Understanding Linkages between Ecosystem Service Payments, Forest Plantations, and Export Agriculture

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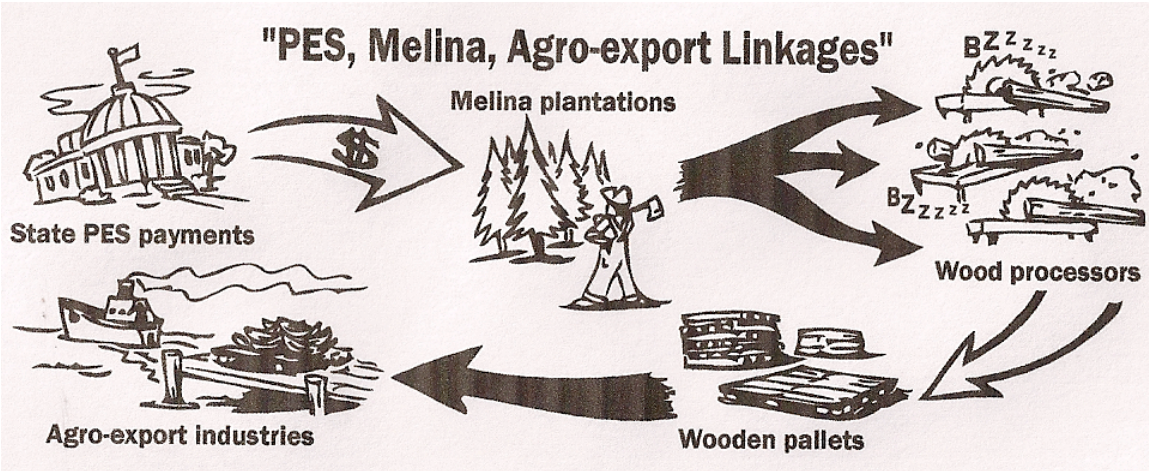
Graphical Abstract



Abstract
In this paper, I consider how and why payments for ecosystem services (PES) become embedded within a country's wider land use practices and economic sectors. To do so, I examine the linkages between Costa Rica's reforestation payments and the country's agricultural and forestry sectors. I first situate the rise of PES in Costa Rica within a changing political economy of land use by showing how it emerged during a period of drastic state policy changes toward forestry and agricultural sectors. This was an era that opened political space for PES, but largely left the economic organization of the country's forestry sector intact. Second, I examine the types of trees that have been planted due to the reforestation modality of Costa Rica's PES program, and how such trees are used across the wider economy. I find that most trees planted under this program are for the fast growing Melina (Gmelina arborera) tree, a species that is almost exclusively used for the production of wooden pallets for agricultural export. Such an outcome renders Costa Rica's payments for reforestation an indirect state subsidy for large agribusiness. I situate these findings within geographic and policy debates about PES and neoliberal environmental policy more broadly. I argue that the empirical results presented here have little to do with the policy's purportedly neoliberal features, but instead, derive from the policy's insertion within long standing patterns of agricultural production and land use.

1. Introduction

In 2008, Costa Rican president Oscar Arias declared that the country would become carbon neutral by 2021, making it the first developing nation to do so (Burnett 2008). This plan relies heavily on the country's system of payments for ecosystem services, in which forest stands linked to this policy will be leveraged to offset many of the country's greenhouse gas emissions from cars, trucks, and airplanes (Lovgren 2008). While some have expressed skepticism as to how far this carbon neutrality campaign can extend (Fletcher forthcoming), the government commission on standards is currently developing offset neutrality procedures for everything from cement plants to weddings (interview 2010). Whether or not such a campaign creates a space of carbon neutrality, it is clear that PES in Costa Rica is becoming integrated with other environmental policies and economic practices across the country in new ways.

Such a development points to key questions about PES that have only begun to be addressed by scholars: in what ways is PES embedded within wider, country-level policy and economic trends, why, and with what effects? In this paper, I address this set of questions by tracking the different economic and policy shifts that accompanied the rise of PES in the mid-1990s, and examine the ways in which one part of Costa Rica's PES program—payments for reforestation—has become integrated with the country's forestry and agricultural sectors. Specifically, I make three empirical claims in this paper. First, PES in Costa Rica arose out of a sustained period of structural adjustment policies heavily influenced by the World Bank and USAID. This was a process of neoliberalization that left the basic economic relationship between the forestry and agricultural sectors intact. Second, environmental service payments for reforestation have mostly gone to support the fast-growing Melina tree (*Gmelina arborea*), a species largely used to produce wooden pallets for use by agricultural exporters. This is a pattern that has rendered the reforestation modality of PES an indirect subsidy for large agribusiness. Third, this result is a consequence of PES becoming embedded within a forestry sector that is poorly articulated with the non-agricultural sectors of the economy.

While PES in Costa Rica is currently being mobilized for carbon neutrality, its relation to the country's forestry and agricultural sectors has produced results that run counter to the very philosophy that PES is supposed to embody. When the state makes a payment to a farmer for either leaving their land in forest (conservation), or for planting new trees on their land (reforestation), it is purchasing the rights to the environmental services (such as carbon sequestration) that such trees provide (Pagiola 2006). The state can then sell the rights to these services to "downstream" users. In the case of the country's carbon neutrality campaign, the rights to land users' carbon sequestration are currently being sold as carbon offsets to bus companies that carry around tourists, with hopes that eventually such offsets will expand to every sector of the economy that emits greenhouse gases (Dobles 2008). Close to twenty percent of such payments, however, go toward reforestation, and as I will show in this paper, such payments result in trees that become an input for highly industrialized, and carbon intensive, agribusiness.

Such an outcome of PES would appear to confirm some of the worst fears of PES critics, who have argued that the policy's grounding in a neoliberal policy discourse of commodification and markets will result in a number of undesirable and perverse outcomes (Corbera and Brown 2010; Kosoy and Corbera 2010; Lansing 2011; Bumpus 2011; McAfee 2012). This is an argument that has been applied not only to PES but also

to a diverse number of cases of environmental policy grounded in neoliberal principles of free markets, resource privatization, and commodification of nature (eg. Castree 2008). Recent assessments of PES, however, call into question the extent to which these neoliberal principles shape PES policy. Some have argued that, in some cases, PES-in-practice exhibits many qualities of a forestry subsidy and its implementation is not necessarily guided by the free market ideals of privatizing and commodifying the commons (McAfee and Shapiro 2010; Fletcher and Breitling 2012). Similarly, in their review of policy debates concerning PES, Dempsey and Robertson (2012) have shown how the discourse around PES is actually quite diverse, with some of its staunchest proponents advancing a policy vision that is an anathema to neoclassical concepts of fully marketized environmental services.

The presence of the state, of course, does not preclude the policy from having neoliberal features. Indeed, a key theme of scholarship on this topic is the often necessary presence of the state to render neoliberal policy prescriptions into practice. Further, heavy state direction in the present does not preclude a further neoliberalization of the policy in the future. As Matulis (2013) recently discussed in the Costa Rican case, the policy's market rhetoric has come to infuse recent efforts to link providers of watershed services to their literal downstream beneficiaries that reside within the same watershed. The result is a water "user fee" model where revenues from the fee must go to the upstream landowners within the same watershed from where the fee was paid. This is a process with the potential to produce a geographically constrained payment system that tends to favor landowners in wealthy watersheds, and thereby reproduce patterns of uneven development.

Given the heterogeneity in both discourse and practice of PES, and given the incongruous mix of neoliberal and non-neoliberal features the policy exhibits, this paper analyzes PES' relation to other sectors of Costa Rica's economy as a way to further clarify the extent to which the neoliberal features of the policy produce specific results. To do so, I consider two aspects of neoliberalization that are frequently linked to PES by scholars—commodification and privatization—and assess the extent to which they can be attributed to the policy's indirect support of export agriculture. I argue that, even if the rise of PES in Costa Rica can be read as a case of neoliberal policy transfer, the empirical consequences of the program's reforestation payments have little to do with these processes. Instead, the impacts of PES described in this paper are driven by how the payments, and the landowners that receive them, are embedded within long standing patterns and practices of forestry and agricultural production. These are practices that, in a number of key respects, remain largely unchanged despite the country's ten-year experience with structural adjustment policies in the 1980s and 1990s. This case points to the analytic limits of invoking commodification and privatization as tools for explaining policy outcomes. I argue that the linkages between PES, Melina planting, and pallet construction described in this paper were well entrenched prior to the arrival of PES, and processes of ecosystem commodification and privatization have little to do with their continued durability. In short, payments for reforestation have done little to transform patterns of land use and economic practice that are discussed in this paper. Instead, it is the opposite. Parts of PES itself have become transformed through its insertion into a long-standing relationship between the country's agricultural and forestry sectors.

To make this argument, the paper proceeds as follows. In the next section, I discuss scholarship on PES and neoliberal policy development. Next, I outline the paper's methodology and study site. Following this, I provide a brief history of Costa Rica's agricultural and forestry sectors since the 1980s, along with an explanation of how the country's PES program emerged in the 1990s. Then, I examine the results of the country's reforestation PES modality, and contextualize these results within the structure of the country's forestry sector. I end the paper with a discussion of why these results have occurred and offer a conclusion that draws out lessons for the Costa Rican case for understanding the development of PES more broadly.

2. PES and Land Use Transformation

Scholarship on PES is voluminous, however, most writings can be thought of as one of two types of analyses. First, there are largely technocratic studies concerning the efficiency of payments, in which the potential leakage, displacement, and additionality of PES in various contexts are evaluated (eg. Alix-Garcia 2010; Wunder 2006; Daniels 2010; Ferraro 2009). Such scholarship, for example, may use econometric tools to demonstrate whether a particular PES program is subsidizing existing reforestation trends or not (cf. Pfaff et al. 2008; Arriagada *et al*. 2010). Such work is primarily concerned with the impact of the policy as it relates to its immediate conservation and social goals. To date, few such approaches have addressed how land use trends that PES might (or might not) produce ultimately become embedded within other parts of the country's economy (but see Koellner *et al*. 2010).

A second strain of scholarship calls into question the ethical, political, and environmental appropriateness PES itself (eg. Kosoy and Corbera 2010; Büscher 2012; McAfee 2012). This more recent scholarship inverts the longstanding technocratic concerns of many economists, and argues that an efficient PES program is not necessarily desirable. Instead, such policies can produce negative long run social and environmental consequences such as increased rural inequality and land dispossession (eg. To et al. 2012; Wittman and Caron 2009), or produce environmentally problematic, single species tree plantations (Backstrand and Lovbrand 2006). Critical scholars, however, have only begun to examine how such patterns found at the level of the project come to interact with other forms of environmental and economic actors across the nation-state (but see McAfee and Shapiro 2010). PES type schemes are expanding rapidly worldwide, and thus becoming integrated with a number of diverse forms of economic and land use practice. Thus, an analysis of how and why such payments become embedded within wider economic sectors remains a critical, yet relatively under investigated, area of inquiry.

While grounded in concerns specific to PES, my analysis is also meant to address an issue that has occupied critical scholars of neoliberal environmental policy. That is: to what extent can we ascribe the consequences of this policy to its neoliberal features, and to what extent does the policy have neoliberal features at all? (eg. Castree 2008; Fletcher and Breitling 2012). In the case of PES, the policy mechanism clearly touches on at least two oft-cited features of neoliberal policy: commodification and privatization. These features have been well explicated by others (see Castree 2004; Mansfield 2008), and only require a brief introduction here. Commodification is the transformation of environmental processes into alienable goods that can be bought and sold for a price.

Even in the largely state-directed program in Costa Rica, commodification is a primary goal of PES, where the state's payments are meant to become "downstream" saleable offsets to either local or global purchasers. Scholars have shown how the process of rendering the nebulous notion of an ecosystem service into a measurable entity can result in reworked natures, such as ecologically simple wetlands (Robertson 2006) or geomorphologically suspect river reconstructions (Lave et al. 2010). Further, the social process of commodifying nature through policies like PES is often a political one that can potentially reproduce, or amplify, existing inequalities in resource access (eg. Corbera and Brown 2010; Kosoy and Corbera 2010; Lansing 2011).

Similar fears have been expressed concerning the closely related process of privatization as well. In the case of PES, privatization refers to the process of assigning property rights to specific functions of nature, where individuated, and closely spliced, conceptual rights are needed so that ecosystem processes can be bought and sold (Lave et al. 2010; Robertson 2012; Mahanty *et al*. 2012). This process itself has been sharply critiqued on the grounds that it renders publically held commons into private goods. Doing so, such goods will become excluded from marginalized populations (Harris 2009), and benefit well positioned actors who have the human and financial capital to access these new property regimes (Bakker 2007; Mansfield 2004).

Parsing the extent to which these neoliberal processes might produce specific social and environmental results is critical because PES is often justified and designed around these very market based principles of nature's commodification and privatization, In practice, however, PES policies rarely involve fully marketized services, but instead, function as centralized state-directed conservation incentives (see Wunder 2006; McAfee and Shapiro 2010; Fletcher and Breitling 2012; McElwee 2012). This policy reality has recently sparked a debate in this journal (Fletcher and Breitling 2012; Matulis 2013) over the extent to which PES-in-practice can be considered an instance of neoliberal environmental policy. Fletcher and Breitling (2012) have used the Costa Rican model to question the extent to which it is neoliberal, a charge which Matulis (2013) responds to by suggesting that the policy's conceptual grounding in market discourse, if not actual practice, has real consequences on the policy's assessment procedures and the geography of payments. Matulis suggests that the case of Costa Rica's newly developed "user fee" water tariff shows us how a policy's discursive grounding in neoliberal ideas can result in into further neoliberalized policy forms in the future. The engagement between Fletcher and Breitling, and Matulis, reminds us that a policy's discursive justification in terms of neoliberal principals can translate into variable forms of policy practice and implementation, even within the same country's policy. Thus, the Costa Rican case highlights the importance of parsing the causal effects between specific neoliberal ideas, and particular outcomes.

This can be a confusing exercise, however, because of the polysemous nature of the term "neoliberalism" (or its process-based variant: "neoliberalization"), and the fact that "ideal type" instances of neoliberal policy rarely exist. Instead, neoliberal policy forms often function as "hybrid" deployments that reflect a mix of the principles of market liberalism articulated with a pre-existing social landscape of institutions, norms, and politics. This is a reality that ultimately renders neoliberalization a process of "profound path-dependency" (Brenner et al. 2010, pg. 330). The current challenge thus becomes to examine the context in which neoliberal policies arise, and inquire into how

and why they take on the trajectories they do, and link parts of the neoliberalization process to particular outcomes. The goal of this paper, therefore, is to sharpen thinking about PES as neoliberal policy by considering whether specific aspects of neoliberalization are responsible for particular conditions, and to advance a broader argument about how to understand a policy's effects in the context of neoliberal policy development. Therefore, this paper tracks the trajectory of PES in Costa Rica by first understanding how this policy emerged out of a period of structural adjustment, and then examines its current linkages with forestry and export agriculture.

3. Methodology and Study Site

My findings and arguments are based on research conducted in Costa Rica from 2007-08, and 2011-2012. I conducted interviews with thirty subjects, many of whom were closely involved in PES formulation and implementation. These include managers and employees at the National Forestry Financing Fund (FONAFIFO; the quasi-state agency that manages PES), employees associated with closely related government ministries, employees of forestry NGOs that enroll landowners in PES as well as experts on the country's forestry industry. I also interviewed members of environmental and peasant organizations that have historically been opposed to PES. Interviews were centered on the relation of PES to the forestry sector and the history of PES policy development. In addition to qualitative work, I utilize a number of statistics and assessments concerning the country's forestry and agricultural sectors that are available through state institutions and industry trade groups. These statistics are used along with data provided by FONAFIFO concerning payments and recipients. My empirical claims about the trees that result from reforestation payments come from data provided by FONAFIFO's San Carlos regional office, which covers PES implementation in the country's North Caribbean plain, otherwise known as the Huetar Norte region.

I utilize data from the Huetar Norte region of the country because it is, in many ways, home to the country's forestry industry as it contains the most sawmills and the most hectares in plantation forestry (Arce and Barrantes 2004; Barrantes et al. 2009). It is also the region with the second largest number of PES payments in the country and has been the focus of some of FONAFIFO's most coordinated efforts at PES implementation to date (FONAFIFO 2008; Daniels 2010). It also contains a dynamic mix of smallholders, forestry plantations, large agricultural plantations, and cattle ranches (Miranda *et al*. 2004; Lansing *et al*. 2008), with a well-developed NGO infrastructure for assisting landowners in enrolling in PES. In short, it is one of the most diverse and active areas of PES implementation in the country.

4. Debt, the death of the social welfare state, and the rise of PES

In July 1981, one year before Mexico's famous debt default, Costa Rica declared a moratorium on its debt payments. In 1982, the recently-elected president Luis Alberto Monge signed a $100 million International Monetary Fund (IMF) loan, which came with conditions that the state would cut public-sector spending, raise taxes, interest rates, and utility rates (Honey 1994; Marois 2005). This began a long process of deep recession, and three rounds of World Bank structural adjustment loans in 1985, 1988, and 1993. Costa Rica also received large infusions of U.S. foreign aid (second highest per capita in the world, after Israel) during this time (1982-85; Edelman 1999). The aid money helped to

blunt the effects of the economic recession while simultaneously granting the United States Agency for International Development (USAID) outsize influence on state policy (Sojo 1992).

Both USAID and the World Bank, and also the IMF demanded a number of dramatic changes to the state's role in the economy. World Bank money was directed towards shifting Costa Rican industry toward new export markets. This was a policy prescription that demanded lower tariffs, tax breaks for investment, and devaluation of the currency—the *colón*. It also entailed eliminating a suite of agricultural subsidies such as crop price supports along with production credits, limits on food and machinery imports, and subsidized consumer prices for subsistence goods (Vunderink 1990). During this time, USAID also established a number of "parallel state" organizations to promote non-traditional exports and to buy out state-sector companies (Cerdas 1991; Shallat 1989; Vunderink 1990). The partial dismantling of state development institutions through structural adjustment intersected in uneven ways with the country's agriculture and forestry sector. The social and economic contours of these changes helped create the political economic context by which Costa Rica's PES program, and the subsequent effects of its reforestation modality, has come about. Below, I discuss the salient changes to the agriculture and forestry sectors during this time and how PES emerged in this context.

4.1 Agriculture sector

Prior to Costa Rica's debt crisis agriculture was one of the country's largest economic sectors, and the largest earner of foreign exchange. In 1975, agriculture was roughly tied with industry as the number one sector contributing to GDP (at 20.3%) and agricultural exports accounted for 59.2% of the country's exports that year (Guess 1979). While banana and coffee have historically been the country's primary export crops (Hall et al. 2000), post-World War II development strategies were geared toward diversifying the economy. This led to state efforts to increase the production of different crops, and new social relations of agricultural production. For example, the state helped create a number of agricultural cooperatives for food production as well as providing price supports, crop insurance, and subsidized credit (Edelman 1999; Vermeer 1990). This ultimately lead to large networks of state support for small and medium-sized farmers, as well as the expansion of new agricultural industries such as sugar production in the 1960s, and cattle ranching in the 1970s (Guess 1979; Sojo 1992; Edelman 1999).

The structural adjustment process that began in the 1980s meant that state supports for small and medium-scale landowners were phased out or reduced (Vermeer 1990; Vunderink 1990). Their production was substantially displaced by an influx of subsidized grains via USAID's Public Law 480 program (Honey 1994). Concurrently, the Oscar Arias administration's new agriculture policy called *agricultura de cambio* (agriculture of change) was introduced. The former policy was meant to displace "uncompetitive" farmers out of producing basic grains, while the latter was a suite of reforms designed to promote exports of "non-traditional" crops (ie. crops other than coffee, banana, or sugar), and primarily included incentives such as reducing commercial taxes, setting preferential interest rates for export products, and government technical support for non-traditional crops (Vunderink 1990; Honey 1994).

In many ways, the *agricultura de cambio* strategy was a "success" as the Costa Rican agricultural sector did indeed expand into nontraditional export crops such as pineapple, mangoes, and cut-flowers (Cerdas 1991; Edelman 1999). These developments, along with a revitalized banana industry, led to an agriculture sector that increased in size and diversified internally. From 1990 to 2008, the agriculture sector grew an average of 2.3% per year, and in 2002 pineapples supplanted bananas as the country's number one agricultural crop (SEPSA 2009). These changes in the agriculture sector, however, occurred in a context where agriculture became less important to the country's economy overall. For example, agriculture's share of the country's GDP was 18% in 1990 but by 2008 had declined by half to 9%. Today, manufacturing (23% of GDP), tourism (17%), and service industries (eg. call centers; 15%), all have a larger share of the country's GDP than agriculture (statistics derived from Estado 2009).

4.2 Forestry Sector

While many state supports for agriculture were being shifted from small producers to larger exporters in the 1980s, state involvement in the forestry sector was just beginning during this period. Compared to its role in other sectors of the economy, the state historically had very little involvement in the forestry industry (Brockett and Gottfried 2002). Prior to the 1980s, there was little state credit for primary forestry producers and Costa Rica, despite its high rates of deforestation, was a net importer of wood in the 1970s (Guess 1979; Hall et al. 2000). In general, the forestry industry in Costa Rica during this period was characterized by decentralized production, with a collection of small producers and processers (Brockett and Gottfried 2002; De Camino et al. 2000) who had few substantial links to other sectors of the economy (Silva 1997).

While Costa Rica lacked a large, vertically integrated forestry industry, the country nevertheless suffered from some of the highest rates of deforestation in the world during the 1960s, 1970s and 1980s (Sader 1988). The state's first response to this trend was the country's first forestry law in 1969, which established the general forestry directorate as a part of the ministry of agriculture, and led to the implementation of a tax credit for forestry in 1979 (Brockett and Gottfried 2002). These modest measures did little to stop deforestation, however, and in response to continued, alarming deforestation trends, a new forestry law was passed in 1986, which resulted in the Ministry of the Environment and Mines (MIRENEM), and transferred forestry activities to the new ministry's purview (Navarro and Thiel 2007).

The new law meant a number of significant changes for landowners. Whereas previously forestry was relatively unregulated, the 1986 law included a number of top-down regulations that made it more difficult, and expensive, to cut down a tree. Landowners were required to obtain a permit for logging, a process that obligated the landowner to produce a detailed management plan that took an inventory of the size of individual trees, the distribution of species on their land, and a long-term harvesting plan that showed the sustainability of the landowner's intentions (Brockett and Gottfried 2002; Navarro and Thiel 2007). Each plan needed to receive approval from the forestry office, with the landowner paying taxes on each tree felled. In theory, such a management plan would ensure a sustainable harvest of trees. In practice, the permit and tax system for managing and accounting for the country's productive forests was widely regarded as

counterproductive, with widespread cases of illegal felling and forged documents (Brockett and Gottfried 2002, 19).

In 1988, the Rural Forestry Development Department (DECAFOR) was formed within MIRENEM in order to implement a new suite of forestry subsidies. These included Forest Advance Payment Titles (CAFAs), the Forestry Development Fund, Forest Bond Certificates (CAFs), and the Fund for Forestry Development (CPBs), programs in which landowners would receive an advance payment at the beginning of a reforestation project. Where previous subsidies were tax credits directed towards large landowners, these subsidies were direct payments for production, and were more explicitly directed toward small and medium-scale landowners (Zbinden and Lee 2005; Navarro and Thiel 2007).

In short, while the forest industry was relatively small and politically weak, the alarming rates of deforestation in Costa Rica meant that this sector saw an expansion of state support in the form of subsidies and an increase of state involvement in regulation. This came during a time of sharp state retrenchment in other sectors of the economy, and occurred with little involvement or oversight from the World Bank and USAID. This pattern, however, began to change in the early 1990s when these powerful transnational actors began to turn their sights toward reforming the country's forestry sector.

4.3 Birth of PES

In 1993 the World Bank published a forestry sector review for Costa Rica (World Bank 1993). In it, the report concluded that forest regulations needed to be decentralized, state-subsidies for forestry needed to end, and trade controls on wood needed to be phased out (Brocket and Gottfried 2002; see also Kishor and Constantino 1993). Similarly, USAID was pushing for forestry reform along more market lines, and worked to organize the forestry sector into a more cohesive political force, eventually creating the Chamber of Costa Rican Foresters, and an influential, market-oriented NGO called FUNDECOR in 1989 (de Vos 2003). With the creation of the Chamber, the forestry industry had, for the first time, an overt lobbying arm. And with the creation of FUNDECOR, USAID was also able to establish a pilot case for market-based forest conservation, where the organization promoted commercial forestry by landowners by providing an advance payment for future tree harvests. The basic idea was that by promoting commercial forestry among landowners, it would prevent outright deforestation (de Vos 2003). Such moves to reorganize the forestry sector along more market lines were further catalyzed when the World Bank's third structural adjustment loan in 1993 carried conditions that required many of the free market reforms outlined in its forestry review be put into action (Silva 1997).

These efforts at remaking forestry in Costa Rica culminated in the in 1996 passage of forestry law 7575[1]. The law decentralized state involvement in forest regulation by creating National System of Conservation Areas (Spanish acronym: SINAC), a sub-directorate of the Ministry of the Environment, which divided the country into eleven conservation zones. Each zone is meant to be autonomous in its financing and administration, and covers the regulation of national parks, wildlife protection, and

[1] I do not have space to properly engage with complicated political history behind the new forestry law. For more on this see de Vos 2003; de Vos 2007; and Silva 1997.

forestry activities. The law also increased the input of industry into policy through the creation of the Office of National Forestry, deregulated the activities of forestry plantations by eliminating special permits for harvesting, transporting, and exporting timber. It also phased out established subsidies for forestry (Brockett and Grottfreid 2002). The new law did, however, still maintain a number of regulatory controls similar to the 1986 law. For instance, the felling of trees still required permits and the payment of stumpage fees (Navarro and Thiel 2007). Most significantly, this law resulted in the creation of the National Forestry Financing Fund (Spanish acronym: FONAFIFO), a quasi-state agency in charge of distributing newly-established forestry payments for environmental services (PES) resulting from forest conservation and reforestation (Castro et al. 2000).

While in practice PES relies on heavy state involvement, where revenue from a 3.5% gas tax is used by FONAFIFO to disburse payments to farmers, it differs from previous state forestry subsidies in important ways. First, the payments are grounded in a market discourse in which downstream beneficiaries of environmental services should compensate "upstream" land users that provide such services. Second, because the policy is grounded in a discourse of environmental services, the types of payments were broadened to include payments for naturally regenerated forest (as opposed to only forest plantations in the earlier subsidies) (Castro et al. 2000). Payments for forest protection is by far the most popular type of PES contract, constituting 67% of all PES contracts countrywide between 1997 and 2008 (Porras 2010, 10). Compared to reforestation payments, the payment is smaller, currently $64USD per hectare per year. Forest protection, however, requires little upfront investment or labor from the landowner, who simply has to keep his land out of production for a period of five years (changed to ten years in 2012). The second most popular payment type (explored below) is payments for plantation forestry (ie. reforestation). These payments are larger ($980 USD/ha in total) and require the landowner to maintain their trees for a period of fifteen years. Contracts under the reforestation modality comprise 18% of all PES contracts countrywide between 1997-2008 (Porras 2010, 10)[2]. The following analysis is therefore directed toward a smaller part of the program, and is not applicable to the program in its entirety.

5. The Ecologies of Payments for Reforestation

In this section I consider the results of the reforestation modality of Costa Rica's PES program. I show how most reforestation payments go toward plantings of the Melina tree, and I show that almost all Melina trees are used to make wooden pallets that are used by export agriculture for shipping. In this way, PES payments for reforestation have become an indirect subsidy for plantation agriculture. I explain these findings by arguing that this is the result of a state policy's insertion within a relatively weak forestry sector that has few linkages to the broader economy.

PES reforestation data from FONAFIFO's San Carlos office shows that reforestation payments in this region appear to reproduce forestry patterns countrywide, in which the majority of trees planted are Melina trees. Between 2003-2005, 57.7% of the area of PES reforestation projects was dedicated to Melina plantings (see Figure 1). This

[2] The amount of money disbursed for reforestation contracts comprise 21% of all PES funds allocated during the same period (Porras 2010, 10).

pattern mirrors trends in the forestry industry as a whole, where about 58% of forestry plantations are in Melina (see Table 1).

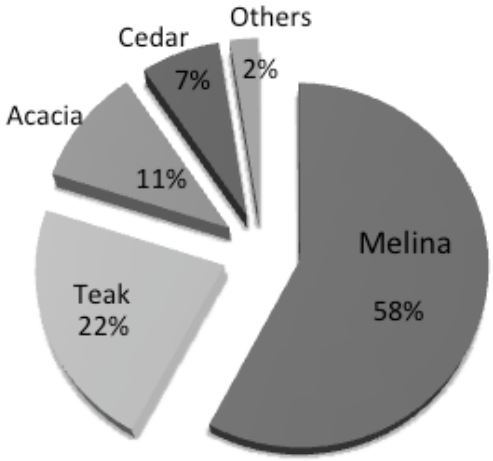


Figure 1: Distribution of species planted under PES reforestation contracts, Huetar Norte region, 2003-2005. Source: FONAFIFO, San Carlos Regional Office

Year	Total Timber (m^3)	Timber for Pallet (m^3)	Percent of total timber for pallet	Percent of plantation timber for pallet
2005	1,018,569	400,000	39.2%	60%
2006	1,130,232	470,000	41.6%	58%
2007	1,339,140	573,028	42.7%	59%
2008	1,229,331	536,624	43.6%	58.5%

Table 1: Yearly share of cut timber for pallet production 2005-2008.
Sources: Barrantes et al. 2009; Barrantes et al. 2008; Barrantes and Salazar 2007; Barrantes and Salazar 2006

Melina is a fast growing deciduous tree originally from South Asia that was introduced in Costa Rica in the late 1960s (Roque 2004). Since then (1975-2000) over 65,000 hectares of Melina were planted, making Costa Rica responsible for roughly 6% of all commercial Melina plantings worldwide, and the country with the largest percentage of its territory (approx. 1.27%) dedicated to this tree (FAO 2002). The tree itself is can grow as high as 30 meters and produces wood capable of variety of uses from furniture to construction. For use in construction the tree is ideally harvested at around 12 to 14 years of age, depending on the site on which it is grown (Roque 2004). As the first Melina plantations from the 1970s began to mature, a new supply of wood became

available in Costa Rica in the early 1990s. During this time changes in the law regarding pallet construction allowed for Melina to be used for this end (FAO 2002; MEIC 1990). As a result, the price of wooden pallets fell by 40% over a period of three years (Alfaro 2000; Roque 2004). Since this time, the supply of Melina in the country has been somewhat erratic, but in general, there has been a greater supply of Melina than there are mills to process it (Roque 2004).

While there is no exact statistic available that shows to what ends Melina plantings are used, it is widely regarded by those in the forestry community that most Melina plantings ultimately become wood for pallet production (interviews with forestry officials 2007; interview with forestry NGO representative 2010; see also Arce and Barrantes 2004). Today, pallet production is the number one use of cut timber in the country (Barrantes et al. 2009). From 2005 to 2008, for example, pallet production consumed close to 40% of all harvested wood per year, and around 58% of yearly harvested wood that came from forestry plantations (see table 1 for precise, year-to-year figures). The vast majority of pallets are used to ship agricultural exports. In 2008, for example, 80% of the 5.3 million pallets that were produced were for agricultural export products (Barrantes et al. 2009). Pallet production so dominates the forestry industry of Costa Rica that the National Forestry Office notes that the country's substantial trade deficit in forestry products would be a surplus if the exportation of pallets were counted as a forestry product, not an agricultural one (see Barrantes et al. 2009, pg. 26).

These figures on pallet production are significant because, while not all Melina trees become pallets, virtually all pallets in Costa Rica are made with Melina (Arce and Barrantes 2004; interview with forestry official 2007; interview with environmental NGO 2009; interview with forestry NGO 2012). There are a number of reasons for this. For pallet production, the tree diameter can be smaller than if used for construction, meaning the Melina tree can be harvested as early as five years of age, rather than the 12-14 years needed for higher quality wood (FAO 2002; Roque 2004). This quicker harvest time means a faster turnaround time for a landowner's investment, making Melina the preferred tree for landowners with timber plantings (FAO 2002). In addition, tree quality can be lower for wood to go toward pallet production, requiring less labor in maintaining tree plantings, and allowing for Melina to be grown profitably in less-than-desirable agroecological conditions (Roque 2004). Finally, tree plantations typically undergo tree thinnings every two to three years, in which smaller trees are harvested to allow the remaining trees room to grow (interview with landowner 2012; interview with forestry NGO 2012). The trees that result from this process are often small, and their wood is usable only for pallet production. The result of all of these factors has been, since the 1990s, a glut of low quality wood whose ideal purpose is for pallet construction (Roque 2004)[3].

Based on available evidence, a number of conclusions about the connections between Melina, pallet production, and PES can be drawn. First, given that Melina trees are almost exclusively used for pallet production, and given the importance of pallet production to the forestry industry, one can reasonably infer that the Melina tree

[3] Since PES contracts are for fifteen years, PES recipients are not legally allowed to take advantage of the fast growth rate of Melina, however, they would be able to take advantage of the wood made available through "thinnings".

dominates the forestry industry in Costa Rica, with Melina primarily serving as an input for export agriculture. Second, PES data from FONAFIFO indicates that farmers entering into reforestation contracts are planting Melina at roughly the same rate as the industry as a whole. The result is that PES contracts for reforestation are becoming an indirect subsidy for large agribusiness.

At this point I wish clarify my argument about the relation between PES and plantation agriculture. First, PES payments for reforestation are not subsidizing plantation agriculture directly. In fact, it is currently unclear whether PES payments are producing any real changes in land use at all. A number of studies, both countrywide (eg. Pfaff et al. 2008; Sanchez Azofeifa et al. 2007), and in specific regions (eg. Sierra and Russman 2006), have indicated that reforestation patterns are not correlated with the implementation of PES (although these finding have been contested, see Daniels et al. 2010 and Morse et al. 2009). Given that it is unclear whether PES can produce new forms of forestry, and given that patterns of Melina plantings and pallet production existed prior to PES, it is reasonable to infer that that PES is not necessarily responsible for creating the landscapes of Melina that have come to dominate forestry in Costa Rica. Instead, I argue that this is a case of PES becoming caught up in a wider political economy of the forestry sector, and its relation to large agribusiness, which has resulted in forestry being dominated by pallet production. In this context, payments for reforestation have become indirect subsidies for plantation agriculture.

5.1 PES and the Forestry Sector

If PES' linkages with the country's forestry sector have rendered its payments for reforestation as a second order subsidy for plantation agriculture, how then can we characterize the political economy of the forestry sector? In this case, the dominance of pallet production in forest products is a symptom of the forestry sector's relative weakness in relation to the agriculture sector, as well as the sector's weak linkages to the rest of the economy. Rather than a sector in which tree production and processing are tightly integrated, the sector is largely composed of small, disbursed producers and independent sawmill processors (Watson et al. 1999; Miranda et al. 2004). This dispersed production network has, thus far, failed to create strong linkages to rising sectors of the economy such as construction and tourism. Instead, the forestry sector has largely remained a provider of pallets for export agriculture, or as exporters of low value wood products.

While the industry is grounded in smaller producers, it also largely takes place on more marginal lands. To date, there has been little systematic empirical work on how agriculture and forestry sectors directly compete for land, however, interviews with forestry NGOs indicate that, in areas where there is relatively easy access to roads, and the growing conditions favor agriculture, crop production will often displace timber production (Interview 2007, Interview 2008). One forester expressed his frustration to me concerning the difficulty of establishing forestry projects in his area:

> There is a very strong competition for land use these days. It is very strong, with oranges, everything you can grow in this zone, banana, yucca, and now there is pineapple, which is the toughest one (to compete with) around these parts." (Interview with forestry professional 2007).

Because of their higher returns, cash crops have an advantage on fertile lands over forestry[4]. Marginal lands not well suited for agriculture, however, saw a dramatic expansion of forests in the 1970s and 1980s. Previously, cattle grazing was a chief land-use competitor with forestry and was one of the primary reasons for the country's high deforestation rates (Hall et al. 2000). The worldwide collapse of beef prices in the 1980s, however, resulted in increasing rates of reforestation across the country, mostly on marginal lands unsuited for agriculture where pasture has given way to secondary forest (Lutz and Daly 1991).

One result of these forestry patterns is that forest product quality and consistency has always been low within the sector. For example, Martinez et al. (1994) estimate that forestry subsidies from the 1980s resulted in plantations in which less than 17% of timber from plantations as of "good quality". Similarly, Torres (1995) estimated in the mid-1990s that only half of all plantations produced acceptable timber for industrial use. These trends continue today, and some evaluations of PES have estimated that 50 to 75% of PES-funded plantations from the late 1990s have failed to produce any industrially usable timber (Baltodano 2008).

Such statistics are indicative of the extent to which the forestry sector has been unable to take advantage of growth in other areas of the economy. Tourism and manufacturing are now tied for the country's leading industries, yet it appears that growth in these sectors have not increased production in the forestry sector. Imports of high-value "finished" wood products have soared 400% since 1999 (Barrantes et al. 2008). Forestry exports from Costa Rica are largely raw wood or low-value products like particle board (which comprised 72% of all wood exports in 2008) with higher value products such as cut timber and furniture comprising only 15% of all exports (Barrantes et al. 2008). The result is that the forestry sector has seen a growing trade deficit since 2004, most of which is attributed to the growing demand for finished products such as furniture and cut wood (Barrantes et al. 2008). Meanwhile the bulk of the industry remains as an in-country supplier of agricultural inputs. These are all features of a forestry sector that remains as a subsidiary of an agricultural export enclave, or an exporter of raw wood products itself, but one that lacks meaningful linkages to the domestic wood demands of other sectors of the economy.

This result—that PES for reforestation primarily funds Melina trees for pallet production—demonstrates the limits of what climate change mitigation policies such as PES can accomplish. Payments for reforestation are ostensibly producing carbon-sequestering trees, but such trees become inputs for large agribusiness. By becoming an indirect subsidy for plantation agriculture, PES occupies a contradictory position. On the one hand, reforestation payments are supposed to support carbon sequestration in the biomass of trees for fifteen years. Once this period is over, however, this same biomass becomes a support for a carbon-emissions intensive, and ecologically harmful industry. It is not my intention in this paper to assess the total climatic impact of the Melina tree throughout its lifecycle. Instead, my goal is to call attention to the ways that the effects of ecosystem service payments do not stop at the landowners' soil, but continue on in

[4] As many of my interlocutors pointed out, and as the quote above illustrates, PES payments are too low to change this dynamic between cash crops and forestry.

diffuse ways to sawmills, shipping ports, boats, and grocery stores. Understanding how and why ecosystem service payments become caught up in such circuits of production and consumption have rarely been attempted by researchers, and is a point that deserves further scrutiny in other cases worldwide.

This result also shows the limits to the extent to which transnational actors can influence neoliberal policy outcomes. Despite the strengthened state support for the forestry industry since the mid-1980s and the country's generally positive reforestation trends, the forestry sector as a whole remains weak, and is mostly dedicated to providing low value wood products for large agribusiness. Situated in this context, the high percentage of FONAFIFO's reforestation payments that go toward Melina plantings are a symptom of the sector's relatively weak linkages to the rest of the economy, where expansion in sectors such as tourism and manufacturing fail to stimulate new patterns of production on other industries. Instead, the forestry sector remains as it always has: primarily a subsidiary of export enclaves of large agribusiness concerns, a practice that is now increasingly supported through PES.

6. PES, Neoliberalism, and State-Economy Relations

How did more than a decade of dramatic changes in Costa Rica's economy and state policy result in a PES modality that acts as a state support for one of Costa Rica's oldest industries? PES is often posited as a "cutting edge" policy: one that is now being mobilized in ways that are meant to remake large parts of the country's economy and environment into spaces of carbon neutrality[5]. Such dramatic policy shifts, however, do not necessarily translate into significant changes on the ground. In this case, for example, parts of PES have become incorporated into a sector of the economy (plantation agriculture) that is older than the country of Costa Rica itself. While the World Bank and USAID were no doubt important in ushering in a PES program that was grounded in a discourse of market incentives, these efforts did not fundamentally alter the basic dynamics of how the forestry industry functions. And it was the political and economic trajectories of the forestry and agriculture sectors that ultimately created the conditions that helped create the PES patterns discussed in this paper.

In this case, reforestation payments have become an indirect subsidy for plantation agriculture because reforestation payments have become embedded within a historically weak and decentralized forestry sector. During Costa Rica's period of structural adjustment, a number of actors—the state, USAID, and the World Bank—implemented subsidies and programs meant to grow the country's forestry sector. Despite

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[5] Costa Rica's greenhouse gas emissions have increased since Arias' proclamation (Fletcher forthcoming). It is difficult, however, to quantify the extent to which PES might be offsetting these emissions. This is because the extent to which PES is responsible for the country's reforestation trends is unknown. Some scholars have suggested that PES has little to do with the country's reforestation patterns (eg. Sierra and Russman 2006; Sanchez-Azofeifa *et al*.; Pfaff *et al*. 2008). Others (eg. Arriagada *et al*. 2009; Morse *et al*. 2009), however, have pointed to cases where the policy is likely the causal mechanism that produces additional forest cover. Reconciling such disparate conclusions is difficult as each of these researchers employ different methodologies and scales of analyses (see Daniels 2010).

these efforts, the sector today remains on the margins of the economy, unable to take advantage of domestic demand for wood, and exporting mostly low value products. Its history of decentralized production and a reliance on a dispersed collection of small, primary producers continues today, resulting in an industry that serves the input needs of large agribusiness (ie. growing Melina trees for wooden pallets). Situated in this context, the empirical patterns of reforestation payments presented here are a symptom of this policy becoming integrated with a fairly marginal industry.

While the results presented here are a symptom, not a cause, of the relations between PES, the forestry sector, and agribusiness, they offer a slightly different way of understanding the development of PES as a neoliberal environmental policy than is often presented in the geographic literature. To understand what is, and what is not, neoliberal about these results I wish to distinguish between two ways of understanding PES as a neoliberal policy: a) the immanent features of neoliberal policy and b) neoliberalism as a political economic process external to the policy itself. The former refers to the internal conditions of a specific policy. For PES, these include the processes of commodification and privatization. For some critics of PES, such internal features are the target of their critique, as they argue that, for example, the process of commodification is the causal mover behind outcomes such as inequality. Such a view is most clearly expressed in Kosoy and Corbera's (2010) critique of the commodity fetishism of PES, where they argue:

> When ES [environmental services] are commodified, they become the basis for new socio-economic hierarchies, characterized by the re-positioning of existing social actors, the emergence of others, and very likely, the reproduction of unequal power relations in access to wealth and…resources (1234).

Similarly, others have argued that the forms of private property rights that PES schemes require has the potential to usurp community norms of commons forest management, and thereby produce long-run negative social and ecological consequences (Backstrand and Lövbrand 2006; Filer and Wood 2012). In other words, such critiques point to the internal features of the policy itself and, when taken to their logical conclusions, show how such features are a key cause of perverse (or potentially perverse) on-the-ground outcomes.

While I am sympathetic to such critiques (Lansing 2011; Lansing 2012), the policy's neoliberal goals of commodifying and privatizing services have little to do with the results seen here, even if the outcome (ie. neoliberal policy produces unintended subsidy for large agribusiness) would surely fit in with the long catalogue of neoliberal policy failures that have been so well documented. In this case, payments for reforestation did not catalyze the results discussed here. Instead, the policy's effect became transformed through its use by other economic actors, resulting in a dynamic where already-existing patterns of land use turned this modality of PES into a subsidy for agribusiness. In short, PES did not cause the relations between a weak forestry sector and agro-export industries, but it instead became caught up in this dynamic. In this way, PES for reforestation functions as a subsidy for plantation agriculture not because the policy is justified by ideas about commodification and privatization, and ultimately supposed to transform environmental services into marketable commodities. Instead, this dynamic emerged through the policy's interaction with long standing patterns of land use.

If the internal processes of commodification or privatization have little to do with PES payments becoming subsidies for plantation agriculture, then to what extent can we consider these results as a feature of neoliberalism at all? In Fletcher and Breitling's (2012) account of PES in Costa Rica, they argue that, despite the fact that there are few actually-existing market features of the policy, it can still be thought of as a neoliberal policy. This is because it remains grounded in a concept of individualized incentives: a discursive formation that espouses a form of "neoliberal environmentality" (pg. 409). Further, Matulis (2013) has recently argued that there are many aspects of the program that reflect ongoing processes of neoliberalization, namely the "user fee" model being tried, and the privatization of forestry certification. While there are many aspects of the program that resemble previous forestry subsidies, Matulis points out how parts of the program are becoming increasingly neoliberalized. I do not disagree with either of these assertions; however, I posit that the neoliberal aspects of this policy are not limited to its market framing or its ongoing policy mutations. It also extends larger political-economic processes external to the features of the policy itself. In this case, Costa Rica's experience with structural adjustment and the outsize influence of USAID and the World Bank in setting the policy agenda in the 1980s and 1990s assured that direct state subsidies toward the forestry sector would be phased out in favor of something grounded in a market discourse toward conservation. In this sense, the emergence of PES is clearly related to the country's broader patterns of neoliberalization. Further, this period in Costa Rica's history had other effects as well. It ended a number of subsidies for smaller farmers, but assured that state support would remain for export oriented plantations, thereby entrenching this form of land use, even as it became less important to the economy overall. It was also marked by some policy "failures", notably USAID's inability to change the internal dynamics of the forestry sector. Forestry in Costa Rica was then, and remains today, largely an appendage to the plantation sector.

7. Conclusion

It is widely noted that there is no such thing as "pure" neoliberal policy (Larner 2003; Castree 2008). Instead, every neoliberal policy development can be thought of as its own hybrid development, one that evolves through an already existing context (eg. Brenner et al. 2010). There is a danger, however, in labeling all policies, no matter how far they stray from neoliberal ideals, as a kind of hybrid neoliberal policy form (Fletcher and Breitling 2012). In some cases, it may be something far removed from the dominant paradigm of market liberalism that produces specific policy outcomes. Rather than trying to determine whether or not this policy meets a definition of "neoliberalism" (a diverse and contested term in any case), I instead propose a question more specific and modest: to what extent do specific neoliberal features of the policy help explain these results? The answer is that they offer very little explanatory traction. Instead, the case presented here shows the importance of thinking through how specific types of landscapes that payments seek to encourage are already embedded within other economic sectors and forms of land use practice. This kind of analysis allows for an assessment of neoliberal policy development that does not necessarily focus on the sui generis, and purportedly neoliberal, features of PES itself. Instead, the empirics presented here are a consequence of PES integration with already existing patterns of economic and land use practice. In the case of Costa Rica, the forestry sector's linkages with plantation agriculture resulted

in PES reforestation payments that have become indirect subsidies for plantation agriculture.

Such an analysis is at once specific to Costa Rica (and specific to a particular part of the program), but holds lessons for understanding how newly implemented PES programs might develop in other contexts. It is a relatively straightforward approach, but one that has, thus far, been relatively underutilized. Future research on the impacts of PES programs in other contexts would do well to consider the ways in which such programs serve to reproduce economic and land use patterns that pre-date the arrival of the program itself. It also serves as a warning about critiquing a policy solely in terms of their neoliberal features. This suggests that efforts to encourage reforestation, whether grounded in market liberalism or not, will potentially become embedded within a system of land use and production that could potentially render such incentives a support for large agribusiness. Future policy efforts would be wise to look at strengthening the linkages between forestry and other industries beyond agriculture. To the extent that the forestry industry can establish linkages with other sectors of the economy, rather than remain as an appendage to the plantation agriculture sector, then these kinds of pernicious, and "hidden" supports for agribusiness can be overcome.

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