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Case Example: Costa Rica

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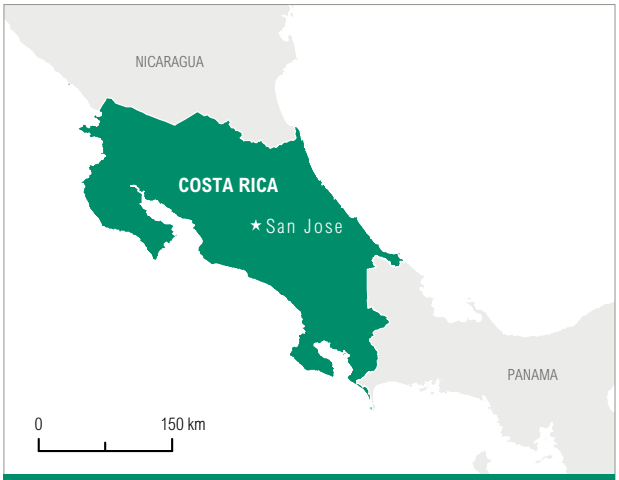
SUMMARY

In 1943, Costa Rica had 3.9 million hectares of forestland, which was 77 percent of the country's land area (GOCR 2011). Crop production and cattle grazing—supported by a rapid expansion of the road network—were the prime causes of deforestation over the course of the next quarter century (Pfaff et al. 2008). By 1986, forests occupied less than 2.1 million hectares, or about 41 percent of the country (Calvo-Alvarado 2009).

From 1986 onward, however, Costa Rica pursued forest restoration, principally through natural regeneration (passive restoration) on abandoned pastures. By 2005, forest area had increased by 394,000 hectares to 2.45 million hectares, or 48 percent of the country (Calvo-Alvarado 2009; Sánchez-Azofeifa et al. 2007) (Table 1).



TIME PERIOD: 1986 to present

AREA RESTORED: 394,000 hectares

TYPE OF RESTORATION: Principally passive restoration

COSTA RICA BEFORE

COSTA RICA AFTER

WHICH FEATURES AND KEY SUCCESS FACTORS WERE EXHIBITED?

A number of features and key success factors are evident in Costa Rica's forest landscape restoration.

Motivate

Factors motivating restoration included:

- **CRISIS EVENTS.** By the 1980s, forest clearing in Costa Rica was a major concern. The country was earning unwelcome global headlines as having one of the highest rates of deforestation of any nation in the world, garnering the attention of policymakers and businesses active in the country (Bennett and Henninger 2010). Scientists were publicly decrying the impact on the flora and fauna of the country (Myers 1981). Denuded slopes threatened to accelerate sedimentation of hydropower reservoirs (Krishnaswamy et al. 2001) in a country where hydropower generates about three-quarters of the nation's electricity (MINAET 2008). Some leaders in the forest products industry were concerned about dwindling forest resources. One study estimated that the total net losses to the country in 1984 amounted to $167 million, primarily in the form of lost timber resources (Solorzano et al. 1991). Furthermore, in 1981, the country defaulted on its foreign debt, triggering structural adjustment programs and a reevaluation of the type of economic growth leaders wanted (Campbell 2002).[1]

- **BENEFITS.** Restoration could generate a number of environmental, social, and economic benefits, which later came to fruition. Environmentally, restoration curtailed soil erosion and sedimentation of waterways and protected biodiversity. Economically, tourism emerged as a major industry that provided new employment opportunities and contributions to the national economy. Costa Rica now leverages its forests and other natural habitats to attract international tourists, a defining trait of Costa Rica's economy today (Weaver 1999). Furthermore, restoration reestablished stocks of timber and non-timber forest products (Schelhas and Sanchez-Azofeifa 2006).

Enable

Several enabling conditions were in place to facilitate restoration in Costa Rica, namely:

- **ECOLOGICAL CONDITIONS.** The soil, water, and climate conditions in most cleared areas remained viable for restoration. A decline in the size of the nation's cattle herd removed grazing pressure from many areas. In Santa Rosa National Park, where human-induced fires were preventing natural regeneration, people took steps to suppress the fires. In addition, in some parts of the country remnant forest tracts served as source populations for natural regeneration (Janzen 1998; Lambin et al. 2003).

- **MARKET CONDITIONS.** A significant enabler of forest landscape restoration in Costa Rica—and according to some researchers the most impactful[2]—was the decline in competition from cattle and commodity crops for degraded or converted forestlands. Cattle ranching was a large industry in Costa Rica during the 1970s, enjoying subsidized credit, price guarantees, and other perks. But the industry rapidly declined during the 1980s onward due to a fall in international beef prices and the removal of national cattle subsidies—part of a structural adjustment program introduced by the World Bank—that reduced the profitability of ranching marginal lands (Calvo-Alvarado 2009). As a result, the nation's cattle herd declined by a third—from 2.1 million heads in 1989 to 1.4 million by 2000. Demand for grazing pasture declined, and the national economy started to migrate toward becoming more urban and tourism-oriented (Lambin et al. 2003; Calvo-Alvarado et al. 2009).

  Another market condition favoring restoration was the growth in the tourism industry as a whole. The number of tourists visiting Costa Rica jumped from just 60,000 in 1986 to 1.7 million in 2005. This is an extremely high number of people, since Costa Rica had a population of only 4 million at the time (Calvo-Alvarado et al. 2009). The rise of eco-tourism in particular fostered favorable market conditions for conserved and restored natural forests.

- **POLICY CONDITIONS.** Securing clear land title for farmers was part of Costa Rica's agricultural development policies dating back to the 1930s. While tenure in the past encouraged farmers to remove forest cover in order to claim the land, tenure more recently has proven important for incentivizing restoration. With tenure, people can reap the benefits of restoring trees and are eligible for receiving payments for environmental services. Furthermore, obtaining tenure gave people experience with interacting with government agencies, as well as improved socioeconomic status, which favored program participation (Thatcher et al. 1997).

Table 1 | **Forest cover in Costa Rica**

YEAR	FOREST COVER (%)	CORRESPONDING HECTARES (APPROX.)
1943[a]	77	3,900,000
1960	59	3,013,000
1979	46	2,349,000
1986	41	2,058,000
2000	45	2,319,000
2005[b]	48	2,451,600

Source: Calvo-Alvarado (2009).
Notes:
a. Government of Costa Rica (2011).
b. Authoritative figures are lacking for forest cover after 2005. In 2010, FAO estimated Costa Rican forest cover at 51 percent of the nation's land area (FAO 2010), which is close to the government estimated figure of 52.4 percent (FONAFIFO 2012). A different methodology was used by Calvo-Alvarado (2009), making comparison difficult.

Government restrictions on clearing the remaining forests within the country also helped lay the foundation for net forest restoration in Costa Rica. In 1969, the country's first Forest Law regulated forest use on public land and established a national park system (Calvo-Alvarado et al. 2009).

Conservation areas expanded during the 1980s and now more than 25 percent of the country's land area lies within a National System of Conservation Areas (InBio 2014). In 1996, the country passed Forestry Law No. 7575, which placed tight restrictions on deforestation (Ortiz and Kellenberg 2002). The law banned conversion of forested land and exports of squared timber and round wood (de Camino et al. 2000), and was enforced. This law also reversed perverse incentives for land conversion. Previously there was a tax on 'unproductive' land (Karousakis 2007). Forestry was considered unproductive which had provided incentives to deforest and develop land for pasture and agriculture Rodríguez, C.M. 2015. pers. comm., 8 April).

- **INSTITUTIONAL CONDITIONS.** Institutional conditions provided an enabling environment for restoration. Before 1994, the Ministry of Environment was divided into three separate agencies—wildlife, national parks, and the forest service, after this time they merged into one agency SINAC (National Conservation Areas Unit), so that there was greater coordination for a landscape approach for conservation and restoration (Rodriguez, C.M. 2015. pers. comm., 8 April).

Implement

The Costa Rican restoration experience exhibited the following capacity and resources for implementation:

- **KNOWLEDGE.** Costa Rica benefits from a number of research institutions—including universities, the Centro Agronomico Tropical de Investigacion y Ensenanza, and the Instituto Centroamericano de Administración de Empresas—that bring know-how to sustainable land management. In addition, Costa Rican forest owners have strong associations that provide technical support (and a political voice) on reforestation, forest management, and forest conservation (de Camino et al. 2009). Furthermore, restoration practitioners trained local people living near parks on restoration activities such as fire prevention and seed planting (Janzen 1988).

- **FINANCE AND INCENTIVES.** Costa Rican efforts to provide financial incentives for restoration have evolved over time. They began in 1969 with tax deductions for reforestation, evolved into special loans for restoration, and later into direct payments for restoration (Table 2). In 1996, Costa Rica shifted its approach away from subsidies financed by the general treasury to a payment for environmental services system, or "Pago de Servicios Ambientales" (PSA). This was financed by a dedicated 3.5 percent of the country's fossil fuel tax and fees on beneficiaries of forest-based ecosystem services (Table 3). The average annual budget for the PSA during the early 2000s was $13.3 million (Daniels et al. 2010). The attributable impact of the payments themselves on restoration is debatable (see "Looking Forward"" below), but some researchers note that establishing the PSA may have made landowner acceptance of Forestry Law No. 7575 possible (Pfaff et al. 2008).

- **FEEDBACK.** Costa Rica has implemented feedback systems to monitor and improve performance when it comes to programs regarding forest conservation and restoration. For example, FONAFIFO—Fondo Nacional de Financiamiento Forestal, or "the National Forestry Financing Fund"—monitors PSA contracts for compliance. And the government has evaluated and redesigned the financial incentives for restoration several times.

LOOKING FORWARD

The transition of Costa Rica from a country with net deforestation to one with net reforestation is an often-cited success story, with the PSA system receiving a lot of attention (Pagiola 2008). But it is important to note that Costa Rica displayed many of the key success factors for forest landscape restoration, and it is the presence of this suite of factors that arguably had more to do with the country's restoration success than the PSA system alone.[3]

For example, the period of steepest decline in deforestation rates—and the ramping up of restoration—occurred in the decade immediately after the structural adjustment that reduced cattle ranching subsidies (Figure 1) (Sanchez-Azofeifa et al. 2007). This period occurred prior to the advent of the PSA system. This evidence points to the important role that competing demand for land (a "market condition") played in restoration in Costa Rica. It also points to the fact that "negative" incentives that keep trees off of land (such as cattle ranching subsidies) can outweigh "positive" incentives for restoration (such as tax deductions), as appears to have been the case during the 1970s and early 1980s. Positive incentives should not be considered in isolation.

In addition, the PSA system seems to be more amenable to large or wealthier landowners. Compensation is often not enough to cover the full opportunity costs of alternative land use, producing a bias toward landowners who do not depend on the payments (Fletcher and Breitling 2012). As a result, transaction costs for participation can be barriers to smallholders. These features point to the need for ensuring that financial incentives are designed to reach multiple types of landowners with restoration opportunities.

Furthermore, many PSA participants stated that they would have protected forests or allowed forest recovery even in the absence of the PSA program due to existing restrictions on forest clearing (Daniels et al. 2010). This finding points to the need to ensure that financial incentives really trigger actions that would not have otherwise happened. The existence of PSA has led to the expectation among farmers that they should be compensated for not clearing forests (FONIFIFO et al. 2012).

Table 2 | **Costa Rican Laws Creating Financial Incentives for Forest Restoration and Conservation**

LAW	YEAR	BRIEF DESCRIPTION
Forest Law No. 4475	1969	Made the costs of reforestation tax deductible. Wealthy or large landowners were the primary beneficiaries.
Forest Law No. 6184	1977	Required at least 2 percent of agricultural loans from commercial and state banks to be allocated for reforestation projects. Interest rates on reforestation project loans were capped at 8 percent and trees were permitted to be used as collateral.
Forest Law No. 7032	1986	Created "Certificates of Forestry Payments" that were awarded to landowners who reforested their properties. The certificates could be traded for cash or used to pay taxes and fees. These certificates broadened the benefits of tax-deductible forest restoration costs beyond large landowners and forest product companies, making fiscal incentives more accessible to lower-income landowners. The certificate system was terminated, however, by the end of 1995 due to the conditions of the third structural adjustment loan from the World Bank, which canceled many subsidies.
Forest Law No. 7174	1990	
Forest Law No. 7575	1996	Created the payment for environmental services program (PSA), which helps to motivate and maintain restoration, in response to the structural adjustment loan. The environmental services include reducing greenhouse gas emissions, protecting water for downstream users, protecting biodiversity, and protecting nature for aesthetic and scientific purposes. Landowners could receive payments for reforestation through plantations, protection and management of existing forests, natural forest regeneration, or agroforestry systems.

Sources: Bennett and Henninger (2009); Daniels et al. (2010).

Table 3 | **PSA Payment Typology**

ACTIVITY	CRITERIA	PAYMENT (2010)
Forest protection	2–300 hectares can be enrolled on private land Up to 600 hectares can be enrolled within indigenous areas	US$64/hectare/year for a 5-year period
Reforestation	1–300 hectares can be enrolled	US$816/hectare for a 10-year period
Natural forest regeneration	Minimum 2 hectares	US$41/hectare per year for a 5-year period
Agroforestry	350 to 3,500 trees per participant Up to 336,000 trees per joint project, cooperative, or indigenous reserve	US$1.30 per tree planted disbursed over a 3-year period
Forest management	Criteria determined by forest area	US$343/hectare over a 5-year period

Source: Daniels et al. (2010).

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ENDNOTES

1. An economic crisis in the early 1980s saw Costa Rica's public debt rise six-fold between 1976 and 1985; as a result, Costa Rica had the highest per capita debt in the developing world (equivalent to $1,500 per person) (Goodman and Redclift 1991).

2. Calvo-Alvarado, J.C. 2014. pers.comm., 4 July; Sanchez-Azofeifa, A. 2014. pers.comm., 20 July.

3. The precise contribution of the PSA to Costa Rica's net forest regrowth experience is still insufficiently understood, partly because there has been inadequate research focusing on the impact of other forest policies, landholder absenteeism, and non-farm livelihood dependency (Daniels et al. 2010).

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