Ecotourism along Pucallpa-Cruzeiro do Sul Corridor

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Abstract: Ecotourism has the potential to reduce the rate of deforestation occurring in the Amazon River Basin. This paper explores concepts linking ecotourism and transportation before arguing that the Sierra del Divisor region is well suited for an ecolodge to stimulate biodiversity conservation and local economies along a proposed transportation corridor linking Pucallpa, Peru and Cruzeiro do Sul, Brazil. In addition to utilizing ecotourism as a tool for conservation and community empowerment, the paper argues for the construction of a limited stop railway as an alternative to a highway. Utilizing both ecotourism and rail, rather than a road, Peru can promote conservation, while still meeting the economic and political goals of the transportation corridor connecting to Brazil.

Keywords: Ecotourism, Brazil, Peru, tourism, conservation, railway, roads

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Support for Biodiversity Conservation

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Introduction

The paper addressing the issue of biodiversity conservation along a newly proposed transportation corridor from Pucallpa, Peru and Cruzeiro do Sul, Brazil. Current plans for this corridor call for the construction of a highway, but this paper supports a railway as a less intrusive means. In order to support biodiversity conservation along the new highway or railway a hypothetical ecotourism lodge located in the Sierra del Divisor Peruvian National Park is examined. Ecotourism is defined by The International Ecotourism Society as, "responsible travel to natural areas that conserves the environment and improves the well-being of local people" (TIES, 1990). Ecotourism along the Pucallpa-Cruzeiro do Sul corridor may have the potential to improve conservation while providing a modest income to local residents.

Research Question

How can global insights on tourism and transport inform the development of a theoretical ecolodge along the Pucallpa – Cruzeiro do Sul road in the Amazon? Current knowledge focuses on different aspects needed to answer the questions, but a synthesis of transport systems and ecotourism does not exist. This paper aims to review existing information on the relationship between transport systems and tourism, as well as, ecotourism in the Amazon River Basin. After reviewing existing knowledge the paper will outline methods in which ecotourism in the Amazon can incorporate knowledge of transport/tourism interactions in order to minimize environmental effects while benefitting the tourist experience.

Tourism represents one of the fastest growing global industries. In 2000 travel and tourism, directly and indirectly, accounted for $3.6 trillion of economic activity, roughly 11 percent of the gross world product (Mastny, 2001). Ecotourism accounted for $154 billion of the $3.6 trillion in 2000, but represents one of the fastest growing segments of tourism with an annual growth rate of 20 percent between 1950 and 2000; tourism as a whole only grew 7 percent annually during the same time span (Hitchcock *et al.*, 2009).

Many developing countries depend on international tourist for a significant portion of gross national product (GDP). In a study done for the U.K. Department for International Development, researchers found tourism is significant, meaning it accounts for at least 2 percent of GDP or 5 percent of exports, in nearly half the nations in the lowest income range and almost

all nations in the lower-to-middle income range (Mastny, 2001). The increasing influence of tourists in developing countries means support infrastructure must increase, including transport networks such as roads and railways. In order to protect the environment and support the success of ecotourism, building new infrastructure in an environmentally responsible way is important. Examining the existing knowledge regarding the relationship between transport systems and tourist behavior is important to pair with current ecotourism practices in order to inform the best possible outcome in the Amazon, where an increasing amount of tourism will occur as accessibility continues to increase.

Three ways exist in which tourist travel: on-site, between-site, and to the destination (Simmons and Becken, 2004). Travel to the destination is primarily done by plane; this paper focuses primarily on how tourist move around once the country to which they are traveling is reached. This paper examines road and rail networks, together termed transport networks. On-site and between-site travel is thus examined on a transport network scale including ground transport; cars, buses, and trains.

Three modes of transport exist: self-propelled, augmented, and fuelled (Mastny, 2001). Self-propelled modes include walking, running, and any other motion done using only the human body. Augmented modes include skiing, riding horses, and any other aids not externally powered. Finally, fuelled modes of transport include cars, trains, and any other form of transportation using an external power source, such as gasoline, to move. Fuelled transport modes necessitate large scale infrastructure to support travel and thus create a prime candidate for sustainability improvements.

Sorupia (2010) conducts two case studies examining the sustainability of transport networks serving Switzerland's Swiss National Park and Brazil's Iguacu National Park. Both parks have tried to establish a network of public transport to carry tourists to the parks. In Brazil a bus system was created but not integrated fully; bus drivers resisted for fear profits would suffer by running service to areas of low user frequency. Rather than creating a comprehensive, easy to use system the Brazilian case provides an example in which a transport system was not well integrated because the incentives were not adequate for bus drivers (Sorupia, 2010).

Switzerland provides an example of a well-integrated, understandable, easy to use transport network. Switzerland has created a network of train strops and bus routes covering the entire canton of Graubunden, an important holiday region, in which Sorupia (2010) conducted the second case study. Graubunden relies on both domestic and international tourist to generate 30 percent of GDP, indicating the importance of tourism and the significance placed on the sector by the government (Sorupia, 2010). Switzerland ensures an integrated transport system through the use of government subsides. Every village is connected to public transport, even though the federal government only pays for service to villages with populations larger than 100; regional governments in each canton provide service to villages with fewer than 100 inhabitants (Sorupia, 2010). Even though Switzerland has a well-established system of public transportation, a large number of tourists to the Swiss National Park, 70 percent, arrive via personal car because of the flexibility allowed when visiting from either Austria or Italy (Sorupia, 2010).

The Swiss and Brazilian cases provide insights into ways in which countries can implement successful public transportation systems. Switzerland's buses and trains run on a very well established schedule which allows for tourists to count on the availability of transport at specific times. In Brazil the bus system does not run with regular intervals, except on Sundays, and the boards posting times are difficult to understand and often incorrect (Sorupia, 2010). One positive action Iguacu National Park has taken is to incorporate outside vendors, operating inside the park, in park management, a process referred to as adaptive co-management (Mastny, 2001). Incorporating outside vendors, a process known as collaborative co-management creates networks of stakeholders who agree to share and manage resources through a process of negotiation, continual learning, and adaptive management in order to maximize results (Cochrane, 2009).

In addition to road transport, rail provides another major means of ground transportation. Rail has a number advantages and disadvantages compared to road travel. Rail travel has been cited as the most space and energy efficient way of moving large volumes of people and freight (Duval, 2007). Rail systems are up to four times more efficient per passenger kilometer than other ground transportation; additionally increased rail utilization creates more integrated means of transportation between urban centers (Duval, 2007). Rail systems also provide a safer means of transport than cars or buses, as trains have far fewer accidents (Duval, 2007). In regards to

sustainability, rail can also offer the benefits of decreased access along the route because passengers are not able to get out of the train and encroach on the forest. Rail also promotes less development along routes than roads because if there is no stop then the train will continue on and not give squatters and easy means of staying connected.

Ecotourism practices must be understood in order to pair with the knowledge of transport systems if the Pucallpa to Cruzeiro do Sul road, and the Amazon Basin as a whole, is going to develop tourism sustainably. Broadly defined, ecotourism is: "the responsible travel to natural areas that conserves the environment and improves the well-being of local people" (TIES, 2012). Many people, including developers, conservationist, and indigenous people, view ecotourism as a means by which to both protect the environment while at the same time providing economic benefits and opportunities. Three key features of ecotourism are: it minimizes the negative environmental, economic, and social impacts often associated with mass tourism; it delivers a net positive contribution to environmental conservation; and it improves the livelihoods of local people (Stronza and Durham, 2008).

Ecotourism offers a number of benefits and has the potential to achieve its goals of promoting social, environmental, and economic interests, but ecotourism also presents challenges. Among the benefits gained from ecotourism are increased funds for national parks, in North America national parks contribute roughly $250 billion per year to the tourism industry (Buckley, 2008). Along with increased funds for existing national parks, ecotourism can promote the creation of private nature reserves as a means to increase the amount of habitat protected; this is common in sub-Saharan Africa in the form of private game reserves (Buckley, 2008). Another potential benefit gained from ecotourism through the education of tourists is the potential for visitors to return home and become advocates for conservation and even change habits to reflect more sustainable lifestyles (Buckley, 2008). These potential benefits offer solutions to all three key features of ecotourism, but making sure they occur is the trick to creating a successful ecolodge versus adding to the market additional green washing, the practice by which a company uses unfounded sustainable rhetoric in order to attract customers interested in sustainability and green practices (Laufer, 2003).

The main challenge faced by ecotourism is the fact that an increase in the number of tourist necessitates an increase in infrastructure, consequently reducing the "natural"

environment which tourists pay to visit.. Stemming from the increase in number of people is an increase in energy usage, pollution, urbanization, soil erosion or compaction, noise, and deforestation (Buckley, 2008). More visitors generally indicates an increase in the number of vehicles and the frequency at which vehicles arrive, both increase the amount of noise around roads which interferes with bird songs, often used to attract mates, and well as raises the chance for collisions with wildlife, increasing road kill (Buckley, 2008). Other high-order effects can be observed as a result of human interference with the natural system including fire regimes, inter- and intra-species interactions, and the introduction of pests and non-native organisms including diseases and pathogens (Buckley, 2008).

Ecotourism promotes worthwhile ideals, but remains an industry seeking to make a profit for its shareholders, which is not necessarily bad if the shareholders are members of a local community, but problems can arise even still. Stronza and Durham (2008) argue ecotourism is firmly "locked into notions of green capitalism," so concerns for profit will outweigh concerns for the environment (Stronza and Durham, 2008). For example, ecocertification schemes are meant to inform consumers which companies are reliable and follow the tenants of ecotourism, but the companies providing certification are also for profit, meaning the incentives exist for these companies to give out certifications even if the recipient does not totally deserve the award (Buckley, 2008).

A case study conducted by Stronza (2008) in the Peruvian Amazon examines the partnership between the community of Infierno and Rainforest Expeditions to run an ecolodge, Posada Amazonas. The goal of the study was to prove local communities can generate enough money though ecotourism to promote conservation (Stronza, 2008). Posada Amazonas is located in southeastern Peru in the Tropical Andes along the Tambopata River. Rainforest Expeditions was interested in the partnership because the community of Infierno had a communal reserve on their land which held primary forest; there were iconic mega-fauna nearby, and the site easily accessible from Puerto Maldonado, the gateway to the Madre de Dios region (Stronza, 2008). Posada Amazonas developed into a very successful lodge operating at full capacity year round, as of 2006 Infierno had received more than $500,000 in profit (Stronza, 2008). Along with the economic growth has come social challenges, some members of the community still live below the poverty line are incentivized to exploit the forest, while others buy more sophisticated

equipment like chainsaws (Stronza, 2008). Overall, the case of Posada Amazonas has shown ecotourism can work as a tool for conservation, but there are hurdles to conquers, such as how an increased wealth is used and the long term commitment to biodiversity conservation, as communities become more affluent.

Theory

This paper focuses on the topic of ecotourism in the context of conservation. Ecotourism as a tool to achieve biodiversity conservation has traditionally been reviewed using two distinct frameworks, an economic framework and a social framework (Stronza and Pegas, 2008). Using economics to assess ecotourism projects focuses on jobs and economic benefits provided, while social frameworks focus on the involvement of local people and the social benefits provided to the community. This paper will address both of these frameworks and then attempt to demonstrate the need to adopt a new framework when studying ecotourism.

Conservationists, over the past 20 years, have looked to ecotourism as a potential strategy for protecting the environment while simultaneously meeting human needs (Stronza and Pegas, 2008). Stronza and Pegas (2008) state that to date most research done on ecotourism comprises of case studies focused on how and why ecotourism leads to conservation, and in order to do this, most researchers rely on either an economic or social framework. These two frameworks are obviously important and ecotourism likely would not work without social support or economic benefits being added, but having two distinct frameworks may be distracting. In order to fully grasp the breadth of the subject of ecotourism, and understand the drivers behind biodiversity conservation as a result, a comprehensive framework taking into account both economic and social aspects simultaneously must be adopted.

Taking the view that economic benefits such as new revenue streams, jobs, and opportunities lead to conservation is one method used to analyze ecotourism's relationship to conservation (Stronza and Pegas, 2008). Studying the economic impacts of ecotourism is an obvious way in which to determine if a project will be successful. Logically, a project operating in the red will not last long, because without money future operation is impossible. A number of case studies from around the world support the economic benefits of conservation. A case study in South Africa found net income from wildlife tourism was almost eleven times more than from

cattle ranching, and job creation was fifteen times greater (Honey, 2008). In Kenya, a lion is estimated to be worth $7,000 per year in income from tourism, and an elephant herd is valued at approximately $61,000 annually (Honey, 2008). Benefits from protecting animals in nature go beyond Africa. In 2001 a study in the Turks and Caicos Islands indicated spiny lobsters may be worth more to divers than to restaurant goers; in Iceland a study concluded the economic value of whale watching worldwide was $1 billion (Honey, 2008). Examples such as the ones above provide clear evidence conservation can pay in ecotourism models. Opening an area to tourism provides a new market, international and national tourists, who place different values on traditionally ignored objects, such as plants and animals (Stronza and Pegas, 2008). The new value tourist place on natural resources can be very profitable if the resources are conserved (Stronza and Pegas, 2008).

The argument that economic benefits must accrue to local communities for ecotourism to result in the goal of conservation is true and makes sense; however, the other half of the equation is left out, the social aspect (Stronza and Pegas, 2008). Just because economic benefits develop from ecotourism projects does not necessarily imply conservation will follow; the Peruvian Native Community of Infierno serves as an example. Infierno partnered with a Peruvian based company, Rainforest Expeditions, in order to construct an ecolodge, Posada Amazonas, the profits of which would be divided with the community (Stronza, 2007). A study of the residents from Infierno shows a mixed reaction to the increased wealth generated by the lodge (Stronza, 2007). Two examples of community members highlight the dichotomy ecotourism can create are a man hired to help build the lodge and a man crafted the thatch roofs at the lodge (Stronza, 2007). The man hired to help construct the lodge stopped hunting once his job at the lodge began, prior to working in ecotourism he had to hunt two to three times a week and sell game meat in the regional market (Stronza, 2007). This man demonstrates the ability of economic benefits to promote conservation, but the man who made the roofs provides a counterpoint. The man selling thatch to Posada Amazonas used the money he earned from working on the lodge to purchase a chainsaw; a chainsaw would allow him to more effectively harvest and sell wood, which he said he planned to do (Stronza, 2007). These examples demonstrate different levels of economic involvement with ecotourism can lead to vastly different outcomes (Stronza, 2007). Employees receiving the largest amounts of money are the most likely to adopt conservation measures into everyday life, while employees and community members that do not receive

enough money from ecotourism to live off may instead use the marginally greater amount to extract more natural resources (Stronza, 2007).

The second major framework utilized studying ecotourism is the social framework, including social changes, local participation, and the effects of involvement on conservation (Stronza and Pegas, 2008). The argument for the social framework asserts, in order for conservation to be a successful byproduct of ecotourism the social structures must be in place to support locals. Local participation in management of the ecotourism site was one of the main points mentioned by multiple studies (Sorupia 2010; Stronza and Pegas, 2008). Involvement in management allows local capacity to increase and local institutions to strengthen (Stronza and Pegas, 2008). Stronza and Pegas (2008) cite examples from Honduras and Ecuador in which positive differences were made by turning over control of ecotourism operations from tour operators to local residents (Stronza and Pegas, 2008). Strengthening local institutions through the management of an ecotourism site allows a community to develop trust, coordination, and social capital among residents (Stronza and Pegas, 2008). Developing these traits creates a strong community able to develop and enforce rules regarding resource extraction, such as hunting, logging, and removing plants, thus promoting conservation in the community (Stronza and Pegas, 2008).

The central theory behind the social framework in relation to conservation is that communities with strong institutions will be able to managed shared resources (Stronza and Pegas, 2008). For example, any community can develop rules regarding hunting but the rules will only be followed if the community as a whole has faith in the system and knows rule breakers will be held accountable. Accountability through strong institutions thus allows communities to manage ecotourism sites well and better prepares local communities to absorb negative changes associated with ecotourism, such as an unequal distribution of wealth (Stronza and Pegas, 2008). Ecotourism is likely to have negative impacts on a community with weak institutions, leading to greater resource use and a gap in wealth among community members (Stronza and Pegas, 2008).

Neither a solely economic or social framework is capable of fully analyzing the complex subject of ecotourism. A framework incorporating aspects from both economic and social views is needed. Stronza and Pegas (2008) start to make the transition incorporating aspects from both

former frameworks with the goal of evaluating linkages between social changes, economic benefits, and conservation (Stronza and Pegas, 2008). Through two case studies conducted in Brazil and Peru Stronza and Pegas (2008) are able to draw conclusions incorporating economic and social issues and effectively create a new, more comprehensive framework through which to analyze ecotourism.

The first case study took place in Brazil; the Sea Turtle Conservation Program (TAMAR) promotes ecotourism as one strategy for protecting sea turtles (Stronza and Pegas, 2008). TAMAR has generated income and employment for local residents for over two decades and has been heralded as a model for sea turtle conservation worldwide (Stronza, 2010; Stronza and Pegas, 2008). The second case study occurred in Peru at Posada Amazonas which has received recognition for the innovative link between business and the local community pioneered there (Stronza and Pegas, 2008; Stronza, 2007).

Results from the case studies reveal ecotourism is not simply an economic tool for conservation so much as a cause of new social growth through new understandings, skills, and relations (Stronza and Pegas, 2008). The Brazilian case suggests economic benefits alone can effectively lead to conservation, at least in the short term (Stronza and Pegas, 2008). Local management was lacking in the Brazilian study but conservation of sea turtles was still achieved, the long term effects are unknown however and further research is needed in order to understand fully the social implications (Stronza, 2010; Stronza and Pegas, 2008). In Peru, the case study showed engaging local residents as co-managers can achieve both economic growth while also building local capacity to manage environmental problems (Stronza and Pegas, 2008). Posada Amazonas suggests ecotourism can do more than deliver employment and income; ecotourism can also strengthen local institutions and set in motion collective action for conservation (Stronza and Pegas, 2008). These results show that while economic benefits are important for the short-term success of ecotourism and conservation, greater involvement of local communities in management may help sustain success for the long term (Stronza and Pegas, 2008).

Analysis

In order to evaluate the potential viability and best practices for a hypothetical ecolodge located along the Pucallpa – Cruzeiro do Sul road, a number of case studies from around the

world are analyzed to evaluate indicators of success. The case studies reviewed are intended to give insights into existing ecolodges and from experience gained at these locations, institute the most effective model possible in Sierra del Divisor. Online search engines were utilized to find sources incorporating a wide variety of key word searches.

This section breaks down case studies in order to extract key components from each. These key components are then linked together to provide a complete model. Using this method provides the most efficient way in which to examine a large number of existing ecolodges and synthesis lessons from each. Additionally the argument for a railway, as opposed to a road network, is elucidated.

The Peruvian road project slated to connect Pucallpa, Peru to Cruzeiro do Sul, Brazil provides an ideal location for ecotourism to play a major role in conservation in a newly accessible region. A straight line linking Pucallpa to the already existing BR-364 in Brazil would bisect the Sierra del Divisor National Park. Outlined here are justifications for an ecotourism location along this road as well as best practices that have been proven in other ecotourism locations around the world.

The first point to clarify is that while in the paper a road project is referred to in order to connect Pucallpa and Cruzeiro do Sul, this is not necessarily the ideal transportation option. Later in this section the case will be made for a railway to serve the Peruvian side of the connection. Before making that point, first the site will be justified as a suitable location for ecotourism.

An ecolodge located in the Sierra del Divisor National Park has the potential to fulfill all the requirements laid out by Wilkie and Carpenter (1999) in order to become a major source of revenue, without which an ecotourism project is destined to fail. According to Wilkie and Carpenter (1999) the criteria an ecolodge must fulfill are:

- Contain charismatic species
- Guarantee wildlife viewing
- Be located close to an international airport or major tourist center
- Offer easy, comfortable and safe access
- Provide internationally acceptable standards of food and accommodation

- Be close to other tourist attractions such as beaches and cultural features
- Offer unique landscapes
- Be moderately inexpensive (Wilkie and Carpenter, 1999)

According to a rapid biological inventory (RBI) undertaken by The Field Museum in 2006 the Sierra del Divisor area contains a number of charismatic species including monkeys, like the white-fronted capuchin (*Cebus albifrons)* and the red howler monkey (*Ateles chamek)*, large predators, like the jaguar (*Panthera onca)* and puma (*Panthera concolor)*, and South American tapirs (*Tapirus terrestries)* (The Field Museum, 2006). Wildlife viewing in the Sierra del Divisor, especially along streams, would be relatively easy for guests because of the large amount of wildlife present in the forest, as evidenced by the RBI (The Field Museum, 2006). A key component to facilitate wildlife viewing is a ban on hunting in the area, which can be assumed in the area bordering the ecolodge. Points three and four laid forth by Wilkie and Carpenter (1999) would both be satisfied by the construction of the new road or by a railroad. FAP Captain David Abenzur Rengifo International Airport, located in Pucallpa is the major airport for the Ucayali Region and would provide tourist with an easy starting point to reach the ecolodge, a drive along paved roads or a train ride would then see guests arrive safely, and comfortable at the ecolodge. The food, accommodations and price would all be based on the management of the ecolodge. Knowing the importance of these factors, lodge management can prioritize and used knowledge gained from other operations to inform decisions in order to meet guests' desires.

The location of the ecolodge would allow for tourists to visit both the rainforest of the Sierra del Divisor, but also take a train from Pucallpa to Lima and continue on to see cultural sites around the country such as Machu Picchu and Cuzco. The importance of considering a broader area than the immediate surroundings is reinforced in a case study by Gulinck *et al.* (2000) conducted in Zimbabwe. Tourism affects a much wider area than just the final destination, visitors travel a great deal during a trip and interact both economically and culturally throughout their stay. The region under review in this paper is set in such a manner as to provide both physically beautiful landscapes but also tie in cultural aspects of Peru. The stunning and unique beauty of Sierra del Divisor can be seen in Figure 1 of the appendices (tordo, 2010). Cerro el Cono is an extinct volcanic cone that soars above the canopy and offers a spectacular

backdrop on the already magnificent forest. This evidence supports the fact Sierra del Divisor has the required prerequisites to become a successful ecotourism location.

Now the groundwork has been laid to justify the region as a likely ecotourism destination, the preferences of the guests must be considered. Hearne and Salinas (2001) conducted a case study in Costa Rica which identified, using choice experiments, four preferences common to most tourists when visiting a site. These preferences were: improved infrastructure; greater number of observation and picnic areas; greater availability of information; and low entrance fees (Hearne and Salinas, 2001). The case study conducted contained a similar situation to the one faced along the Pucallpa to Cruzeiro do Sul road. In the case a road running to Braulio Carrillo National Park was paved in order to allow visitors to easily access Barva Volcano (Hearne and Salinas, 2001). Tourist preferences collected were used to inform park managers at Braulio Carrillo how to most effectively prepare for the coming influx of tourists. The situation faced by the hypothetical ecolodge being built is very similar as tourists will be visiting the region in much greater numbers than previously. Infrastructure that facilitates easy movement must be balanced with the need to leave the environment as undisturbed as possible. In Sierra del Divisor aerial trams are not a likely attraction, but a similar service could be provided by canopy walks along suspended bridges. At an ecolodge, park entrance fees can be incorporated into the overall cost, reducing the perceived costs to visitors. Lastly, information is a key part of ecotourism and knowing that guests prefer to have more information to less provide insights on how to best present information. Instead of basic means of transferring information at traditional hotels, such as flyers and pamphlets, an ecolodge can take advantage of guests' willingness to learn and lodges can host informative talks and offer guided tours in which the goal is to learn about and experience the forest first hand.

Ecotourism places a large emphasis on attracting international travelers, especially from developed countries, to ecotourism locations because international travelers often are willing to pay more than national travelers (Kepe, 2001). Kepe (2001) conducted a case study in South Africa concluding that travelers originating from the host country itself can also play a major role in ecotourism, especially when a lodge is first opening. Kepe (2001) found that national tourists have slightly different values than international tourists and these values may be easier to meet as a lodge first beings operation. National tourists value primarily the natural experience

and desire to be isolated, while international travelers share these values but with an added desire is to interact with local communities (Kepe, 2001). A lodge beginning operations can focus on attracting national travelers solely based on the environment, infrastructure, and accommodations before the cultural aspects are in place. Utilizing national travelers to build a solid customer base allows the lodge to gradually build a rapport with local communities, which will benefit both the communities and the lodges as more international tourists arrive. Kepe (2001) states international tourists are more desirable in the long term for an ecotourism operation because international tourists typically are willing to spend more money, stay in a location longer, and interact more intensively with the local communities (Kepe, 2001). Situated along the border of Peru and Brazil, access would be easy for both Peruvian and Brazilian tourists and could serve as a great base from which an ecolodge could build operations.

The final crucial element to consider when planning an ecolodge is the local communities and the reciprocal impacts between the communities and the lodge. Tourism offers the chance for many locals to supplement income by providing goods and services to guests, or to adapt completely to tourism and begin working in the tourism industry through direct employment. An ecotourism destination fulfilling all the points raised so far may still fail without proper support from the surrounding communities. The most likely chance to get local support is to provide economic benefits (Walpole and Goodwin, 2001). Posada Amazonas, in Infierno, Peru, provides a great example of a community and lodge that thrived because the proper economic incentives existed to ensure cooperation between locals and the lodge for mutual benefit.

A case study conducted at Royal Chitwan National Park, Nepal identified two conditions that ensure the successful integration of biodiversity conservation and local economic development (Bookbinder *et al.*, 1998). First, immediate economic benefits to local people must be present, and second, long term incentives must be appropriate for the scale of the threats to biodiversity (Bookbinder *et al*., 1998). Economic incentives derived from conservation activities rather than from direct financial compensation, such as paying a farmer for livestock killed by predators, are ideal to promote long term sustainability (Bookbinder *et al*., 1998). Posada Amazonas is able to achieve long term sustainability because of the economic benefits locals derive directly from tourist activity (Stronza, 2007). The model that Posada Amazonas uses in

which 40% of profits go directly to the local community is a promising one. A similar approach should be considered for future ecolodges, including in the Sierra del Divisor.

A case study conducted by Walpole and Goodwin (2001) around Komodo National Park, Indonesia identified three recommendations tourism planners should consider when developing new lodges. The first recommendation is to ensure economic benefits are as evenly distributed as possible (Walpole and Goodwin, 2001). Local elites around Komodo National Park were found to benefit the most from tourist activities (Walpole and Goodwin, 2001). The second recommendation made was to promote greater cultural sensitivity among guests, and finally maintain a constant relationship with the local communities in order to monitor sentiments (Walpole and Goodwin, 2001).

The recommendations made by Walpole and Goodwin (2001) should be taken into account in Sierra del Divisor. To combat an unequal distribution of benefits the lodge could offer training programs or micro-loans aimed at promoting sustainable development in the community (Walpole and Goodwin, 2001). In Peru a different set of cultural norms exist compared to Indonesia and may more closely fit with "Western" culture, thus presenting less of an issue than tourism faced in a predominately Muslim region of Indonesia. The importance of cultural sensitivity remains high and should still be encouraged in guests, because ultimately the people at the lodge are guests of the locals and should respect local traditions and norms. The final recommendation made, maintaining an active relationship, is crucial. Local opinion can change quickly based on current events and an active relationship can help lodge managers stay in front of negative opinions and opposition, which may lead to retaliation through acts such as poaching, logging, or drug trafficking.

Global insights can inform decisions regarding the construction of new ecotourism projects. Using a checklist of necessary features the Sierra del Divisor region is a prime candidate for a new ecolodge to be built. Local communities must be engaged in new projects and the best way in which to garner support is through economic benefits, such as employment, micro-loans, or access to a new market of tourist able to buy wares. The importance of tourists originating from within Peru and Brazil can also be determined from previous lodges' experiences. Nationals provide a solid base from which to start because the important aspects are already in place, such as the nature viewing and seclusion, while internationals often wish to

experience local communities as well. These communities will be more receptive of tourists as the benefits of the lodge become more apparent and economic growth in the community occurs. National tourists present a promising market in Sierra del Divisor because the lodge would be a convenient stop on the way to Brazil along the newly developed transportation corridor.

Currently the Peruvian government plans to construct a road connecting Pucallpa to the BR-364 in Brazil. This paper supports the building of an ecolodge along this new road in order to promote biodiversity conservation, but an ecolodge is not contingent on a road. A better means of connecting Peru and Brazil along this path would be a railway. A railway achieves the goal of connecting Pucallpa and Cruzeiro do Sul, still allows for the construction of an ecolodge, and has a smaller impact on the environment.

A similar project to the one Peru is considering took place in Brazil, paving the BR-319. Viana *et al*. (2008) examined the BR-319 paving project and proposed an alternative, building a railroad. The points raised in Viana *et al*. (2008) are pertinent in Peru and should be considered before construction of the road begins.

As the largest contributor to deforestation in the Amazon, road building over the last decade has led, directly and indirectly, to 75% of deforestation in the region (Viana *et al*., 2008). Roads create a spatial pattern of deforestation known as the "fishbone effect" because a road provides immediate and easy access to the natural resources present by which loggers, hunters, farmers, and drug traffickers enter (Viana *et al*., 2008). Along large roads, such as the proposed road from Pucallpa, squatters move in and exponentially increase the vectors by which deforestation can increase (Viana *et al*., 2008). Ecotourism offers one tool to combat the spread of deforestation, but the chances of ecotourism preventing a movement as large as would follow a new road the size being considered is slim. Instead, a much better means to curb deforestation is the construction of a railroad.

A key advantage of rail systems over highways is a greater control of access to adjacent land by limiting the construction of secondary roads, in essence blocking the fishbone effect from taking place (Viana *et al*., 2008). In addition to reducing deforestation, trains produce less greenhouse gas emissions than cars or trucks when transporting the same amount of material (Viana *et al*., 2008). Through these two benefits railroads combat the two leading causes of

global climate change, both deforestation and greenhouse gas emissions. Finally, railroads are cheaper in the long term than roads. Viana *et al*. (2008) state that while initial investment to build a railroad can be larger than required to build a highway, railroads require less investment once the costs of maintenance are incorporated (Viana *et al*., 2008).

Assuming Pucallpa and Cruzeiro do Sul have to be connected via direct ground transportation; a railroad is a much better option. Cheaper, cleaner, and more efficient the choice seems obvious. An ecolodge constructed in the Sierra del Divisor National Park would still be beneficial by providing economic opportunities to local communities as well as promoting biodiversity conservation. Ideally the train would have a stop at or near the lodge to provide easy, safe transportation to tourists, but without other stops the chances of squatters settling along the railroad are far less likely than along a road.

Conclusion

Ecotourism has the potential to catalyze biodiversity conservation through economic and social development. Posada Amazonas and the community of Infierno, Peru, provide a clear example of an ecolodge that has provided positive benefits to the local community while simultaneously accomplishing the goals of conservations. When designing a new lodge it is crucial to consider both the economic feasibility as well as the potential social changes. Considering one without the other can result in a lodge not connected to the local community, thus unable to influence behavior and reduce stresses on the forest. A new lodge must also incorporate the eight key components set forth by Wilkie and Carpenter (1999).

The new connectivity corridor connecting Pucallpa, Peru to Cruzeiro do Sul, Brazil will open the area to new human pressures leading to deforestation and a degradation of the natural environment if left unchecked.. The Sierra del Divisor region of Peru offers a prime location for a new ecolodge to be built in order to support conservation in the region. Home to a large number of species guests to the region could be assured of the opportunities to view wildlife, as long as responsible forest management is observed. In addition to a large amount of animals the presence of large, charismatic species such as the jaguar serves as a selling point to tourists. Even though the chances are low to actually view a jaguar, guests are likely to pay more for the potential opportunity versus an area where charismatic species are not present (Wilkie and

Carpenter, 1999). The third crucial point, from Wilkie and Carpenter's necessary criteria, already present in the Sierra del Divisor region is a unique and interesting landscape. The forest alone provides an interesting conglomeration of organisms and unique endemic species that interact to form complex structures. Adding in the geophysical aspects of the area, such as the volcanic cone, Cerro el Cono, shown in Figure 1, the landscape is truly unique.

In addition to the biological and physical criteria being present in the Sierra del Divisor region the city of Pucallpa provides the necessary human side of the equation as well. Pucallpa provides access to an international airport relatively close to the location of a new lodge and also provides a link to the rest of the country and would act as a hub for tourists heading to Sierra del Divisor. Access to the lodge, located in the forest, will be relatively easy after the new transportation corridor is opened to link up with Brazil. Current plans are to achieve the goals of the corridor with the construction of a highway, but a road is not the best option. A railway connecting Pucallpa to Cruzeiro do Sul would achieve the same goals as building a road but achieve the same outcomes in a more environmentally friendly way. Railways do not encourage the same level of expansion into the forest that follows roads through the inevitable "fish-bone" pattern of deforestation that follows roads. A train stop at the lodge would provide tourist an easy and safe means to travel but limit squatter expansion into the forest.

Assuming a connection between Pucallpa, Peru and Cruzeiro do Sul, Brazil is inevitable both governments should consider the effects on the forest and its wildlife. Using a rail system achieves the goal of connecting both cities, but in a way which minimizes subsequent deforestation. Additionally, trains produce fewer greenhouse gas emissions than cars on a per ton materials shipped basis (Viana *et al*., 2008). The construction of an ecolodge along the new railway would provide additional support for conservation in the area. A successful ecolodge is able to engage the local communities and alter lifestyles to support conservation enhancing behaviors. The Amazon Rainforest is a vital resource not just for Peru and Brazil, but for the entire world, this importance adds extra responsibilities to the governments which are able to make decisions that directly impact the forest. The cities of Pucallpa and Cruzeiro do Sul can become a model for other regions to emulate with the construction of an environmentally conscious railway instead of a road. Ecotourism offers the necessary monetary backing to provide the economic support for trains over roads in the Amazon Rainforest.

Appendix

Figure 1. Cerro el Cono located in Sierra del Divisor, Peru. (tordo, 2010)

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