Communal management as a strategy for restoring cloud forest landscapes in Andean Ecuador

Abstract

Engaging smallholders in restoring forests can be challenging, but is essential if landscape-level projects are to succeed in many populated regions. For an individual landholder, compared to other competing land uses (agriculture, pasture, and even other tree-based systems like plantations) the benefits of restoration are often dispersed, less obvious, unproven in the local context, and require large areas to be realized, making restoration risky or difficult. This study in the Ecuadorian Andes showed that introducing communal reserves created a space for people to learn about the practice and benefits of planting trees. Because communal reserves provided a relatively low-risk, low-cost environment to restore forests, key barriers to participation were lifted. In the process, farmers learned about tree planting and its benefits, knowledge they could (and did) apply on private farms. Introducing communal land-tenure thus changed local norms and practices around forest cultivation and clearing, and produced diverse forests across the landscape.

Introduction

Determining how to make forest restoration attractive and accessible to smallholders is a key question for practitioners and policy makers, and essential if landscape forest restoration is to succeed in the tropics. Landscape forest restoration centers on integrating land uses and stakeholders across multiple scales, including those who work and depend on the land locally. If local smallholders are unable or unwilling to contribute or participate, the scope of such projects will be severely limited.

Policy makers and researchers now recognize that a key requirement for engaging landholders is secure land tenure, as having long-term control and access to a restored site helps ensure they will reap the benefits of the trees they plant, and gives restoration projects a better chance of persisting (Pattanayak *et al.* 2003). But we know less about the efficacy and suitability of different *types* of land tenure arrangements to promote landscape restoration. To date, many interventions have focused on restoring forests on private land, but we still know relatively little about the suitability of communal lands as forest restoration sites. This is despite evidence that community-based forest management can be a highly successful means of managing tropical timber extraction and other products (Persha *et al.* 2011) and could, in theory, work well for restoration.

In this paper, I present a case study from Ecuador that illustrates the potential of designating communal lands for forest restoration. I demonstrate that, by bringing people together to discuss, experiment, and see the outcomes of tree planting, communal restoration projects have spurred communities to create new norms and rules around land use and forest conservation, with impacts that extend beyond the restored sites. These successes have far-reaching applications in landscapes across the tropics.

Study Region

The Intag Valley is rural Andean farming region in Imbabura, Ecuador. Mountainous, steep, and remote, the region ranges from 650 to nearly 4000 masl in elevation, with annual rainfall from 1500 to 3300 mm (Kocian *et al.*, 2011). Located in the center of the Tropical Andes biodiversity hotspot, the cloud forests here are exceptionally diverse (Wilson & Rhemtulla, 2016). Following centuries of sparse habitation and dense forests, deforestation rates increased precipitously throughout the 1970s, 80s and 90s, mainly for cattle ranching and small-scale farming. Today, cloud forests have been extensively cleared (upwards of 60%).

Cloud forests play a vital role in the hydrological cycle, capturing clouds and mist as precipitation. Following deforestation in watershed catchments, in the past two decades communities in Intag reported increasing problems with droughts and erratic water supply during the dry season (May-Oct). In response, a local environmental NGO *Defensa y Conservacion Ecologica de Intag* (DECOIN) helped more than 40 communities establish small-scale, community-based reforestation projects in watersheds ("communities" in this region are self-defined administrative units, with a leader/mayor nominated by its residents). Founded in 1995 by long-term resident Carlos Zorrilla, DECOIN worked through local schools to increase environmental awareness about the value of forests and promote forest stewardship. Funded through private donations and partnerships with international environmental NGOs, the goals of the watershed reforestation projects were to: 1) improve the quality of water resources in communities (in particular, maintain summer streamflow); and, 2) restore and conserve forest

biodiversity in the region. DECOIN purchased land in watersheds from local farmers and signed the title over to communities for the purpose of conservation and restoration, with use restrictions in the title: no burning, cattle, cultivation, or harvesting for sale.

Restoration involved planting mostly native trees in former pastures where non-native pasture grass inhibited natural regeneration. DECOIN provided each community with training and financial and technical support to establish a tree nursery. They also provided training for people to harvest seeds from nearby forests, grow seedlings, and plant and care for trees. People, whether unpaid (as was the case in two communities where funds were not available) or paid a local daily wage (two others where a private donor provided funding for this) generally worked in communal workdays. Participation was voluntary, but expected in unpaid communities by all who used the community watersheds for their water supply. Each community member worked roughly the same number of hours in each community. Rather than reaching smallholders through existing farmers associations, DECOIN's focus was exclusively on tree planting in watershed reserves. DECOIN is the only organization in the region to engage participants at the community level (all other associations work with private farmers), and they introduced community rights to land.

Comment [WS1]: were there any issues with community organizing and management? DECOIN signed titles over to communities, and participants were voluntary. How were the "communities" identified and defined? Does voluntary participation mean some people were part of the community title but didn't partake in the effort? What does this mean for cost (labor) and benefit sharing?

I worked in four communities who were restoring forests to their watersheds by planting native trees. All four were similar with respect to their average landholdings, income, number of households (23 to 45) and other key demographic indicators (Wilson 2015), and were dispersed over an area of approximately 25 km^2. In the region, residents were mainly *mestizo*, with minority populations of *Otavaleños* and Afro-Ecuadorians. Most people (about 90%) owned land, and the average farm size was approximately eight

hectares (Kocian *et al.*, 2011). Five major livelihood strategies were apparent in the communities in which I worked: subsistence farming, market-oriented farming, cattle ranching, off-farm skilled work, and day labour (Wilson 2015, Wilson and Coomes *in prep*). Residents worked primarily as farmers, producing subsistence crops and some cash crops, and nearly 40% also raised cattle for beef production. Over a third of the households earned income through wage labour or skilled, off-farm work (Wilson and Coomes *in prep*). Remittances from relatives working abroad or in Ecuadorian cities were negligible.

Fieldwork took place over eight months and two seasons in 2010 and 2011. To understand both ecological and social drivers and outcomes of the watershed restoration projects, I used a combination of qualitative and quantitative methods from the natural and social sciences. Specifically, I quantified local land-use and -cover changes with satellite images from 1991, 2001, and 2010; compared tree diversity in multiple patches of primary, planted, and naturally regenerating forest; and assessed community participation in cloud forest replanting using household interviews, focus groups and oral histories (details in Wilson 2015; Wilson and Rhemtulla 2016).

Outcomes of communal restoration

Restoring forests on communal land produced a number of social and environmental benefits, and, according to interviews with both landholders and local NGOs, was widely considered a success. In total, 69 people restored over 70 ha of land in four microwatersheds, planting over 75,000 trees. Most people reported planting trees to restore water resources, and four to seven years after the inception of the projects, more

than half reported an increase in water quality, quantity, or both (Wilson and Coomes *in prep*).

Why did communal governance work well for people and forests?

This case illustrates several ways in which governing restoration projects communally can benefit both people and forests. First, compared to restoring on private lands, restoring on land owned and governed by the community was a relatively low risk investment. Smallholders could restore forests without giving up farmland, making the opportunity costs of restoring on communal land lower than on private land, where restoration may compete directly with agricultural production. This allowed a broader range of community members, from the land rich to the land poor, to participate (Wilson 2015). It also allowed those people without the resources to restore on private land (e.g., landless or very poor households) to participate, and to receive the benefits from doing so.

The benefits that people hoped to achieve (water resources (local community members) and biodiversity conservation (DECOIN)) were communal and societal goods shared among people in the community, and internationally. But these benefits require relatively large, strategically located restored areas to be realized. Restoring forests to watershed areas may not have been possible (or attractive) if the burden has been placed on the few households who owned land in watersheds (2 to 6 in each community), but were both attractive and accessible when the resources of the community (labor, knowledge, motivation) were pooled. Restoring forests thus fits a typology of extensive

133 land uses, such as pastures and wild woodlands, that have been traditionally managed
134 communally even in places where agricultural plots are managed privately (Table 1).
135 The low-risk, low-cost investment of restoring forests on communal land seemed
136 to create space for people to learn about and experiment with tree planting. Many people
137 contributed resources and knowledge to restoration, and working together as a
138 community allowed this experiential knowledge to be shared in a hands-on, interactive
139 setting. Moreover, because the risk of a given species failing was both shared between
140 members of the community, and diminished because people's livelihoods did not
141 depended directly on it, farmers were able to experiment with a wide range of different
142 native species. As a result, the restored forests had high native tree biodiversity (Wilson
143 and Rhemtulla 2016), and people learned skills (propagation, planting, etc.) that could
144 also be applied to private land. Perhaps more importantly, working together to restore
145 forests created a sense of unity around reforestation. In a place where deforestation had
146 been the norm only a few years before, community members bonded over the shared
147 experience of planting trees for the future of the community.
148 Successful community-level governance also relied on the efforts of several key
149 individuals who were well known and respected in communities. DECOIN's founder had
150 lived in the area for 30 years and was both well connected and respected. He hired
151 exceptional leaders in each community – long-term residents who were small scale
152 farmers and thus intimately familiar with the needs of the communities. In three of the
153 four communities, local leaders were charismatic visionaries with a long-term plan for
154 the community that involved uniting around the goal of restoring forests and water, and
155 creating conditions by which residents could live off the land in perpetuity. These leaders

were spoken of highly by other residents – people commented on their vision, their work ethic, and their trustworthiness. In the fourth community, however, the leader was perceived to put personal financial gain ahead of the needs of the community, and rumors of corruption were rife. Participation rates in this community were far below the others. The value of a trustworthy, charismatic leader should not be underestimated when planning communal restoration projects.

Forest landscape restoration and communal management

From a landscape perspective, communal management meant that large areas of land could be restored in strategic locations to restore a given ecosystem service. Rather than restoring small patches on private landholdings distributed across the landscape, communities planted trees in contiguous patches of land around streams. Restoring the same crucial area of forest on private lands would have been challenging, as all landholders would have had to 1) agree to participate; 2) agree to restore that particular area of land; and 3) monitor and maintain sites individually. Communal restoration also meant that those who were most interested and invested in restoring forests were able to participate, even if they did not own land in target areas.

However, the communal model did rely on the willingness of each landholder with key landholdings to sell their land. In each community, lands were held by two to six landholders, each who sold a portion of their land to the communal reserves. DECOIN reported that negotiating these deals was one of the most challenging aspect the projects. But in this case, most of the land purchased was low productivity pasture, and most landholders who sold land either had additional holdings elsewhere in the

179 community, or were absentee owners with alternative sources of income. These absentee
180 owners were not reliant on the land as their primary income source, and, living outside
181 the community, would have seen little benefit in restoring forests on their land. Our
182 survey results and interviews confirmed that the livelihood impacts of these purchases
183 were thus minimal, but in other sites and scenarios, care would have to be taken not to
184 displace people without viable alternatives.
185 A significant benefit of communal restoration was that restoring on communal
186 land seemed to provoke people to increase forests on private land (Wilson and Coomes,
187 *in prep*). After restoring forests on communal land, nearly 80% of the participants planted
188 trees on private farms, and an additional number of households that had not participated
189 in the projects also began planting on-farm trees at that time. Prior to the communal
190 projects, only 9% households had planted on private land. In addition, secondary forest
191 cover in the region increased dramatically as people intentionally allowed forests to
192 regenerate naturally on private land along roads and waterways (Wilson 2015).
193
194 **Conclusions**
195 Restoring communal lands can allow for more inclusive participation, larger
196 restored areas, and can facilitate knowledge sharing and acquisition. It can thus be very
197 well suited to achieve the goals of both ecological forest restoration (focus on restoring
198 intact ecosystems), and forest landscape restoration (focus on the spatial allocation of
199 restored/reforested sites to benefit a range of stakeholders). This case suggests a few key
200 lessons for maximizing the benefits of such projects. First, communal restoration should
201 be focused restoration around shared, communal services or goods with widespread

appeal in the community. Second, restoration can be used strategically to achieve goals that may be out of reach to individuals, but that may be possible as a group. Third, within communal arrangements, it can be beneficial to allow people the space and flexibility to learn from each other, share knowledge, and experiment with different species and methods. Fourth, projects should engage locally trusted, respected, and visionary leaders.

Table 1: Attributes of land use patterns historically associated with communal versus private land tenure (identified by Netting (1976, table adapted from Ostrom 1985). Communal forms of land tenure are optimal when the value of production per unit of land is low, when the frequency and dependability of use or yield is low, when the possibility of improvement or intensification is low, when large areas are required for effective use, and when relatively large groups are required for capital investment activities. (Ostrom, 1985, pg. 14). These criteria describe forest restoration well – the benefits are relatively small per unit of land (compared to crops, for example), diffuse and distributed among community members, and require relative larger areas of land to be realized. But, they can also be important for farming (e.g., pollination, water flow regulation, erosion control, and so on). Thus, although restoring forests may not be a 'worthwhile' investment for a single landholder, it can make economic sense as a community.

	Land tenure type	
Attributes of land use	**Communal**	**Individual**
Value of production per unit area	Low	High
Frequency and dependability of use or yield	Low	High
Possibility of improvement or intensification	Low	High
Area required for effective use	Large	Small
Labour- and capital-investing groups	Large (voluntary association or community)	Small (individual or family)

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Highlights

- Engaging smallholders restoration is challenging but is essential.
- Communally managed projects can provided a low-risk, low-cost environment for restoring forests.
- Communal land also facilitates restoring forests in strategic locations on the landscape.
- Working as a community can change norms and practices around tree and forest use and conservation.

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Abstract

Engaging smallholders in restoring forests can be challenging, but is essential if landscape-level projects are to succeed in many populated regions. For an individual landholder, compared to other competing land uses (agriculture, pasture, and even other tree-based systems such as plantations) the benefits of restoration are often dispersed, less obvious, unproven in the local context, and require large areas to be realized, making restoration risky or difficult. This study in the Ecuadorian Andes showed that introducing communal reserves in an area where, previously, most land was privately held, created a space for people to learn about planting trees and created projects with with synergistic, landscape-level impacts. Because communal reserves provided a relatively low-risk, low-cost environment to restore forests, key barriers to participation were lifted. Farmers also learned about and experimented with tree planting, knowledge that they were able to apply on private land. Introducing communal land-tenure thus increased awareness of the benefits of restoring forests, provided fertile ground for innovating with trees, and in the process changed local norms and practices around forest cultivation and clearing. Ultimately, introducing communal restoration produced diverse forests that were strategically located on the landscapes to provide maximum ecosystem services to communities – conditions that many restoration projects strive for, but that are often difficult to achieve.