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Money for Monos: An analysis of the Payment for Environmental Services Program in the Osa Peninsula

Presented By

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Abstract

Wildlife conservation and agriculture are often seen as conflicting activities, particularly in tropical forest environments. Focusing on the Osa Peninsula of Costa Rica, this paper demonstrates that such topics need not be thought of in terms of mutual exclusivity. Additionally, this paper explores the ways in which rural Costa Ricans think of and interact with the primary forests and how they cultivate the land, either for personal use or for commercial agricultural practices. The Payment for Environmental Services Program (PES) is used as a framework to analyze the intersections of political, social, and economic ties to land.

The PES program has existed since the mid 1990s and has the potential to revolutionize the way governments and, in turn, people value the ecosystems and wildlife. Costa Rica implemented the world's first program on a national scale in which land users are compensated for various environmental protection efforts. This ranges from reforestation to strictly conservation of existing forested areas. Funded by taxes, international donors, and down-stream benefactors, PES is a voluntary service that promotes poverty alleviation, carbon sequestration through forest conservation, as well as increased water quality and availability. Costa Rica's programs, unlike other countries, implements both forest conservation and water quality provisions.

The social and economic implications of these programs have been written about extensively, justifying the theoretical and economic frameworks that underlie the payments. However, the claimed environmental benefits and socioeconomic impacts have yet to be thoroughly reviewed. Using an ethnographic approach, I triangulate the stakeholders, government officials, tour guides, and farmers. Additionally, spatial analysis through Geographic Information Systems (GIS) provides a comprehensive view of the policy, economic, and cultural factors affecting wildlife management and preservation.

Chapter 1

Introduction

Wildlife conservation and agriculture are often at odds with one another, particularly in tropical forest environments. Through exploring the philosophical and political foundations for conservation in the 21st century, I posit that a payment for ecosystem services program could be a progressive tool through which we can effectively manage the tensions that exist between land use differences. Such a program recognizes that the forest provides services, such as water filtration that are worth preserving in natural order for civil society at large. Costa Rica is used as a proxy as it was first country to implement the Payment for Environmental Services program (PES, also referred to as PSA – Pagos por los Servicios Ambientales) on a national level. Through the lens of PES, we can assess the economic and social value we place on the environment in ways that hasn't been done in the past, and provide an analysis of changing ideologies of nature from a governmental and possibly individual level. This has implications for the future directions of conservation policy and initiatives globally, and has many areas through which it could be improved and adapted that I will address throughout this paper.

Philosophical Foundations

The foundation of these topics in my academic exploration was inspired by the works of William Cronon and Aldo Leopold. Through primarily analyzing their ideologies of nature in our society, I provide a philosophical base from which we can analyze conservation policy in a larger context. This debate is vital in progressing through conservation policy on any level and understanding the ideological or economic

frameworks that could be driving such change. William Cronon addresses the rhetoric around nature versus civility to provide insight in how we develop our conceptualizations of such spaces. Aldo Leopold speaks to the ethics and economics behind conservation. I weave my own ethics throughout and conclude with the importance of analyzing Costa Rica in this respect.

William Cronon is a contemporary geographer who, like many others, believes that we must assess the past in order to progress through the present; in respect to environmental sciences, the ways in which we have conceptualized nature strongly influence the sustainability of our relationships in the future. He critiques not only the physical, but also spiritual conceptualization of "nature" and the "wilderness" that westerners, such as John Muir, have written of and experienced throughout recent history. Such a romanticization of nature often results in a disconnected relationship from the wilderness with which we have coexisted for thousands of years and has led to a synthetic "wilderness" we want to enjoy for recreation in a safe and highly regulated environment. "Any way of looking at nature that encourages us to believe we are separate from nature – as wilderness tends to do – is likely to reinforce environmentally irresponsible behavior," which is the framework from which we are ideally moving away from now (Cronon, 1996). That is to say, if we are recognizing how our actions as humans impact global health, we must move back towards coexistence.

In that Ken Young (2014) postulated "for many Americans wilderness stands as the last remaining place where civilization, that all too human disease, has not fully infected the earth" Cronon would ask what does this wilderness look like? While Young does

acknowledge “some scholars have raised almost existential concerns about views of nature, as recognition of the Anthropocene makes it obvious that humans are part of nature and nature is in part a reflection of the actions of people” (Young, 2014). I argue William Cronon has been that key scholar.

Similar to Cronon, Leopold argues that we must think about the quality of our conservation and preservation initiatives, how we “manage the environment rather than creating an artificial one” (Leopold, 2012). However, rather than speaking to the rhetoric and larger environmental history, Leopold presents fundamental ideologies, such as a land ethic, that are necessary to make progress in the realm of conservation.

Until a fundamental land ethic is reached, Leopold’s argument is that economics always drives conservation movements. We must aim for a fundamental shift in our beliefs and rights of the environment to have a society that values all diverse parts of the biosphere. A land ethic would change our role as dominant humans and imply that we are members and citizens of the earth as a whole–that we share and must inherently respect the other species that are equal-level members. Beyond this value, we are “affirming [biotic] rights to [a] continued existence, and at least in spots, in a natural state” (Leopold, 2012). Comprehensively, we are not simply picking and choosing the parts of the biosphere we are protecting, but rather recognizing the vital role of all components in this complex system. This would allow those with stronger scientific backgrounds (or at least strong collaborations with ecologists and environmental scientists) to be those in control of the design and implementation of policy. In this respect government and economists would

be secondary in the serving the needs of the fragile ecosystems, and rather the scientists would be those informing environmental policy.

I speak to the negative effects that not employing such strategies is having in regards to the PES programs in Chapter Four, but it is vital to mention now as the economically driven conservation policy will continue to be "hopelessly lopsided…[ignoring] many elements in the land community that lacks commercial value, but that are (as far as we know) essential to its healthy functioning" (Leopold, 2012). A larger ecological conscience would sustain actions of coexistence beyond the economics that have been thus far driving conservation.

Leopold argues we have not yet reached such an ethic. He attributes such lack in the movement to a lack in how we manage and discuss conservation and nature's role. Thus far, environmental education has been lacking in promotion of an underlying ethic and consciousness, and, as aforementioned, is driven purely by economics. This is not surprising, but for true health and sustainability on behalf of the environment, he argued there should be a "biotic right, regardless of the presence or absence of economic advantage to us" (Leopold, 2012). However, would strong environmental policy promote such a land ethic in our society at large, or will these morals need to be present in individuals for progress to be made?

Specifically in relation to ecosystem services, he speaks to the ways in which we have previously thought of natural resources. Through legislation and ecosystem service

markets globally, we are recognizing the value of the environment beyond exploitation, respecting such environments in ways that were previously just to "turn turbines, float barges, and carry off sewage" (Leopold, 2012). Altering the role of nature to exploit the services it can provide to our society is no longer a sustainable form of interaction with this planet. We must stop sequestering ourselves, accept that humans can no longer attempt to extend control over all aspects of the natural world, and allow ourselves to be physically humbled by the energy, vibrancy, and role of other life forms.

Latin American Studies of "Nature" and Relevance

Every conservation narrative inherently must call to question the positionality of humans within "wilderness," what types of activities are acceptable, and should people be allowed to inhabit certain regions. Within the conceptual frameworks of Leopold and Cronon, all species' interdependence inherently means a system of equality, value, and mutual respect. The combination of rich biodiversity and critical ecosystems calls for a strong development of progressive environmental politics throughout Latin America. While the region is by no means devoid of environmental alteration and exploitation, policies towards environmental rights and protection are robust throughout this region. Although the amount of protected areas is growing exponentially, increases from 803 million hactares to 1,115 million hectares (1 hectare = 2.478 acres) from 1990 to 2000 alone, it is vital to assess how we think about nature and wilderness (Robins, 2006).

Costa Rica provides an interesting lens through which we can analyze these issues. While known for strong environmental management practices, it is a tiny country, only about

1/20 the size of Colombia for reference. Thus, environmental policies in Costa Rica are difficult to extrapolate to larger areas.

Chapter 2

Costa Rica Background

This small Central American nation spans an area of 51,100 km^2. The country has an estimated population size of 4,805,295, with 65.1% of its population residing in urban areas. The urban population has increased a 22% since 1980 (World Bank Indicators, 2012). In contrast to neighboring countries, Costa Rica's education and public health sectors are far more developed. The adult literacy rate is 96% and there is little prevalence of dengue fever, malaria or malnutrition (World Development Indicators, 2012). As explained through the Environmental Kuznets's Curve (EKC), this has allowed Costa Rica to focus more on conservation efforts. Made popular by the World Bank Development Report of 1992 (IBRD, 1992), the EKC proposes that as countries develop, there is an associated trend of environmental degradation or protection that follows (Stern, 2003). For Costa Rica, protecting the environment is not just an end in itself, but a way of protecting ecotourism, one of Costa Rica's largest national industries. This requires a careful balance between ecological impact and economic growth. Costa Rica's tropical geographic location demands a higher awareness of the ecological impact and sustainability in their development. Roughly 25% of Costa Rica's

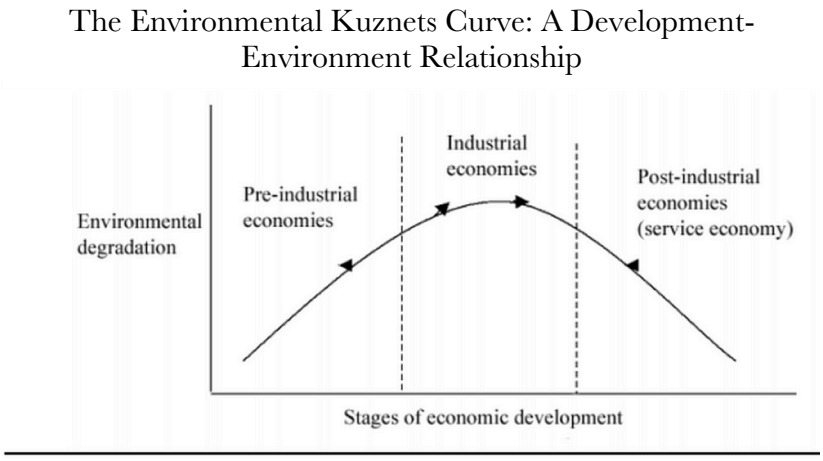

Figure 1. Environmental Kuznets's Curve

territory is protected under some form of national park or reserve system. However, when thinking about the amount of its conserved land, the total regional impact is relatively small. It is difficult to extrapolate their environmental policies to larger territories. Yet, as Costa Rica has developed socially, international and domestic attention to environmental sustainability has grown, eventually leading to the development of the Payment for Environmental Services program (PES), the focus of this report.

Environmental Policy in Latin America

To contextualize Costa Rica in a larger Latin American narrative might paint a less glorified picture of this "progressive" country. The FAO's State of the World's Forest 2007 Report states that "Latin America and the Caribbean lost 0.5 percent of its forest area between 2000 and 2005, 20 percent faster than in the previous five years" (Sierra, 8). This is a significant change and we should think critically about the driving forces behind such loss. Recognizing environmental threats and fundamental environmental rights, many countries are writing policies to tackle issues including deforestation.

Throughout Latin America there are clauses regarding environmental protection and rights of "Mother Nature." As of 2008, the new constitution of Ecuador became the first globally to "recognize legally enforceable ecosystem rights" (O'Toole, 2014). Similarly, Bolivia's 2011 "Law of the Rights of Mother Earth" (Ley de Derechos de la Madre Tierra) aims to bridge the gap between humans and nature by recognizing nature's right not only to exist, but also not to be polluted or genetically altered (O'Toole, 2014). Regulations such as Argentina's banning open-air mining and Ecuador's designation of

one million hectares as an "untouchable zone" where oil extraction and logging are prohibited have been expanding throughout Latin America (Sierra, 2007).

Since 2011, both Brazil and Ecuador have been expanding their protected regions. Brazil added 20 million hectares for a total of 110 million protected hectares, which now makes this the largest protected area system in the world. Sixty-one percent of the remaining forest of Ecuador is inside indigenous territories and 19% is in protected communities (Sierra, 2007). Colombia has the most robust environmental consciousness through its 1991 constitution, with 15 articles referencing its right and also the rights of indigenous peoples to the land (O'Toole, 204).

The political recognition for the protection of biodiversity and "integrity" of ecosystems is the first step towards actual implementation and on-the-ground protection of these fragile systems. Environmental degradation, extraction of natural resources, and unsustainable agriculture practices still exist throughout Latin America, despite policy advances. Ambiguity in definitions of protection or sustainability have been points of contention throughout this process. I acknowledge the wealth of provisions for the environment throughout Latin America in part to highlight the political progress being made, but more so to demystify the notion that Costa Rica is the sole leader of conservation and environmental movements.

The recognition of Costa Rica as seemingly ahead of the curve can partially be attributed to the fact that it was the first Latin American country to default on its international debt.

This forced it to be at the whims of the international, mainly western, community that was beginning a "green path" of its own in the 1980s. Simultaneously, reports surfaced about the frightening deforestation rates in Costa Rica. In 1992, Costa Rica's Strategy for Sustainable Development (ECODES) "indicated that, if unchanged, the trend toward unsustainable management of the country's forest resources during the last 50 years would deplete all primary forests of commercial timber by 1995" (Sanchez, 2002). With little initial regard for positive environmental ramifications, Costa Rica was forced to implement the recommendations of the International Monetary Fund. This mandated that Costa Rica discontinue costly subsides to ranchers which aided the farming and timber industry. These industries had initially contributed to high deforestation beginning in the 1970s (Woodward, 2009). Thus, in the 1980s, there was also a stark decrease in deforestation that was praised by environmental groups. In later years, these politics also opened trade to international markets, which for local emphasis of my study region, eradicated the farmers market of the port in Puerto Jimenez, Costa Rica, forcing many farmers to look for work in metropolitan areas. Direct causal relationships cannot be made, but from 1987 to 1997 there was a 20% increase in forest cover, Sanchez-Azofeifa (2007) does point towards "the net increase in forest cover, [as] mostly due to land abandonment" (Kleinn, 2000).

It is also estimated that 400,000 hectares of pastures were abandoned between 1984 and 1994. Secondary forest increased from 230,000 hectares to 425,000 hectares (1 hectare = 2.478 acres) in the same time period (Kleinn, 2000). The 1980s and 1990s saw the first major decline of peoples in the mountains. Without economic or governmental support

for agriculture or cultivation of trees to sell, deforestation will decline. Currently, there is approximately 50% forest cover, with 24.9% primary forest (10.7 % standard error), 8.3% young secondary forest (8.4% standard error), and 16.3% advanced secondary forest (7.2 % standard error) (FAO FRA, 2001). The environmental impact of the international influences in Costa Rica are not fully understood, but are a part of a growing infiltration of neoliberal politics throughout Latin America.

Neoliberalism & Conservation

Through the latter part of the 20th century, multinational influences and economic reform severely impacted the future of environmental quality. The "total exploration investment in Latin America grew from US $100 million at the end of the 1980s (representing 10% of global investment) to US $1170 million by the end of 1990s (29% of global investment)." This illustrates the significant role of international stakeholders throughout the region (Liverman, 2006). The core belief of neoliberal politics in this context is that private landowners and entities will better manage resources, leading to a commodification of the environment (Büsher, 2012). This capitalistic approach puts a price tag on every component, looking to maximize profits, production, and scale, and when applied to the environment creates major conflict.

Whose responsibility is it when the governments and communities at times do not have the economic freedom or political power to properly manage or fund conservation techniques? Should those private entities often responsible for environmental degradation have a larger responsibility to the environment and communities? Such is the thrust of an UN-led initiative, REDD + (Reducing Emissions from Deforestation and Forest

Degradation), that facilitates partnerships with the private sector, mostly multinational banks, for ecosystem service and conservation schemes. Because cattle ranching and unsustainable cultivations still are the leading causes of deforestation, efforts to restructure policies that drive such extraction are vital (Geist, 2002). Yet, we cannot make such direct causal relationships, as that would undermine the complexity of such politics. However, if we can promote ecosystem services markets through the private and public sectors, this might relieve the economic pressures that have imposed heavy pressure on these fragile systems.

How do we put a price tag on land, air, or water? Those who fear that "non human natures turn into lifeless commodities through neoliberal conservation," argue this is simply a 21st century tactic of colonization (Büsher, 2012; Liverman, 2006). Private entities with the responsibility of the management of carbon sequestration, conservation of water resources, or even pollution control cannot be credited with a social or environmental consciousness that surpasses their inherent goals for profit. Others point out that this is a complete disruption, and destruction, of local economies (Heynan, 2005). This is to say that the natural resources that communities have built their existence upon are being extrapolated through the commodification and fundamentally devastating "local powers and infrastructure" (Heynan, 2005). As Aldo Leopold points out in "The Land Ethic" (2012) this is essential for effective, long-lasting conservation initiatives. Büsher, also a skeptic of these movements, gets to the heart of such debate, asking if we must "sell nature to save it?" (Büsher, 2012). However dangerous it is, I see this switch

from the exploitation of nature for profit to the conservation of nature for profit one of the most practical and necessary aims of conservation initiatives globally.

However, this paper is neither an environmental history, nor a direct attack on neoliberal politics. I am interested in determining whether these changing policies have been or could be indicative of positive ideological change towards mindfulness of our planet's ecosystems. The histories of Costa Rica and Latin America as a whole clearly instrumental influenced current environmental policy in the region. It is important to contextualize the establishment of PES as it was born out of a period of great environmental change globally.

Chapter 3

Foundation of Payment for Environmental Services

The development of ecosystem services payments stems from a unique political and environmental atmosphere. As previously mentioned, in the 1980s, the original Forestry Act of 1969 that gave subsidies for converting forest to pasture land for Costa Rican farmers was ceased (Woodward, 2009). This dramatically slowed deforestation rates and provided impetus for the Payment for Environmental Services program. PES is innovative and novel though by no means the only program of its type, but it is the most robust of its kind in Costa Rica, and potentially worldwide. The implementation on a national scale allows for anyone within the country to apply and the government distributes the contracts to those who qualify. With some complications to be explored later in this paper, this is, in large part, on a first-come-first-serve basis (Arriagada, 2012).

Distribution on a large-scale contrasts with models that have a specific focus on a given region at risk, or for a watershed needing restoration work, such as the program in Colombia. The environmental problems therein are explored in Chapter Four, but the political will to allow for all citizens to have an equal opportunity is profound. As Sierra and Russman (2006) highlight, this integrative technique of policy, development, and economics can potentially be more effective than previous attempts of pure regulation for conservation initiatives. PES programs have the potential for influential change, locally and globally, as they are changing the economic and social mechanisms that have resulted in the need for systemic strategies for conservation and reforestation in the first place.

The specific regulations for an emphasis on environmental management were written in the mid 1990s. The governing bodies of the National Forestry Financing Fund (FONAFIFO), the Ministry for Environment, Energy, and Telecommunications (MINAET), and the National System of Conservation Areas (SINAC) play roles in the environmental governance and enforcement of policies, such as the Payment for Environmental Services (PES). The economic, political, and cultural motivations for this program are dynamic, but have been rooted in ideologies that clean air is a public good (Alston, 2013).

Four major laws built the foundation of the PES programs. The first regulation is a 1995 Environmental Law 7554 which mandates "a balanced and ecologically driven environment for all" (Sanchez-Azofeifa, 2007). This is followed by the 1996 Forestry Law 7575 that "mandates 'rational use' of all natural resources and prohibits land cover change in forests" (Sanchez-Azofeifa, 2007). Next, the 1998 Biodiversity Law "promotes the conservation and 'rational use' of biodiversity resources" (Sanchez-Azofeifa, 2007). Yet, the Forestry Law 7575 of 1996 recognized the four specific ecosystem services worth protecting: 1) carbon sequestration, 2) biodiversity conservation, 3) water protection, and 4) preservation of scenic beauty (Pagiola, 2006). These were to become the four pillars of PES, in which land users would be compensated for practicing any of these aspects.

Many regard this program as a progressive mechanism to provide alternative forms of income to those who would extract resources or exploit the natural environment for profit (Pagiola, 2005; Wünder, 2008; Goldman-Berner, 2012). It is essentially a payment for conservation. Ideally targeting small and medium sized farmers, PES programs give an economic incentive for protecting the environment by literally paying for the ecosystem services provided by the land (Pagiola, 2005; Pagiola, 2005; Wünder, 2008; Goldman-Berner, 2012). This allows farmers to remain on their land within a reserve area or in an ecologically sensitive area without feeling pressured to harm the environment through unsustainable agricultural practices, hunting, or the extraction of wood. Another benefit of this source of income could instill a stronger pride in the land's natural resources and beauty, as well as its biodiversity and plant life. It could also allow humans and nature to live in greater harmony.

Objectives

The PES contracts take many forms to achieve the ecosystem goals. The underlying principle behind most ecosystem market systems is simply that if we do not pay for preservation now, we will be paying for restoration work later. One poignant example is: "deforestation can impose costs on downstream population who no longer receive ecological services such as water filtration" (Pagiola, 2005).

The breadth of Costa Rica's programs-unlike other countries-encompasses both forest conservation and water quality provisions. The law's four major objectives allow many benefits, such as 1) the potential of additionality (net increase in forest coverage growth), 2) private efforts of conservation, and 3) the improvement of water quality and its

availability for human consumption or hydroelectric generation. Contracts can vary from simple forest conservation to reforestation or compensation for complex agroforestry systems.

These categories have been expanded and adapted as the program develops and grows. Table 1 shows the types of the most common contracts and their respective land area. Dollar values are provided if there is an assurance of their accuracy.

Table 1. Type of Contract and Respective Value

Type of Contract	Amount per acre per year for a 5-year contract
Forest Protection	$60.57
Protection of Water Resources	$75.71
Reforestation	$185.50
Forest Management	$47.32

Source: FONAFIFO, 2014; password-protected information

Table 2 shows the number of hectares or trees planted in relation to the three main types of contracts. From the start of the program in 1997, there were roughly 137,000 hectares protected. Since 2008, this has been expanded to 600,000 hectares (Arriagada, 2012). Understanding the different types of contracts and their varying payments is vital to understand the program's political and economic motivations.

Funding

How this program is funded has profound implications for political, economic, and social motives that are telling of the actual environmental conservation goals. Initially, PES was mostly funded by a portion of the gasoline tax that ranges from 3.5% to 5% up to 15% (depending upon the source). Contributions from international donors and ecosystem

service buyers were a secondary source (Pagiola, 2005; Ortega-Pacheco, 2007; Sánchez-Azofeifa, 2007).

Table 2. Hectares Protected/Trees Planted under each type of contract

Year	Forest Protection (Hectares)	Reforestation (Hectares)	Natural Regeneration (Number of trees)
1997	88,830	4,629	--
2000	26,583	2,457	--
2003	65,405	3,155	--
2006**	19,972	4,586	279.30
2009	52,017.70	4,017.50	1,500.20
2012	62, 276	4,252.20	1,204.50

Source: FONAFIFO, 2013
**Reforestation and Natural Regeneration were split into separate categories

However, the demand was increasing and the necessity to focus on more specific watershed management grew. An additional water tax was implemented nationally in 2006 in response (Ortega-Pacheco, 2007). Each successive year, 15% more of the tax will be allocated to MINAET, for 100% contribution by the seventh year. Although this is a national mandate, local communities are responsible for sending the money and no more than 25% of it will return to the respective communities (Ortega-Pacheco, 2007). Half of the water tax revenues will be utilized by MINAET for resource conservation; the other half will be distributed between SINAC and FONAFIFO. Now, FONAFIFO has the capacity to target the originating communities for local watershed protection (Ortega-Pacheco, 2007).

While the government in large part is currently funding these programs, this is dependent on political and economic stability within the country, and must be approved each year. Another dilemma is the transparency of the governing bodies. By reaching out to FONAFIFO, the graduate student I work with was able to access their payment plans (as shown in Table 2) but this is not publicly available information. The actual data is largely inconsistent within the academic literature and especially in relation to watershed management.

Watersheds and External Financing

A largely elusive component of PES is the ecosystem service contracts surrounding watershed management and the role external financing plays. Wünder (2006) argues "watershed protection is often the only fund-generating environmental service." This, however, leads to inconsistencies between the extent to which these contracts are given on a "first come, first serve" basis or if preference is given to those who are in watersheds that provide specific resources to hydroelectric projects (Arriagada, 2012; Pagiola, 2005; Ortega-Pacheco, 2007).

Research indicates that values range from $4 per hectare per year for watershed management (Watershed Markets, 2014), to $255-382 annually (Arriagada, 2012). However, the greatest discrepancy is found in Liverman (2006) who claims the World Bank reports $10 ha/year in a watershed to be developed for hydroelectricity or $210 ha/year for carbon sequestration. Liverman's data also $40 per hectare per year for communities protecting upstream from hydroelectric schemes and $45 for communities in the recharge zone for the largest national brewery in Costa Rica.

All of these payments seem to be dependent on the downstream financer. One value that is typically agreed upon is $64 per hectare per year for forest protection, which one could assume will have an impact on water resources, yet the connection is rarely made. These discrepancies in price and intricacies of contract types correlate strongly with the importance, economically and environmentally of ecosystem management.

Without consistency and transparency regarding financing and qualification, the legitimacy of environmental protection is questioned. Through fieldwork, I was able to tease out some of these answers. However, I am still left questioning the implementation of PES programs as an environmental protection mechanism, rather than as a socioeconomic tool for poverty alleviation and improvement of community dynamics as it is prominently presented in the literature.

Chapter 4

The Osa Peninsula

During the summer of 2014, I accompanied a graduate student of the University of Texas, Gregory Schwartz, in his research of these programs throughout the Osa Peninsula. This region has a complex environmental history and is rich for investigation. The geologic forces and orogeny resulted in three different forest types and roughly 2.8% of the world's biodiversity throughout the peninsula that was left relatively undeveloped until recently. "Approximately one third of the tree species recorded in Costa Rica are found in this region," but as of 1997, "only 44% of the forest remaining on the peninsula was mature" (Sanchez- Azofeifa, 2002). Through conversations with tour guides and MINEAT officials, I learned that the Peninsula was once a very active port for farmers and one of the most preserved regions as well.

Yet, this is not to say it was void of lumber extraction and gold mining, for both have been very prevalent and are now minor problems in the region. The turn of events was to come when the state – largely funded by international entities – was to buy the land from the farmers to establish the Corcovado National Park in the 1970s. This was to be the only park in the country that is fully owned by the state.[1] Marrying this with the end of subsides to farmers (mentioned earlier) resulted in the abandonment of land and industries such as cattle ranching. This was highly influenced by neoliberal politics and also resulted in the closure of the farmer's market at the port, which fundamentally

[1] Although I have spoke with one PES-participant who said he has documentation that the Costa Rican government does not actually own the land and it was purchased by other countries.

altered the social and economic dynamics of the region. Now, they have painted an image of a pristine natural area ripe with ecotourism.

This narrative is vital to the region's sentiment and environmental history. By stripping people of their land and livelihoods, ideologies and perceptions of the environment, the political bodies have been changed as well. Furthermore, I am interested in what role PES is playing. How does paying people to preserve the land that they own, rather than growing crops, raising cattle, or even harvesting trees influence conceptualizations of humans role in nature? Socially, are there gender differences? Are there different mindsets or behaviors between those who participate and those who are not participating? Is this a mind frame that Costa Ricans as a whole have? That is the focus of this study.

Methods

Based out of the largest tourist town in the Osa Peninsula, Puerto Jimenez, in the summer of 2014, we conducted semi-structured interviews to assess the public perception of the programs, gender differences, and accessibility to the programs. Pooling from databases of PES participants and through snowball sampling techniques, we spoke with 80 landowners, of which 40 are

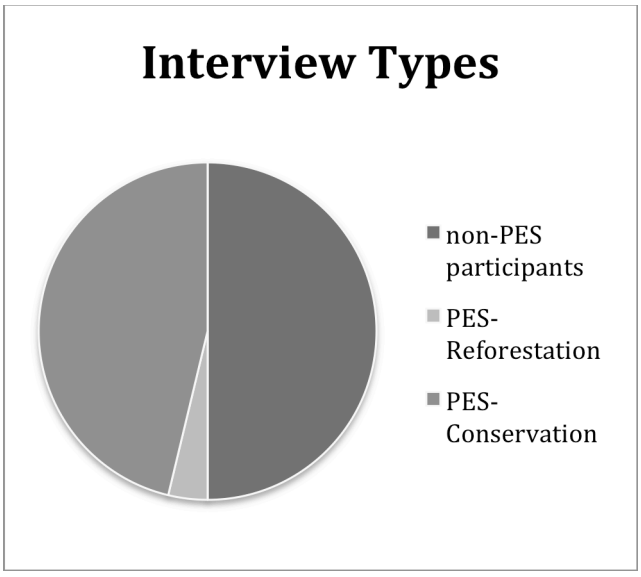

Figure 2. Interview Types

involved in the PSA program and 40 are not, with equal distribution of men and women as well (Figure 3). Through acquiring regional and micro-regional data on PES participant names from the FONAFIFO website, we would further gather as much data about them such as phone number or general addresses, and ask to conduct interviews. Snowball sampling is a process by which you arrive to an area, ask one individual for an interview, and through neighbors and recommendations the process "snowballs" until you have spoken with all your participants. There were seven couples sharing a household; their answers in regards to perceptions of nature and opinions will be analyzed separately, but for purposes of statistical analysis we then have a total of 71 individuals (36 PES, 35 non-PES). There were no thresholds for size of farms or properties, and for every landowner we acquired basic land cover characteristics such as

Statistics	Non-PES Participants				PES-Participants			
	N	Min	Max	Mean	N	Min	Max	Mean
Years Under PSA	40	0.0	0.0	0.0	40	2	16	7.4
Size (ha)	40	0.1	310.0	45.95	40	6.5	322.0	82.26
Size of farm (ha) under PSA	40	0.0	0.0	0.0	40	2.5	247.0	64.11
% of farm under PSA	40	0.0	0.0	0.0	40	26.0	100.0	80.63
% primary forest	40	0.0	99.0	17.74	40	0.0	100.0	59.82
% secondary forest	40	0.0	100.0	17.6	40	0.0	97.0	23.4
% pasture	40	0.0	100.0	33.63	40	0.0	45.0	8.34
% cultivations	40	0.0	100.0	15.63	40	0.0	4.0	0.15
% palm oil	40	0.0	100.0	9.08	40	0.0	40.0	0.15

Table 1. Land Use Statistics

agriculture, primary or secondary forest, and pasture (Table 3).

When conducting interviews on the site of their property we took the latitude and longitudes of each participant. For those whose interviews were done off site, we estimated the locations of the exact farm based on the information they gave us (21 total

estimated). Figure 4 shows the geographic distribution of interviewees: brown represents the PES-participants and green represents non-PES. We attempted to normalize the distribution for a comprehensive analysis.

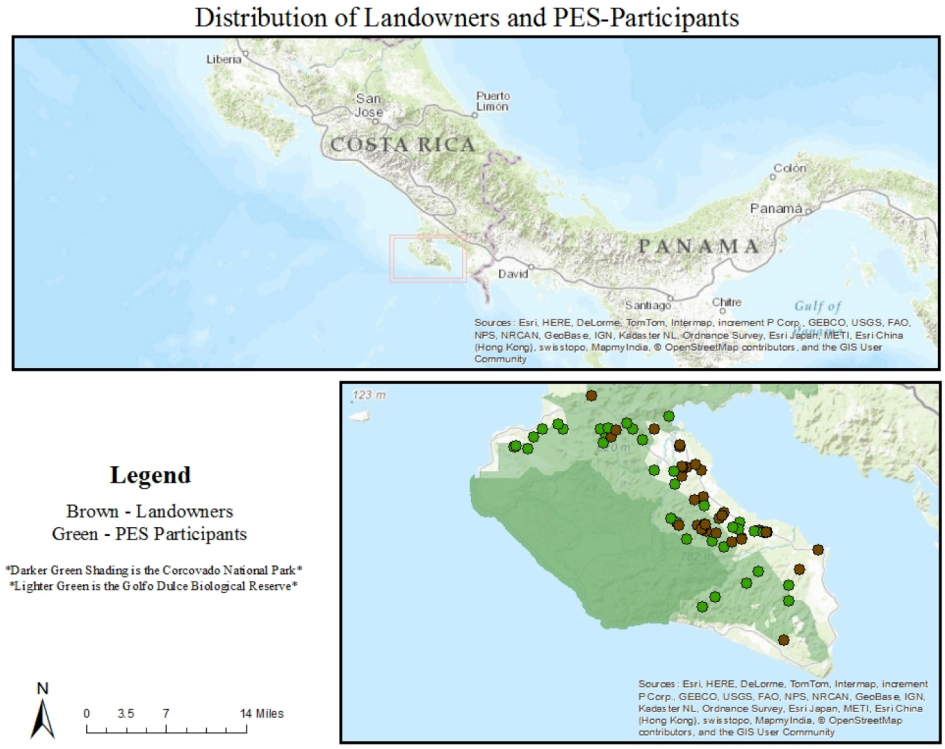

Figure 3. Distribution of Interviews

Another important factor is that, as seen in Figure 4, is that our study area borders one of the largest and most renowned national parks, the Corcovado National Park. Much of the surrounding land is considered a biological reserve and there are also biological corridors that traverse the region. I will speak more to the effects this has on landowners, as well as park administration in the resulting sections.

Results

Land use analysis, perceptions and opinions in relation to basic information were gathered from our interviews. There were four main points of interest that I highlight: 1) non-differences in education levels, 2) income and job discrepancies, 3) land uses and size, 4) and the general perceptions and opinions of PES programs.

Education and Income differences

Unlike initially thought, there actually are not large differences between those who participate in the program and their levels of education, with most of the people having less than a secondary tier education. Out of the 80 participants, 72% had less than a secondary education. This however does not mean that the other 28% completed secondary but they did at least start. Furthermore, of the 72% they did not necessarily go to school at all, one in particular had completed "3 months of [kindergarten]." Interestingly though, as Figure 5 shows, more people that are not participating in PES

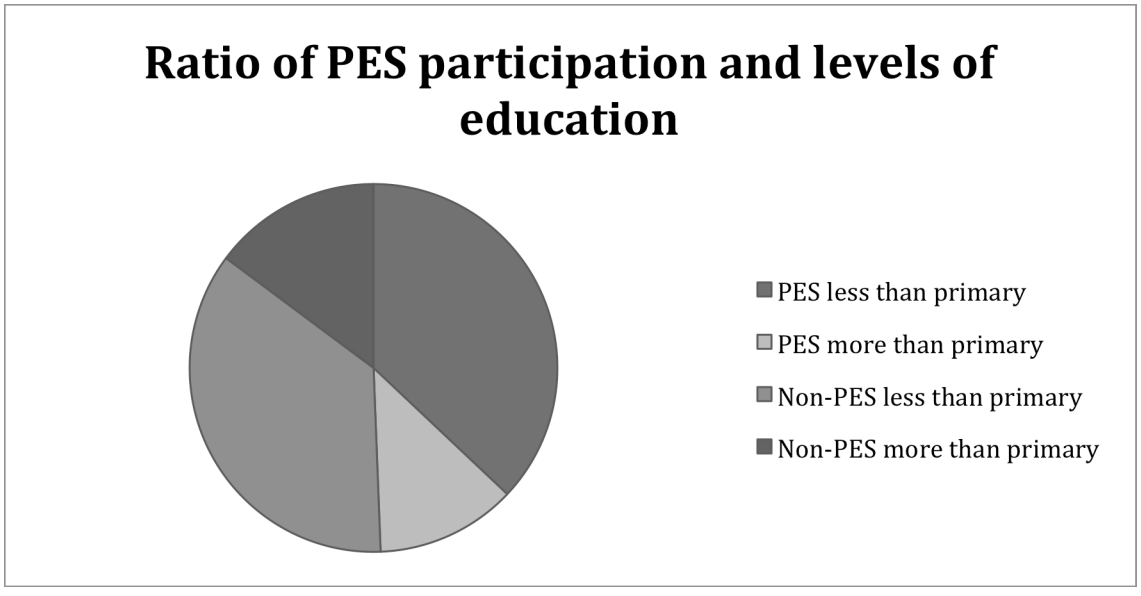

Figure 4. Level of Education and PES Participation

have more than a primary school education. That is to say that, from our sample size, higher education does not mean you are more likely to participate.

Another hypothesis that was disproved is that those who participate in PES are typically of a higher income bracket. Income was asked as an open-ended question directly to the participants, if a definitive answer was not given income was estimated based on follow-up questions. As Table 4 shows, there is actually an inverse relationship between average income levels between men and woman in relation to PES participation, with men PES participants making more on average then their non-PES counterparts, and women PES participants earning less than non-PES participants.

Table 2**. Average Income (with outliers)**

Men		**Women**	
PES	**Non-PES**	**PES**	**Non-PES**
$1,111	$759	$829	$1,107
Average Income (without outliers)			
Men		**Women**	
PES	**Non-PES**	**PES**	**Non-PES**
$1,111	$871[3]	$829	$1302[4]

We can see that when you remove outliers from Non-PES participants (landowners who reported they did not have an income because they farmed or traded for sustenance) the figures do not change that much. I don't believe we can say that on average, wealth does

[3] Two zeroes removed
[4] Three zeroes removed

not necessarily increase participation in the program, but that is a relationship to be further investigated and outside the scope of this paper.

Land size and uses

The size of the land however, does seem to have a noticeable impact on participation or not, in which those participating in the program have significantly larger plots. This has larger implications for the protection and conservation of forests, but does not actually give an option to those smaller farm owners.

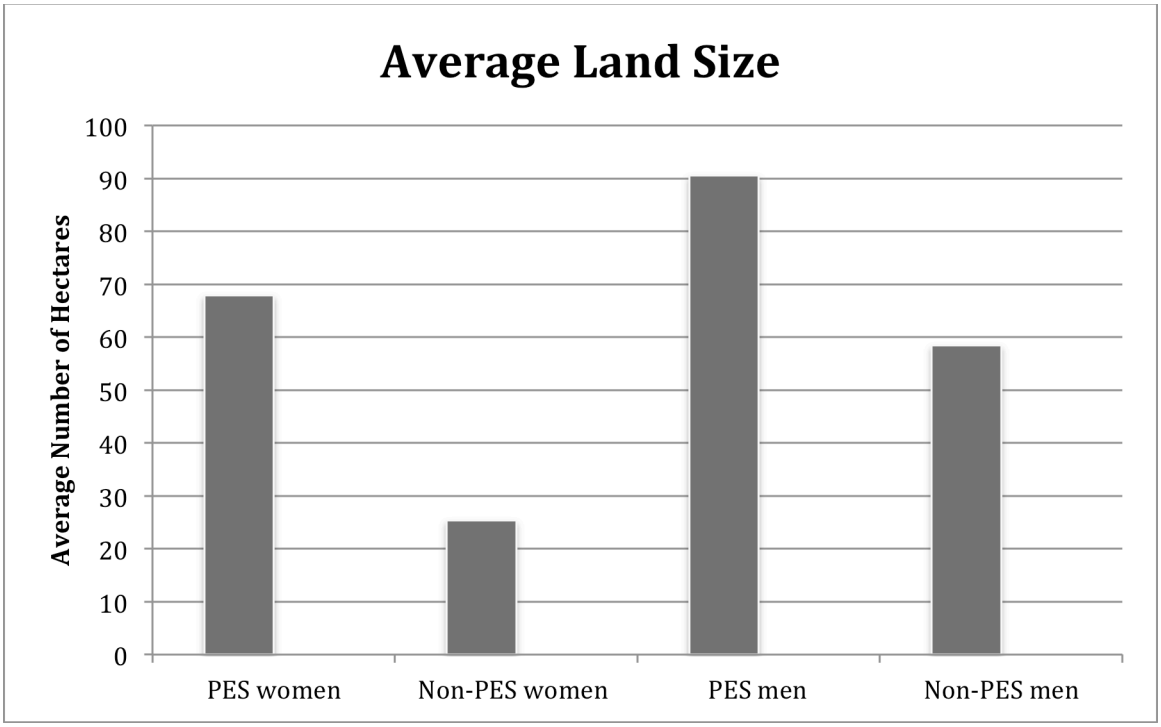

Figure 5. Average Land Size

An important distinction, relating to the discussion prior about land abandonment, is the amount of landowners who actually live off of their land, as opposed to those who have paid jobs and live in separate houses. Six of the PES-participants actually live full time in

the city and have paid jobs in addition to receiving PES payments for land outside of the city. However, 21 of the PES-participants also have paid jobs that can range from eco-tourism to the management of nearby soccer fields, and 29 of the 40 PES-participants live at least 11 months out of the year on their PES-contracted land. In contrast, only 12 of the non-PES participants have someone in their family with a paid job. Worth noting is the cultivation of Palm Oil by both PES and non-PES participants. Although this was not classified as a "paid job" it is an incredibly profitable industry. Table 5 shows this distribution: more non-PES participants cultivate Palm Oil, with about six times the amount of land in cultivation for this industry than PES participants. Many studies point to the increasing deforestation environmental degradation as palm oil production has skyrocketed in the last couple of decades (Koh, et al 2008; Fizherbert, et al, 2008; Wicke, et al, 2011). While many farmers seemed to believe palm oil production was attracting more wildlife to their property, the empirical data to support such claims does not exist. Although our study did not dive deeply into pal oil production in the Osa, I fear for the rapid increase in palm oil production in Costa Rica as any industry that contributes to extensive deforestation is going to have negative environmental repercussions. I do not have data beyond the statistics above towards how prevalent it is, but this severity of the situation in Indonesia and Malaysia in particular cannot be overlooked as the demand for palm oil increases globally.

Table 3. Palm Oil Cultivation					
Non-PES Participants			**PES-Participants**		
Participant	% Of Palm Oil	Total Hectares Owned	**Participant**	% Of Palm Oil	Total Hectares Owned
Couple 1	100	8.5	**Couple 1**	40	28
Couple 2	75	39			
Participant 1	50	13			
Participant 2	35	20	**Participant 1**	5	68
Participant 3	33	75			
Participant 4	25	36			
Total Hectares under Palm Oil Cultivation	85		**Total Hectares under Palm Oil Cultivation**	14.6	

****Couple used to show that although we spoke with both husband and wife, there is not a double count of the land use statistics**

Perceptions and Opinions

A fundamental component of our work was to understand the general perception of the PES programs from those who participated in the program. We asked, "Are PES programs an effective means for protecting the environment?" On a 4.0 scale, the average rating was a 3.2 which is a strong indicator that the participants believe it is having positive environmental benefits. However, when asked, "Are PES programs a useful form of income to farmers?" the response was not as strong. On the same 4.0 scale, the average

rating was a 2.5, an entire order of magnitude less than the effectiveness towards the environment. While unanimously the participants believe this is a step in the right direction, there are still complaints about the amount of money received by the farmers for these efforts.

In addition to these questions we investigated opinions of responsibility and knowledge of the environment on a whole. PES programs unite public and private sectors, small landowners and multi-national organizations by recognizing ecosystems and the services they can provide us are extremely threated without actions now. In our interviews we provided many options towards whom ultimately has the responsibility to care for the environment, such as property owners, the government, NGOs, or all together equally must work towards managing the environment. As Figure 7 shows, there were discrepancies between the responses of PES participants versus non-PES participants. On

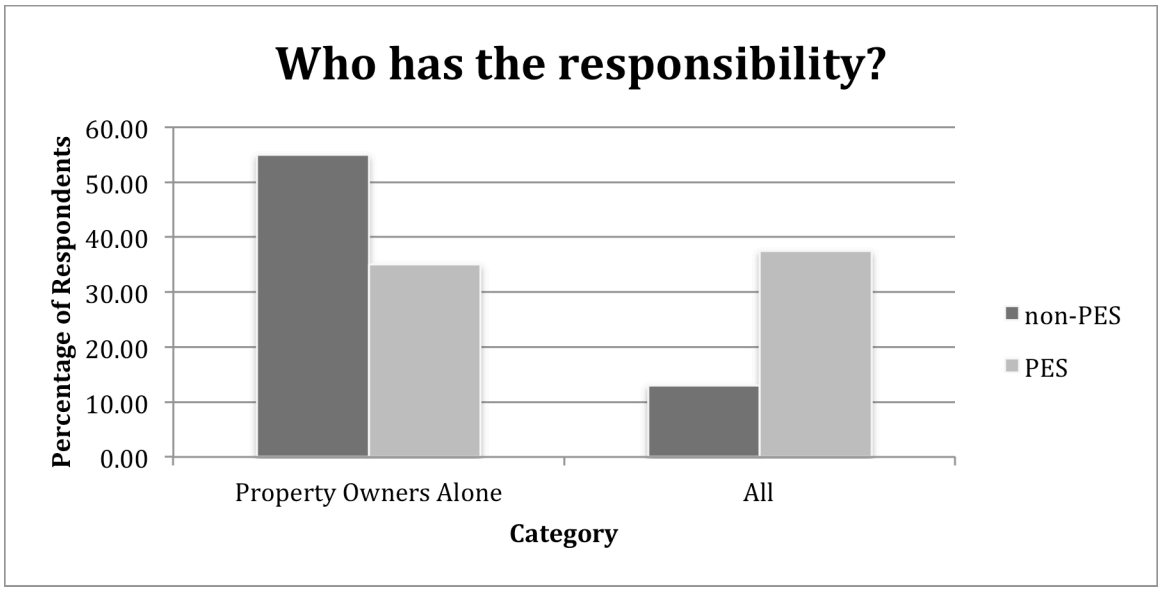

Figure 6. Who has the responsibility?

a whole, non-PES participants feel as though individual property owners have more of a responsibility than all stakeholders together as those who participate in the program believe. This inverse relationship could provide insight towards underlying reasons in initial participation in the PES-programs. If those who are participating believe that all sectors, property owners and government alike, have a role in protecting the environment they may be more likely to be involved in the government run program; whereas those who believe property owners alone have the right would potentially refrain from conservation program participation on any level. Last correlation to note is the responses towards questions towards general knowledge of the environment between men and woman. Although I expected that land owners would believe men knew more about the environment, I was surprised that both men and women unanimously agreed that both sexes have an equal understanding of the environment! With strong reporting of machismo, or male-dominated roles, within Costa Rica, the fact that women were given credibility towards these matters, which we typically associate as a male realm, is worth further investigation.

Land Owners Concerns:

We had the chance to listen and genuinely understand some of the major concerns of the landowners, and I will touch upon two major occurring themes beyond the list of questions. However, a in-depth discussion surrounding land tenure and ownership is beyond the scope of this paper, see writing by Stephan Pagiola or Gregory Schwartz for a thorough and much needed understanding of this issue to fully grasp the land owners' problems associated with the payments and land security at large.

First, interviewees unanimously believed, the exorbitant amount of fees and paperwork that accompany the initial application and continuation of PES payments are execrated as corrupt and exhausting. There is an interesting dialogue to be had as to why the average incomes between men and women are reversed, but still withholding is the higher incomes by PES participants. There also needs to be a high skill level of reading to complete the paperwork. However, to reiterate, I do not see much difference between the formal education with those who participate in the program and those who don't (Figure 5). Nonetheless, the amount of disposable money and time up front needed to participate in the programs is unsustainable. I would argue this marginalizes those who can participate.

Second, is the fact that the farmers are not paid on time. There have been instances in which the payments entirely cease. This makes it incredibly difficult for the payments to be seen as a reliable form of income. These extreme points of contention between farmers and governing bodies have perpetuated ideologies that governing bodies are inefficient and ridden with corruption. When asked if the governing body was effective in protecting the environment, although women were a little more confident, both sexes were wary and unanimously agree that they are not effective in helping the residents. Accounts of corruption and abuse of power were frequently described, but an important distinction should be made between those working in the centralized offices versus patrolling offices.

Throughout my time in Osa, I came to know many of the government officials. I had a positive relationship with those working in the MINAET office in Puerto Jimenez. Through multiple conversations about projects inside and outside of the office, I have colleagues that I believe I will work closely with in future years. While those in the administration have strong aspirations, they are underfunded. The amount of resources, (physical and technological) required for land use analyses, development of trails and corridors, as well as general oversight is lacking. The residents know this. They ultimately support the ambitions of the administration. Their greatest complaints are targeted at park rangers, who conduct a large range of unsupervised actions and abuse their power.

I experienced this first hand as I worked, informally, under a park ranger of the Corcovado National Park. Without knowing that all volunteers must be formally accounted for in the National Park system, I was able to shadow one of my friends' father who is a park ranger. This was during his 14-day deployment in various stations within the park. Due to fervent sexual harassment and discomfort with the amount of regulations ignored, I fled the park and returned to Puerto Jimenez after about nine days. There were distinct power systems, in which it was soon apparent which officials did not abide by the laws, and which officials acted with pride and respect for the environment.

For example, I witnessed days of pure fishing through pristine river channels that are closed off to the public. Government owned equipment was utilized in this highly illegal activity.

Although I attempted to rectify such disobedience with the central offices, I am unsure if any formal legal actions were taken. I fully empathize with Costa Ricans who have been subjected to this abuse of power and can appreciate the extent of such problems. While I must again qualify there were park rangers serving their position with honesty, there were those who are supposed to be on the forefront of environmental protection and are in reality are mistreating these fragile systems.

Environmental Policy Recommendations

Ultimately, there are a many points that need substantial improvement if we aim to serve the environment through this program. I have four major policy recommendations:

1. Target Contracts
2. Recognize and value water resources
3. Restrict types of trees planted
4. Monitor and Evaluate

A fundamental principle of conservation, or land management work in general, is the need to reduce fragmentation of forested areas. The disregard for this through the random distribution of PES contracts demonstrates the true lack of ecosystem rights and needs. Through my research, I have found no provisions that account for cohesion across watershed management or forest conservation contracts, to have a measureable impact on water filtration or decreased sedimentation and run off. On a password protected website, FONAFIFO released the distributions of contracts within their respective areas (Table 5).

Type of Contract	**Area <= 50 Ha**	**Area > 50.01 <=100 ha**	**Area > 100.01 <= 300 ha**	**Area > 300.01**
Forest Protection	244	103	135	42
Protection of Water Resources	94	16	11	7
Reforestation	70	32	30	7

Table 6. Number of Contracts per category by area
Source: FONAFIFO, 2014; password-protected information

It is pertinent to note that not a single study relating watershed management and PES programs has a consideration for how many hectares needed to be protected or reforested to have an impact on water quality or availability. In Costa Rica, as of 2014, roughly 80% of the water resource contracts signed were in areas less than 50 hectares. This presents large problems for effectiveness of a water protection component (FONAFIFO, 2014). Even within forest protection contracts (the most frequently signed) roughly 50% of the contracts are of an area less than 50 hectares, and only 0.08% for areas larger than 300 hectares (Table 6).

While the national implementation of the program is often praised, the ability for these initiatives to have quantifiable ecosystem impacts is challenging to measure, as there are also no national reports released on the spatial distribution of projects. It is yet to be determined whether this is fault of project design or the necessity for structural adjustments for the true motives of the program. Above all, a call for such provisions cannot be overstated.

Similarly, if water resources are truly a main program objective, we must understand the unique biophysical and geomorphological characteristics of each watershed that will

allow us to write policies that respect each fragile system. The link between forest management and the inherent watershed impact is very often overlooked. With an appreciation of their interconnectedness, I believe significant improvements can be made. Ultimately, watersheds adhere to no political or corporate boundaries and trespass socially delineated land uses. As one of the only components that are funded by individual downstream benefactors, Blackman and Woodward (2009) analyzed the motivations for such participation. Only one of the seven potential benefits proposed to the participants as a reason for their participation included the environmental services provided, while the others included improved relations with various stakeholders (Blackman and Woodward, 2009).

Although "80 percent of all interviewees chose 'forest protection and provision [of] environmental services' as the most important benefit of the program," it was noted that "green washing" could be a major factor influencing such response. (This is the integration of potentially environmentally positive practices by a company without an actual concern for the environmental benefits (Laufer, 2003)). Although the program allows plants to target upstream watershed to limit deforestation, manage erosion, or flooding, the program is still voluntary (Wünder, 2007; Ortega-Pacheco, 2007; Pagiola, 2005). Land users must apply, and be accepted to the program, for the services downstream to be received. With a higher demand than can be funded, this can pose a challenge for land connectivity, or give way to forest fragmentation, in a given watershed.

While there may not be reports that specifically analyze water services provided as a variable of PES, there are a few studies that use remote sensing to assess forest coverage (Sierra and Russman, 2003; Sánchez-Azofeifa, 2007). The protection of water resources is highly correlated to land use and cover, therefore reports in academic literature that do not focus wholly on this issue cannot be discussed as a true fault. However, both Sierra and Russman (2003) and Sánchez-Azofeifa (2007) conclude PES has little (well under 1%) to no impact on forest cover. Furthermore, Wünder (2006) highlights a handful of studies that find approximately 75% of land currently enrolled in PES would have been conserved or protected without PES contracts. In a similar vein, "0.08% of PSA contracted forest would have been cleared in the absence of payment" (Wünder, 2006). Reports such as these continue, most recognizing a minute correlation between forest coverage and PES, but ultimately concluding that a) extensive evaluations do not exist, and b) the findings that do exist are minimal at best.

Furthermore, no studies address the fact that a consideration for the types of trees planted is critical. True reforestation contracts actually mandate participants cultivate teak or molina, both non-native, yet highly profitable trees. Participants have the ability to plant any type of tree, native or not, for their reforestation contracts, and often take advantage of planting trees that grow quickly and can be cut for profit once the contracts are finished. Thus, the reforestation component is not actually contributing to the natural environments, or adding forested land (i.e. additionality), but rather contributing to global markets of teak and molina that are highly profitable. Every participant who we spoke with was growing teak through their reforestation contract. One could argue this may

have benefits for carbon sequestration, but ultimately this is extremely detrimental to the environment. It does not contribute to actual forest coverage increase or decreased soil erosion, and will have negative repercussions when the land is eventually cleared for cultivation of the trees.

Unequivocally, reports demand the need for empirical research and monitoring of the payments. Many studies highlight the fact that "no attempt [has been] made to quantify the delivery of [ecosystem] services," yet continue with evaluations of the public perceptions and impacts for reasons aforementioned (Wünder, 2006; Ortega-Pacheco, 2007; Blackman and Woodward, 2009; Pagiola, 2005). This lack of monitoring questions the importance of the four foundational environmental components of the PES programs as the economic and social successes, for example rural poverty alleviation, have been written about extensively.

Final Thoughts

Ultimately, I question the long-term plans of the Costa Rican (and international) government. If Costa Rica continues this process of urbanizing the population and expanding the national parks systems in which the majority of their territory is not being "used" by their people, where do they think that will get them? There is, in fact, a growing middle class and their population is largely urbanized, but, as we are seeing in the United States, we cannot have a population sustained on imported and processed foods. This "neoliberal" mindset that we need to consolidate might be to the advantage of

Costa Rica's conservation objectives, but harmful to the mental, political, financial, and physical health of their people.

As instrumental as policies are to progress, the direct relationships towards resulting environmental effects are difficult to make. As O'Toole points out, "policy makers do not generally call into question economic models…and [pressures] on natural resource" which should be instrumental to this process (O'Toole, 2014). Economics and needs of ecosystems are often at odds with one another, yet PES has potential to change this. As suggested by Sierra and Russman (2006), PES programs are just a stepping-stone towards a true free market of ecosystem services as a commodity. The positive and negative side effects of such are quite unclear; skepticism and optimism are in great tension as the program continues. There are many promising implications, and we must think of how to better structure policy to yield the environmental benefits, or ecosystem services, desired.

Although PES may have been borne out of national initiatives to incentivize protection of natural ecosystem services, the sincerity of such efforts is questionable. Conservation of resources can take many forms. Practices such as forest conservation or erosion mitigation can drastically improve water quality and availability. Clarity within projects and their respective funding is relatively impossible to come across. Furthermore, those projects that have specific water provisions are not monitored for success. For effectiveness in water quality and availability, as are the stated purposes, an emphasis must be on cohesion between the spatial distribution of contracts.

Mexico's sister program, Payment for Hydrological Environmental Services has a handful of evaluation and monitoring reports that provide scientific insight to achieve specific environmental protection goals (Alix-Garcia, 2012; Muñoz-Piña et al, 2005). Similar respect must be given to the unique biotic components within Costa Rica for an ability to properly manage and protect such resources. Without such provisions, the purpose of PES programs in Costa Rica cannot be stated as to promote ecosystem service conservation. To evaluate the environmental impacts, monitoring must be in place. I hesitate to agree with Büsher (2012) "the demand for profit will tend to trump positive social and environmental outcomes whenever it is at odds with them," but in this case it is hard to dispute. Costa Rica's PES programs have great potential for conservation and mitigation of environmentally detrimental practices. I believe that with minor changes such potential could be reached.

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