Juan Lojas, the Associate Director for Asociación para la Conservación de la Cuenca Amazónica (ACCA), a conservation-oriented organization based in Puerto Maldonado, crime and prostitution are on the rise in Puerto Maldonado and elsewhere in Madre de Dios and these increases can be linked to the highway.

The huge population boom in Madre de Dios has entirely changed the dynamics of the region. Several of those interviewed referred to the city of Puerto Maldonado before as a quiet, safe place where everyone knew everyone. Rapid development in the city has changed that entirely.

"There is no community," said Leyva Carbone. "There are little communities everywhere, but there is no community. It's a big opportunity for economic growth. That is all what Puerto Maldonado is right now."

Many of the major social issues raised by Madre de Dios residents have yet to come to fruition since the opening of the highway in 2011. As Van Loon noted, predictions that Puerto Maldonado could not handle increased traffic and forecasts that brothels would begin to appear in the city's center to service truck drivers passing through the area have been largely unfounded. However, the city is evolving rapidly as a result of the Interoceanic Highway and it remains to be seen what social issues will arise in the coming years.

In regards to Puerto Maldonado's future, Van Loon remarked:

> If you want to see what Puerto Maldonado will look like in 10 or 20 years, go to Pucallpa. Greater crime, bigger city and more industry. The lower class and underserved populations are continuing to fall by the wayside. Greatest wealth produced by and for foreigners who had a bunch of money to invest to begin with and have capital resources that locals do not.

The Interoceanic Highway stands to adversely affect the livelihoods of locals in several respects. The growth in activity resulting from the Interoceanic Highway is helping shatter communities throughout the department of Madre de Dios and the negative social impact stands to overshadow the highway's positive effects.

Indigenous Communities

The construction of the Interoceanic Highway is poised to have a permanent effect on the livelihoods of indigenous groups in Madre de Dios. Approximately 30 indigenous groups live alongside the Interoceanic Highway and their traditional ways of living are being threatened by the road (Dourojeanni 2006). Located in some of the most

remote areas in South America, many of these groups have remained isolated from the rest of Peru for centuries. The opening of the highway now pits the interests of indigenous groups directly against the interests of loggers, small-scale farmers, gold miners, soy producers and cattle ranchers (Katrina 2005). The culture of the immigrant populations from the Andean highlands threatens to erode the indigenous cultures in the Amazon. Needless to say, a harmonious relationship between the indigenous groups and the region's newcomers seems unlikely.

Tensions between colonists and indigenous populations are longstanding in Madre de Dios. In many respects, the Peruvian government's efforts to protect indigenous groups from the threat of colonists invading their land have been underwhelming. In his book *Indigenous Rights and Development: Self-Determination in an Amazonian Community*, Andrew Gray (1997) points out that for indigenous communities in Madre de Dios, "labor rights are ignored, human rights violations are a daily occurrence and even where the indigenous peoples have their territories recognized by law, colonists refuse to respect them." Gold mining colonists, in particular, have clashed with native communities. Conflicts between miners and indigenous groups have erupted over land use and pollution resulting from gold mining activity (Rubio 2010). In regards to relationships between native communities and miners, Van Loon stated:

> This is something that's already been going on for a while. Native communities are renting their lands for a nominal fee to gold miners and the gold miners are essentially destroying the land, taking the majority of the profits and the natives receive payment as a quick fix and are also being left with a lot of disastrous ecological consequences of the mining.

The recent boom in economic activity in Madre de Dios is already adversely affecting the living situation for indigenous communities. Destructive activity such as

logging, mining and agriculture are polluting the surrounding ecosystem, accelerating soil erosion rates, destroying canopy cover and contaminating the water supply. Environmental degradation in Madre de Dios and other areas along the Interoceanic Highway place previously isolated indigenous groups in a precarious position.

But as Conover (2003) noted in *National Geographic*, consequences affecting these indigenous groups go beyond environmental degradation. In the coming years indigenous groups will be increasingly affected by "disease, displacement and acculturation" (Conover 2003). In addition, undesirable behavior such as drug activity and prostitution are poised to increase in coming years as traffic along the Interoceanic Highway increases (Conover 2003). The highway's effects on previously uncontacted communities will be "disastrous," according to Survival International, a non-government organization that advocates for the rights of indigenous groups (Roberts 2011).

The Interoceanic Highway has had a negative impact on traditional aspects of indigenous communities according to Antonio Fernandini Guerrero, a Lima native and resident of Puerto Maldonado who has worked extensively with indigenous groups in his work with the Madre de Dios Native Federation. From Fernandini Guerrero's perspective, the highway is helping bring to indigenous communities a Western, consumer culture that is relatively foreign to them. The highway also is providing a means for young people to leave the communities in search of outside opportunities in the city, which is having an adverse effect for many of these areas.

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Chapter 3: Strategies for Mitigating the Impact of the Interoceanic Highway

Introduction

Due to the destructive nature of roads, there is no way to completely eliminate the environmental and social impact of the Interoceanic Highway. Building a highway that bisects the heart of the Amazon River basin will almost certainly increase deforestation rates, degrade the health of surrounding ecosystem and adversely impact the livelihoods of local indigenous groups. However, the promotion of sustainable land-use practices by non-government organizations (NGOs) will be key to mitigating the impact of the Interoceanic Highway.

According to multiple interviewees, disorganization, corruption and a lack of resources have plagued the regional government's efforts to mitigate the impact of the highway. A clear lack of coordination exists between agencies and failure to establish continuity in projects has limited the government's capacity to combat unsustainable land-use practices. Laws regulating gold mining are seldom enforced and attempts to remove illegal gold miners from the region have been remarkably shortsighted. The failure by the government to regulate illegal gold mining activity and other unsustainable land use practices and enforce existing laws has placed an enormous burden on NGOs and conservationists to come up with their own mitigation strategies.

The NGO Amazon Conservation Association (ACA) in conjunction with its Peruvian sister organization, Asociación para la Conservación de la Cuenca Amazónica (ACCA), has created the Manu-Tambopata Conservation Corridor project to protect a natural corridor existing between the department's two most-renowned protected areas,

Manu National Park and the Tambopata National Reserve. The organization also has its long-standing Castaña Corridor project, an initiative taken to promote one of the more sustainable land-use practices in the region, Brazil nut harvesting. Other organizations have taken the initiative on implementing the Madre de Dios REDD Project while others have worked with local communities to establish ecotourism projects in the area, another sustainable and economically viable means of living. Other mitigation strategies proposed in Madre de Dios and elsewhere are promoting reduced-impact logging methods, encouraging responsible consumer behavior, adopting sustainable agricultural practices and working to minimize the environmental impact of gold mining.

The key to mitigating the impact of the Interoceanic Highway will be slowing down the two positive feedback loops generated by capital accumulation and impoverishment in the model outlined by Durham. In their article on Brazil nut harvesting in Madre de Dios, Javier Escobal and Urusla Aldana (2003) point out "the most important factor in breaking the link between poverty and rainforest degradation is the income-generating strategy." The most successful mitigation projects will take an integrative approach with surrounding communities and promote sustainable alternatives to gold mining, logging, ranching and other driving sources of deforestation and environmental degradation in the region.

This chapter looks at major projects in Madre de Dios to reduce the highway's impact. In addition, it explores other mitigation strategies that could be adopted by the private, public or NGO sector.

The Manu-Tambopata Conservation Corridor

The Interoceanic Highway cuts through forest located in between the Tambopata National Reserve and Manu National Park, two protected areas known for their extraordinary biodiversity. In order to reduce the effects of ecosystem fragmentation, minimize disruption of a natural corridor and preserve forest cover, the ACA has come up with the Manu-Tambopata Conservation Corridor (MAT) project. In addition to the MAT Corridor, the organization designed two additional corridors, the Castaña and Andean Cloud Forest Corridors, designed to "mitigate major emerging threats to biodiversity and sustainable livelihoods" (Rosenthal et al. 2012).

ACA considers the development of the MAT Corridor, designed to protect a 518,291-acre area of rainforest, including part of an ACA conservation concession, in one of the most biologically diverse regions in the world a "global conservation priority" (ACA Conservation Corridors). The MAT Corridor was designed with the goal of breaking away from the fortress conservation model by promoting sustainable land-use practices and integrating inhabited regions into the corridor (Rosenthal et al. 2012). ACA relies on "participatory social engagement" and uses a "multi-faceted, field-based approach" to create effective, sustainable change (ACA 2013). According to the ACA (2012), "The corridor includes a mosaic of land uses, including protected areas and areas zoned for economic activity. It was designed with input from researchers, communities, and regional authorities to ensure thorough consideration of social, political and ecological dynamics."

While the construction of corridors is necessary to protect biodiversity in this region, there are concerns associated with them. The creation of biological corridors is a

long-term project, requiring a considerable amount of resources to build and maintain these corridors (Rosenthal et al. 2012). In addition, biological corridors in Peru do not have any legal status, "which leaves each piece of the mosaic vulnerable to shifting political winds and legal claims" (Rosenthal et al.2012).

Furthermore, the issue of gold miners descending upon lands adjacent to the highway serves as a further impediment to the creation of these corridors. According to Kirkby, the area where the MAT corridor is to be built is "the most difficult possible place you can possibly try to implement a corridor in the region simply because of the unlucky scenario of the huge hike in the price of gold as a consequence of the financial crisis back in 2008, 2009." Due to the profitability of gold mining activity, it will be difficult for the ACA to limit the number of operations within the confines of the corridor.

Brazil Nut Harvesting and the Castaña Corridor

Brazil nut harvesting has often been promoted as an economically viable, ecologically sound alternative to gold mining, logging, ranching and other environmentally destructive livelihoods for people living in rural Amazonia. It is often a keystone activity for sustainable economic development initiatives in conserving Amazonian rainforest (Nunes 2012). Brazil nut harvesting is a seasonal activity that complements other economic activities in rural regions, serving as an important source of income and providing incentive to protect the forest for these valuable reserves (Escobal and Aldana 2003). When exported to the United States, Europe and elsewhere, Brazil

nuts command a premium price. Approximately 30,000 people in Madre de Dios work in the processing, transport and export aspects of the Brazil nut industry (Flores 2009).

ACA has an extensive history working with Brazil nut harvesters in Madre de Dios. In its long-standing Castaña Corridor project, ACA works with over 400 families in eastern Madre de Dios to protect the forest around the Interoceanic Highway and provide economic assistance for Brazil nut harvesters (Rosenthal et al. 2012). ACA seeks to consolidate Brazil nut concessions that cover thousands of hectares of primary forest along the Interoceanic Highway (Rosenthal et al. 2012). This is done with the hopes of providing better economic security to Brazil nut harvesters and to better protect vulnerable primary forest along the highway.

According to Hannah Stutzman, the ACA's Director of Programs:

> The Castaña Corridor project was really one of the first to work with Brazil nut harvests and to look at Brazil nut concession and managing land for Brazil nuts as a conservation tool. One of its biggest accomplishments is that it has collected an enormous amount of data about Brazil nuts and Brazil nut harvesting that does not exist anywhere else...It has created an economic benefit for those harvesters but it is also a big conservation benefit in ensuring that the land can stay in Brazil nut harvesting.

Brazil nut harvesting stands to become further solidified as a viable economic opportunity by the implementation of Reducing Emissions from Deforestation and Forest Degradation (REDD) projects. Successful implementation of REDD projects "aim to incentivize conservation by compensating forest users for employing techniques that reduce harmful greenhouse gas emissions." Brazil nut concessioners serve as ideal candidates for REDD payments.

Brazil nut harvesting is often touted as a win-win scenario for both conservationists and people living in rural Amazonia. ACA's Castaña Corridor initiative

serves as an ideal project for offsetting the highway's impact, while providing a meaningful source of income. Brazil nut harvesting is a proven economic alternative for impoverished people living in rural Amazonia.

Madre de Dios REDD Project

The Madre de Dios REDD Project is a recent development carried out by the project developer Greenoxx. REDD is a mechanism to provide market incentives to maintain carbon reserves and promote good stewardship of the land without having to overthrow the current economic framework. With deforestation and forest degradation accounting for approximately 15 percent of the world's greenhouse gas emissions (Metz 2007, Vander Werf 2009), REDD serves as an important tool in climate change mitigation. REDD is often touted as an excellent tool to reduce deforestation rates and transition towards a green economy (UNEP 2011).

In article regarding forest conservation, Brazil nut concessions and REDD+, Nunes et al. (2012) state:

> Perhaps the most important initiative being considered is Reducing Emissions from Deforestation and Forest Degradation in developing countries, and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks (REDD+). In effect, REDD+ goes beyond PES (Payment for Envronmental Services) projects, as it focuses on creating both an institutional framework and international financial mechanisms for developing countries to reduce carbon dioxide emissions from deforestation and forest degradation.

With the ninth largest forest cover in the world (FAO 2006, FAO 2010, Kramme 2009), Peru, and in particular Madre de Dios, is an ideal candidate for REDD. The establishment and sale of carbon credits can help prevent deforestation, incentivize more sustainable land-use practices and benefit local communities in Madre de Dios (Brown

2013). The Madre de Dios REDD Project is a proposed initiative that attempts to "use proceeds from the sale of carbon credits to increase field patrolling and satellite monitoring to prevent illegal deforestation, while providing benefits to nearby communities" (SCS Global Services).

The Madre de Dios REDD project figures to face some difficulties in achieving its goals. Many of the competing land-use practices are extremely profitable and it will be difficult to incentivize people to change. Furthermore, there is concern that REDD-type projects in Madre de Dios and elsewhere in Latin America could have an adverse effect on indigenous populations, particularly for those native communities living in voluntary isolation (Cabello 2010, Van Dam 2011). Although these threats to indigenous communities are legitimate, the Madre de Dios REDD project also works to mitigate some of the harmful land-use practices that threaten these communities as well as offer to provide new opportunities (Van Dam 2011, Gomez interview).

In regards to the prospects of REDD in Madre de Dios, Kirkby remarked:

> There is a lot of hope for it. REDD does have a long-term future (in Madre de Dios). It is going to be difficult in the short-term. People are used to making quite a lot of money from different sorts of forest destruction in this region. So it will be a case of picking the low hanging fruit first. Trying to get monies to people who are already with the incentive to destroy forest, but whose economy may very well be influenced by the REDD project.

In a neoliberal economic environment, REDD serves as a critical mechanism for reducing deforestation rates in tropical forests. Despite its potential shortcomings, the Madre de Dios REDD project potentially could have a major impact in mitigating the effect of the Interoceanic Highway.

Ecotourism

Ecotourism has often been suggested as a sustainable alternative to the destructive land-use practices in the region. Ecotourism operations, both large-and-small, have become popular along the Tambopata River. A few organizations have worked with Baltimore to establish rural tourism operations and a few households have benefited from these initiatives. One local lodge in Baltimore, El Gato, has based its household economy around ecotourism. While a few families have benefited from ecotourism operations, many acknowledge the shortcomings in ecotourism initiatives.

"It is hard to see ecotourism as some kind of cure-all and that is what it is often portrayed as," said Van Loon. "Ecotourism is often portrayed as the way local people, jungle people, are going to make a living off of conservation. My feeling is that this should be just one strategy in a broader toolkit of conservation strategies."

Although there are limitations in ecotourism initiatives, they can be an excellent source of supplemental income for subsistence farmers and others in Madre de Dios. Combining ecotourism with agroforestry practices and Brazil nut harvesting could serve as an economically viable and ecologically sound combination of livelihoods for homesteaders in Madre de Dios. According to Van Loon, people who have benefited from ecotourism in Baltimore have invested years, or in some cases decades of labor into their operations but they have found a viable source of income to supplement their day-to-day activities.

Kirkby sees potential for an integrative approach to ecotourism in local communities. According to Kirkby:

> For the smaller guys, the local ecotourism operations like El Gato, if they concentrate and try to make a decent living from the activity during the

> four or five months of the high tourist season and continue to do what they would otherwise be doing with other activity for the rest of the year, then I think they have a pretty good future. If they sit down and work out how do I fill my beds during the high season and whatever activities will keep me occupied during the rest of the year. And thankfully here in Tambopata there are plenty of activities that will keep people occupied.

Both Kirkby and Van Loon seem to agree that ecotourism can have a positive effect on rural communities in Madre de Dios as long as it is not used as an exclusive source of income. Sustainability in rural areas of Madre de Dios will likely come when people work to adopt a broad number of activities that are economically profitable and environmentally sound. For residents in Baltimore and elsewhere, ecotourism is definitely has a place in a "toolkit of conservation strategies" worth considering.

Gold Mining Enforcement

"The whole mining shenanigans that we have here is a big problem of governance," said Kirkby. "No one wants to control it. Grab it by its horns and deal with it. No one is capable yet of doing it."

The Peruvian government has failed to effectively regulate mining in Madre de Dios. Illegal gold mining camps employ an estimated 15,000 to 50,000 workers throughout Madre de Dios (Fraser 2013). While the current gold mining laws are considered to be decent and fair by many, they are not being effectively enforced. The regional government, overrun by corruption, has failed to demonstrate legitimate political will to deal with the issue. As one interviewee remarked, some of those in charge of regulating mining in Madre de Dios have ties to mining operations themselves. Rampant corruption serves as the biggest obstacle to "formalizing" and effectively enforcing gold mining operations in Madre de Dios (Fraser 2013).

The Peruvian government has recently made some attempts to crack down on illegal gold mining operations throughout the country. The government has raided some of the larger gold mining camps to temporarily shut them down (Tegel 2013). Peru's Energy and Mines Ministry is working with the nation's regional governments to expedite the formalization processes for illegal mining operations and allow for informal operations (Andina 2013).

Currently there is disconnectedness between the institutions and the state in Peru. A clear lack of coordination exists among Madre de Dios' regional government, the Ministry of the Environment and the Energy and Mines Ministry (Fernandini Guerrero interview). Better coordination by the national government, regional government and regulatory agencies would be necessary if the Humala administration is sincere about its efforts to crack down on illegal mining operations.

Better Consumer Awareness

Perhaps the driving force of deforestation and environmental degradation is not the mining itself, but rather the market demand for gold, which has made these illegal mining operations ever so profitable. In Durham's (1995) model of the political ecology of deforestation in Latin America, market demand is what drives the capital accumulation feedback loop. While the Peruvian government needs to do its share in cracking down on illegal mining operations, it is also the responsibility of businesses and consumers in developed nations to ensure their products were purchased from legitimate sources. In order to reduce the impact of illegal gold mining operations in Madre de Dios, all aspects of the gold supply chain need to be targeted. Promoting a consumer awareness campaign

about the problems associated with illegal gold mining operations could be an excellent way to reduce the impact of mining.

Fernandini Guerrero believes that increasing public awareness about the connection between illegal gold mining operations in Madre de Dios and their social and environmental impact could have an effect that parallels the blood diamond campaign in Africa. Consumers are now aware of the link between diamond mining and human rights violations in Africa, but for the most part, the world does not know the significance of gold in the Amazon. Promoting gold that meets "fairmined" certification standards could help direct market demand away from illicit gold mining operations. As Fernandini Guerrero remarks, part of the solution to mitigating environmental degradation in the Amazon lies outside the region.

Certification or corporate responsibility programs to purchase gold from miners that meet a series of social and environmental standards could play a pivotal role in the fight against illegal gold mining operations in Madre de Dios. Organizations like the Association for Responsible Mining are able to certify small-scale operations that adhere to a set of criteria and are deemed to be "fairmined" (Fraser 2013). Since consumer behavior dictates market demand, targeting consumers and businesses along the supply chain is an efficient way to delegitimize illegal gold mining operations.

Chapter 4: The Significance of Grassroots NGOs and Camino Verde

Role of Grassroots NGOs

Grassroots NGOs play a significant role in the Amazon and elsewhere in Peru. NGOs fill a void caused by either state failure or market failure or serve to rectify weaknesses in popular organizations (Livernash 1992). NGOs play an important role in Peru as they take on roles of "consultant groups, social enterprises and financial service institutions in order to bridge a gap between farmers, the state and the market, in the absence of domestic, endowed autonomous civil society funding mechanisms" (Bebbington 1997). This is particularly important in a nation such as Peru that has limited resources, corruption at all levels of government and often fails to enforce existing regulations.

NGOs can strengthen civil society, protect disenfranchised people and initiate conservation measures when the government or private sector is unable to provide these services. According to Livernash (1992), "In developing countries, NGOs can solve some pieces of the development puzzle by taking an unconventional approach; by listening carefully to what people want and working to enlist their participation or support; or by trying to foster development and husband natural resources. NGOs can be a truly independent voice, either by serving as a focal point of opposition to government programs or by serving as the models for new government programs."

The role of NGOs is particularly important in a region like Madre de Dios, where the government has failed to control deforestation rates and target the primary sources of deforestation and environmental degradation. The Manu-Tambopata Conservation Corridor and Castaña Corridor projects as well as the Madre de Dios REDD Project

represent initiatives driven by the NGO sector to promote sustainable economic activities and reduce the negative environmental, social and economic impact of the highway. In Madre de Dios, both the public and private sectors have effectively failed to promote sustainable land-use practices and have also failed to properly account for the impact of the highway. Because of this, the burden falls upon the NGO sector to fill the void the public and private sectors have left.

Community-based organizations play a vital role in rural areas in Madre de Dios. Gray (1997) notes, "The further away from Puerto Maldonado one travels, the more the state is coopted by local interests." The national and regional governments have considerably less influence over rural residents in Madre de Dios than in Puerto Maldonado and this failure to govern rural populations effectively creates a void that can be filled in part by the grassroots organizations. Community-based NGOs in rural areas have the ability to access the poor and mobilize local resources when the local or regional government is unable to do so.

Community-based NGOs can play an important role in mitigating the impact of the Interoceanic Highway. Conservation-oriented grassroots organizations that promote sustainable land-use practices can help slow down the impoverishment and capital accumulation positive feedback loops illustrated in the Durham's (1995) model of the political ecology of deforestation in Latin America. The capital accumulation feedback loop is driven by market demand for products derived from environmentally destructive economic activities, which leads to deforestation. Providing economically viable sustainable alternatives to environmentally destructive activities could slow down the capital accumulation feedback loop and stabilize deforestation rates.

Grassroots NGOs that work with local populations to mobilize local resources efficiently have the capability to slow down the impoverishment feedback loop. Working with local communities to promote more efficient use of resources can slow down the negative environmental impact brought about by the expansion into marginal lands, intensification of existing production and diversification of household production that helps feed the impoverishment feedback loop (Durham 1995). Poor management of household production as a result of impoverishment leads to "some form of environmental degradation, such as loss of soil and soil fertility, buildup of pesticide residues and further deforestation" (Durham 1995). Escobal and Aldana (2003) remark, "The most important factor in breaking the link between poverty and rainforest degradation is the income-generation strategy. There exists room for maneuver to encourage more rational forest use via environmentally sustainable practices." By promoting more environmentally and economically efficient resource uses, NGOs can also slow down migration patterns into new frontier lands by minimizing environmental degradation and maintaining the soils utilized by local populations for indefinite periods of time. Minimizing extractive land-use activities in frontier regions is of utmost importance in slowing down the impoverishment feedback loop since "ecological damage in extractive frontier regions is a recipe for unsustainable development involving short-term prosperity followed by the return of poverty" (Perz et al. 2012).

Case Study: Camino Verde

Camino Verde, located in the rural farming community of Baltimore in Madre de Dios, is an example of an NGO embedded in a rural area that has the potential to slow

down Durham's two positive feedback loops and mitigate the impact of the Interoceanic Highway. Dedicated to protecting biodiversity, promoting indigenous wisdom and encouraging sustainable land-use practices, Camino Verde works to establish functioning models of economically viable sustainable land-use practices that local community members could potentially adopt. Camino Verde adheres to the triple-bottom line of sustainable development promoting environmental, economic and social well-being.

Camino Verde began as a personal project of its executive director, Robin Van Loon, who purchased the land for the purposes of farming. Van Loon came to Peru in 2002 and arrived in Madre de Dios in 2004 driven by an interest in medicinal plants ("Camino Verde News"). In March 2006, Van Loon purchased 35 hectares of land along the Tambopata River in Madre de Dios and began experimenting with agroforestry techniques and natural regeneration strategies shortly afterwards (Zapata 2013).

Van Loon soon discovered that there was a dearth of knowledge in the documentation of endangered tree species in the Tambopata region of the Amazon River Basin. In 2008, Van Loon decided to establish an organization with the hope of filling this void. He established the United States-based non-profit with the goal of creating a living seed bank for these tree species. The seed bank was established "to act as a botanical garden representing the broadest variety possible of useful trees, to emphasize key trees including exploited and endangered Amazonian species, to study the growth and characteristics of these species in a cultivated setting, identifying trees that show promise for widespread or commercial reforestation, and to research and develop multi-species agroforestry systems that provide local subsistence farmers with an economically viable tree-based alternative to slash-and-burn" ("Camino Verde News"). Camino

Verde's living seed bank is home to over 250 Amazonian tree species, covering seven hectares of land ("Camino Verde News").

According to Van Loon:

> As I started looking for seeds of many of those plants, I was met by a surprising level of ignorance as far as where you get the seeds. The fact that these plants were coming exclusively from wild forests on one hand was an amazing testament to the way people in the region had always lived. But at the same time, it was kind of scary in the face of mounting destruction of forests and in the face of mounting overexploitation of key species for timber, for medicine and the overlap between the timber and medicine because so many of the amazing timber trees are also medicinal as well.

Over the last several years, Camino Verde has further experimented with agroforestry and reforestation techniques that are applicable to the Amazonian River Basin. The organization is committed to finding profitable, sustainable uses of tropical forest resources for the people of Baltimore. Camino Verde has participated in carbon-offset projects and experimented with essential oil distillation projects from aromatic plants. The organization now has five full-time employees working to carry out its mission.

In summarizing Camino Verde's methodology, Van Loon said:

> We are not attempting to share these experiences through a pedagogical model where we suddenly share the wealth of our knowledge with communities and develop workshops and seminars where we tell local people what to do. It is my belief and it is a guiding principle of the organization is that models that work and what we will be able to spread will be based on their effectiveness, based on their efficacy.

Camino Verde has evolved to the point where it has the capacity to design projects that can slow down Durham's two positive feedback loops and reduce the negative impact of the highway for the community of Baltimore. The establishment of the living seed bank can help preserve endangered Amazonian tree species threatened by

population pressures and unsustainable land-use practices resulting from the construction of the highway. Camino Verde is effective on a micro-level by conserving lands on the organization's property as well as on a macro-level by promoting responsible stewardship of the land in the community.

A variety of economically viable land-use practices for farmers in Madre de Dios have been promoted by Camino Verde. A diversification of economic activities is important to make sure that Baltimore residents do not become overly dependent on one economic activity. Good stewardship of the land in rural Amazonia requires a diversification of land-use activities that work to protect the region's fragile topsoil.

"Most people agree that civility will come and sustainability will come from a diverse set of actions, activities that people will do with their land and not just concentrate on one particular activity," said Kirkby. "Having option value on your land in terms of where your money comes from is probably key to the whole thing."

Camino Verde's projects in agroforestry, carbon offsets, essential oil distillation and gardening demonstrate that there are economically viable alternatives to gold mining, logging and unsustainable agricultural practices. By doing this, Camino Verde is theoretically working to slow down the capital accumulation feedback loop, which is fed by unsustainable land-use practices. At the same time, Camino Verde is working to slow down the impoverishment feedback loop because projects involving agroforestry and reforestation are less likely to damage the fragile ecosystem necessary to support an Amazonian homestead economy.

Camino Verde: A Critical Analysis

The greatest strength of Camino Verde lies in the fact that it is a small organization that is able to take innovative approaches in a remote area that receives limited government assistance and has a need for an NGO presence. With leadership and resources to succeed in fulfilling its mission statement, the organization has sufficient resources and a devoted staff who work on projects that can be adopted by the community. Camino Verde is deeply embedded in the community of Baltimore and has all the makings of a functional grassroots organization. Its employees live among the farmers and have the resources to explore alternative economic opportunities. Rather than impose a shortsighted pedagogical model that has been the downfall of so many NGOs, the organization seeks to establish a working relationship with farmers and promote good stewardship of the land in Baltimore.

One of the benefits of having an NGO such as Camino Verde in Baltimore is that it has the resources to experiment with certain projects, whereas neighboring farmers do not have the time or money to undertake these projects. Over the last several years, Camino Verde has experimented with the planting of exotic tree species for wood, has grown exotic fruits and vegetables in the garden by procuring seeds from the United States and elsewhere and has recently begun to experiment with essential oil extraction as a viable economic opportunity. While there is incentive for farmers in Baltimore and elsewhere along the Tambopata River to leave for Puerto Maldonado where economic opportunity is greater, Camino Verde tries to find sustainable practices from which farmers wishing to stay in Baltimore can benefit.

In regards to Camino Verde's potential to assist the community of Baltimore, Kirkby remarked:

> I think a group like Camino Verde is in a very privileged position in the case of Baltimore. And Baltimore should be very pleased to have that kind of a foundation amongst them because it is going to offer opportunities for people. Many of them may not know what they are at the moment, but sure it is the case. So a way of basically getting information is the most important thing. People always thrive and do better with better information. So Camino Verde as a mechanism for channeling information to people about, you name it. It could be ecotourism. It could be sustainable resource extraction. It could be which consumers and which suppliers are the best to use. All these things Camino Verde can help channel to benefit the local community of Baltimore.

Camino Verde promotes a variety of sustainable-land use practices rather than pushing a singular agenda. Incorporating a variety of conservation strategies and a diverse set of land-use practices will be critical in reducing deforestation rates and environmental degradation. The organization's success can be demonstrated by the way it has provided tree seedlings for farmers in Baltimore interested in reforestation or agroforestry techniques. The distribution of tree seedlings is offered to farmers who have a legitimate interest in planting trees as part of their strategy. This annual distribution of seedlings is the most concrete example of a positive impact Camino Verde has had in Baltimore.

According to Van Loon:

> To date, we've given out over 5,000 trees to a total of 20 or 25 farm families in the area. This can be translated into probably 50 acres of fruit trees that have been planted in total. A large number of acres are saved from slash-and-burn as people are able to obtain more of their income from perennial tree crops rather than annual grain crops which necessitate slash and burn.

As Van Loon noted, the fact that Camino Verde is a small organization is also its greatest limitation. While its annual budget is growing each year, it is still a small organization with limited resources. The immediate target community is only about 15 families. Camino Verde is so small that many organizations in the nearby city of Puerto Maldonado have never even heard of the organization. While it has a strong network of support, Camino Verde will always be limited by the fact that it is a tiny nonprofit located in a remote location.

In addition, one of Camino Verde's limitations is the fact that the organization's success is linked almost entirely to the efforts of its executive director. As its treasurer Jeff Green remarked, the organization's success is contingent upon Van Loon's vision and his commitment to that vision. Under the organization's current structure, Camino Verde would likely fold without Van Loon's efforts and, therefore, the sustainability of the organization is in question. However, Van Loon, the organization's staff members and its board of directors are working hard to make Camino Verde a more self-sustaining organization. Camino Verde has created a sister organization, Camino Verde Tambopata, with its own executive director, and has expanded its number of staff in recent years in part to delegate some of the primary responsibilities of the organization away from Van Loon as well as expand the organization's operations.

Camino Verde's Mission and Mitigating the Impact of the Interoceanic Highway

By protecting biodiversity, preserving indigenous knowledge and promoting sustainable land use practices, Camino Verde stands to have a substantial impact in mitigating the impact of the Interoceanic Highway in Baltimore and elsewhere along the

Tambopata River. The organization not only has an impact on the land it actively works to conserve, but more importantly, it has an impact on the community of Baltimore as it tries to lead by example and promote responsible stewardship of the land. The ever-increasing exploitation of natural resources and ecosystems in Madre de Dios places the burden on organizations like Camino Verde to provide alternatives to the driving forces of deforestation and ecological degradation linked to the highway.

In discussing the importance of the organization's reforestation efforts, Van Loon says:

> In the case of pure conservation, the 1,000 plus acres that we work actively to conserve are just a drop in the bucket on a regional scale. Where Camino Verde comes in, and the role that we play has more to do with the preservation of individual species, and in our case, that refers to trees. We seek to plant the most overexploited trees in the region and for that matter in the greater Amazon region. As important tree species are ever more endangered by their use as timber and in some cases their use as medicine, we are there planting the same trees to ensure that the genetic diversity of these species is retained for future generations.

With its reforestation center, living seed bank, agroforestry products and essential oil project, Camino Verde has the tools to provide the residents of Baltimore with economically viable, sustainable land-use practices. With gold mining, logging and unsustainable agricultural practices serving as more attractive opportunities in Madre de Dios, it is important that Camino Verde take a proactive role in looking for alternative economic practices that can be implemented in the community. While it is a small NGO operating on a limited budget in a remote area, Camino Verde has the capacity to make a substantial impact with its admirable vision and unconventional approach.

Camino Verde has undertaken some projects that could play a signficant role in slowing down deforestation, reducing biodiversity loss and mitigating the environmental and social impact of the highway. However, due to its remote location and lack of

resources, its impact is mainly being felt in Baltimore and a few other places on the Tambopata River. In order to become a more effective organization, Camino Verde should coordinate with other grassroots organizations as well as the larger NGOs to share its wealth of knowledge. Coordinating with a larger organization could be effective if Camino Verde hopes to eventually reach a wider audience. Camino Verde is a unique organization that attempts to rectify the shortcomings of other organizations and it has the potential to play an even larger role in promoting sustainable land-use practices and helping prevent biodiversity loss.

By embracing principles of sustainable development and sustainable management of natural resources, Camino Verde leads by example. Van Loon has a unique vision on how to achieve sustainable development and is leading the way in an unconventional fashion. Rather than trying to implement Western theories of development, he blends indigenous wisdom with sustainable practices embraced by permaculture circles and elsewhere. This unique approach may be critical to slowing down the capital accumulation and poverty positive feedback loops addressed in the Durham model.

Camino Verde is focusing on sustainable development strategies in one of the most vulnerable areas of the world. The department of the Madre de Dios is home to some of the best-preserved, yet most-threatened sections of Amazon rainforest in South America. While top-down strategies such as the Madre de Dios REDD project to mitigate environmental degradation could be beneficial, grassroots NGOs such as Camino Verde will play a vital role in helping residents become good stewards of the land.

Conclusion

The Interoceanic Highway was constructed with the idea that the economic benefits of the highway would offset the negative environmental effects brought about by the highway. Less than three years after the opening of the highway, the environmental impact of the road has been substantial. The road has exacerbated deforestation rates and has contributed to a rise in unsustainable land-use practices. The highway has contributed to a rise in illegal gold mining operations, the principal economic activity and driving force of deforestation and environmental degradation in Madre de Dios. The highway has opened up markets and has led to an increase in monoculture plantations and industrial agricultural practices. Logging operations have increased as well in recent years. In addition, the highway has made indigenous populations living in voluntary isolation vulnerable to colonists encroaching on their territory, crime has risen steadily in Puerto Maldonado and elsewhere in Madre de Dios and property values are skyrocketing.

The population pressures, unsustainable land-use activities and massive deforestation rates have presented a major challenge for the Peruvian government as well as NGOs in the region. Environmental NGOs and other organizations have had trouble finding alternative economic opportunities that can compete with some of the more profitable land-use practices. For the most part, the Peruvian government appears to be unwilling and unable to regulate some of the more destructive economic activities. To better reduce the negative environmental and social impact of the Interoceanic Highway, the government must work to reduce corruption and enforce existing laws, while the NGO sector needs to have better coordination among organizations and the private sector must do a better job consulting NGO representatives and government officials when

undertaking future infrastructure projects. Mitigating the environmental and social impact of the highway will require an all-hands-on-deck strategy that will involve the public, private and NGO sectors.

The surge in gold mining operations following the 2008 global financial crisis is a testament to the impact globalization has had on the Amazon. Global market demand for gold, agricultural products and timber have led to an increase in unsustainable land-use practices in Madre de Dios. Market demand for extractive activities coupled with poor governance and the completion of the Interoceanic Highway have created a crisis in Madre de Dios. As long as the regional government of Madre de Dios appears to be unwilling and unable to enforce existing laws, mitigating the impact of the Interoceanic Highway and its social and environmental impact will require unconventional solutions. The Madre de Dios REDD Project, ACA's Manu-Tambopata Conservation Corridor and the Castaña Corridor intiatives and organizations such as the Alliance for Responsible Mining that work in "fairmined" gold certification projects represent creative strategies for mitigating some of the social and environmental problems faced in Madre de Dios. These projects attempt to fill a void that the government has left in the region.

The most effective strategy may be to prove that activities that promote responsible stewardship of the land are economically viable. People are drawn to gold mining and other unsustainable land-use practices in the region because it is profitable in the short-term. Subsistance farming, Brazil nut harvesting and small-scale ecotourism operatives represent possible ways for people living in rural areas of Madre de Dios to profit in a sustainable manner. Promoting an integrative approach to sustainability that incorporates a variety of conservation strategies should be a priority. Grassroots NGOs

such as Camino Verde play a critical role in promoting sustainable land-use practices and combatting gold mining and other extractive activities that are being driven by the forces of globalization.

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