



A NETWORKED LANDSCAPE?: Using Relational Structures to Examine the Implementation of Community-Based Forestry Projects in the Kalatungan Mountain Range

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Abstract

Over the last three decades, billions of metric tons of anthropogenic greenhouse gases have been released into the atmosphere as a result of deforestation. In the same period, forests overlaying indigenous peoples' land demonstrate the highest levels of biodiversity conservation, hinting at the value of their practices for forest conservation. Worldwide, indigenous peoples leverage different knowledge bases, including scientific and indigenous knowledge systems and practices, to sustain their forests. Their ability to steward their ancestral lands may be enhanced by building and leveraging partnerships within the context of community-based forestry. These efforts may be enhanced by applying social network theories and tools. This chapter illustrates how social network analysis (SNA) can be used as a project evaluation tool from the outset and in intervals of indigenous peoples' forestry projects. It applies this approach to two projects which engage with six community-based forestry initiatives in the Kalatungan Mountain Range. Probing into the relationship between local and landscape-wide action, this chapter aims to shed light on the social structures and positional qualities that facilitate leadership and collaboration in forest governance.

Introduction

Climate change is expected to severely impact forest systems. Recent forest fires in the Amazon, Australia, and California offer sobering evidence of the threat that a warming climate constitutes for forest systems and the people living in or near forests. Changing climate conditions are expected to raise the frequency and intensity of forest disturbances (e.g., fires, drought, and flooding) and to change land use patterns (Canadell et al. 2009; Thomas et al. 2004; Bonan 2008; Asner et al. 2015). At the same time, deforestation accelerates climate change. In the last three decades alone, billions of metric tons of anthropogenic greenhouse gases have been released into the atmosphere as a result of deforestation. Worldwide, policy communities have mobilized in search of effective policy instruments to address deforestation.

Community-based forestry (or community forestry) is one instrument that has been put forward to halt and perhaps reverse deforestation. Community forestry places forest governance in the hands of forest dwelling communities. It aims to empower forest-dwelling communities to take action on deforestation while generating sustainable livelihoods (Kellert et al. 2000; Ribot 2009). In so doing, community forestry may liberate forest governance from restrictive and inefficient bureaucracies and spur policy innovations that are tailored to resource user needs, promote social justice, and amplify forest systems' adaptive capacity (Armitage 2005, Kellert et al. 2000).

In the Philippines, community forestry was established in 1995 as "the national strategy to achieve sustainable forestry and social justice" through Executive Order No. 263 (McDermott 2001, 32). While some note its potential to amplify forest conservation and biodiversity (Lasco and Pulhin 2006), community forestry's implementation has largely been inadequate (Pulhin et al. 2007). Most empirical studies suggest that community forestry can be a costly rather than economically liberating for Filipino forest dwelling communities (Lasco 2010; Shackleton et al. 2002). Community forestry, it has been argued, enables the Filipino elite to maintain power, capture economic benefits, and disproportionately burden local resource users (Li 2002). While observing the inadequacies of community forestry implementation in the Philippines, Pulhin and Inoue (2008) argue that it still offers some valuable lessons, especially when community forestry lies at the interface of community forestry and indigenous peoples' governance.

Indigenous peoples (IPs) manage an estimated 11 percent of the world's forests (Sobrevila 2008). They contribute greatly to the conservation of forested land (Garnett et al. 2018), and since they live and harvest directly from forests, IPs are expected to be acutely impacted by climate change (Abate and Kronk 2013; Erni 2015; Green and Raygorodetsky 2010; Norton-Smith et al. 2016; Suich et al. 2015). Climate change is already impacting Filipino forest-dwelling indigenous communities. The Higaonon people in Misamis Oriental report that climate change distorts the "nature signals" which they

have used for generations to guide their spiritual and livelihood practices (de la Peña et al. 2017). In this regard, one interesting case study is the Kalatungan Mountain Range where forest governance increasingly involves a specific type of community forestry, one that dually leverages scientific and indigenous knowledge systems and practices (IKSP).

As a point of departure, this chapter takes the idea that IKSP serve as an effective yet poorly understood basis for community-based forestry. We agree with Linda Robyn that the continued neglect of IKSP in mainstream environmental conservation praxis constitutes

a grave injustice because it is socially injurious to Native peoples and, in effect, all people . . . When writing about Indigenous peoples, the exclusion of environmental issues also establishes an injustice because it does not recognize the origins of social institutions among all human beings. (2002, 198)

While a formal movement to raise recognition about the legitimacy of IKSP as a basis for knowledge and practice has been underway at least since the 1992 UN Conference on Environment and Development, it has not yet gained sufficient ground in mainstream policymaking. One handicap is inadequate knowledge about the relational dynamics within communities of practice. To address this challenge, we employ a mixed-method research design which centers around a series of social network analyses (SNA), which are increasingly being used to study the governance of socio-ecological systems like forests (Newig et al. 2010; Sandström and Rova 2010; Ernsten et al. 2008). While scholars have argued that SNA would be a useful tool for designing, implementing, and evaluating projects (Valente et al. 2015; Bodin and Prell 2011; Prell et al. 2009), it is rarely used in this way. We address this gap by leveraging SNA to demonstrate how knowledge of social networks can assist project managers in designing programs that improve cross-cultural collaboration within the context of forestry, thus helping amplify the impacts of evidenced-based forest governance initiatives.

In what follows, we briefly discuss our method of study before launching into a description of our case study: the Kalatungan Mountain Range. Then we demonstrate how SNA can be used in combination with interviews, surveys, and document analysis to reveal intervention opportunities within the forest landscape. We also apply SNA to reveal how indigenous peoples' capacities for community forestry are determined in part by the structure of social relations embedded in their cultures. We also provide some recommendations for enhancing indigenous peoples' forestry and discuss our findings before ending with a summary of the chapter's main conclusions.



Using Network Analysis to Examine Forest Conservation in the Philippines

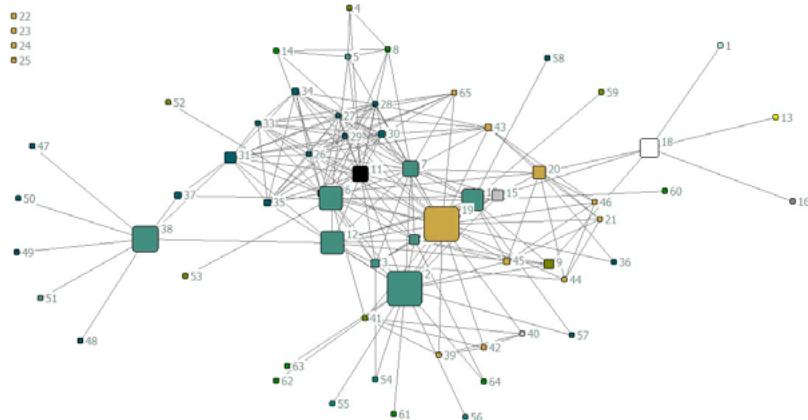
The Forest Foundation Philippines is a non-profit organization that was established under two bilateral agreements between the governments of the United States and the Philippines. At the time of this writing, the Forest Foundation has supported hundreds of projects which have contributed to the restoration of 4,200 hectares of forests, established 40 community forestry projects, helped improve the management of 1.5 million hectares of forested land, and helped support more than 60 community enterprises.

This chapter focuses on Forest Foundation-supported programs in Misamis Oriental and Bukidnon. We combine interviews, surveys, document analysis, and social network analysis in our study. Text analysis was conducted using the computer program ATLAS.ti, while network analysis was conducted using the software environment R. Knoke and Yang define social networks as “structures composed of a set of actors, some of whose members are connected by a set of one or more relations.” (2008, 8) SNA employs a mix of graph theory and data visualization techniques to study a range of social systems, from families to international NGOs (Borgatti et al. 2009).

The networks we analyze are built using a two-step approach. As our first step, we employed SNA-based stakeholder analysis (Prell et al. 2008) to develop a sampling frame. We began by performing a document analysis on 167 documents made available by the Forest Foundation from which we selected two ongoing projects that met the following criteria: (1) the aim of building the capacity of indigenous peoples to govern their forests; (2) the project being implemented in the Kalatungan Mountain Range; and (3) the project managers being sufficiently well connected in the region. The selected projects are each managed by the Xavier Science Foundation (XSF) and the Mindanao Integrated Management Foundation (MINMAF). XSF’s project aims to build capacity through reforestation and conservation, while MINMAF’s aims to build capacity through knowledge generation. We contacted the eight Lumad indigenous peoples organizations (IPOs) identified in the documents and six agreed to participate in the study (see Table 1).

TABLE 1. Participating Indigenous Peoples Organizations

	LOCAL GOVERNMENT UNIT	CULTURAL ROOT	FOREST FOUNDATION SUPPORTED PARTNER
Bayawon, Lungayan, Lukday, Pendonay, Tandakol Tribal Association (BLLUPENTTRAS)	Lilingayon	Talaandig	XSF
Catal Lumad Development Association (CALUDA)	La Roxas	Talaandig	XSF
Manggayahay Talaandig Tribal Association (MANTALA)	Mt. Nebu	Talaandig	XSF & MINMAF
Miarayon-Lapok-Lirongan-Tinaytayan-Talaandig Tribal Association (MILALITTRA)	Miarayon, Lapoc, Lirongan, San Miguel	Talaandig	XSF & MINMAF
Nagkahiusang mga Manubong Manununod sa Yutang Kabilin (NAMAMAYUK)	Bacusanon	Manobo	XSF & MINMAF
Portulin Talaandig Tribal Association (PTTA)	Portulin	Talaandig	XSF & MINMAF

**FIGURE 1.** XSF project network

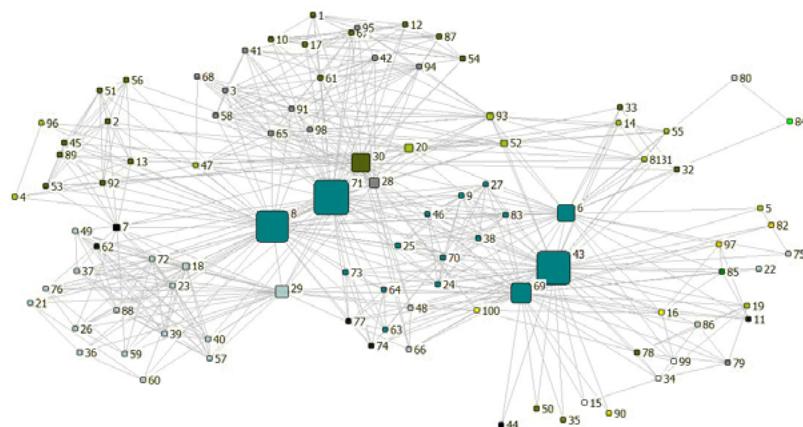


FIGURE 2. MINMAF project network

We constructed networks using 21 documents from XSF and 12 documents from MINMAF. Figures 1 and 2 are network visualizations of the stakeholder networks built through this process. In these visualizations, the size of each node measures its betweenness centrality score, which captures each node's importance for connecting other members of the nodes to each other.

A list of interviewees was drawn from the stakeholder networks using each potential interviewee's betweenness centrality. Actors with high betweenness centrality scores are assumed to know the details of community forestry because they are in the “eye of the storm”; median betweenness centrality scores reflect that the actors are involved, albeit not intimately, so they may have a more holistic vision of community forestry; and low betweenness centrality scores indicate that this individual may be able to reflect (1) barriers to participation, and (2) untapped resources. As our second step, we interviewed these individuals to build the networks used for the analyses.

TABLE 2. Data Collection Protocol

DOCUMENT ANALYSIS		
Number of documents analyzed: 167		Number of independent verifications: 10
Interviews		
Targets		
Round 1	Forest Foundation Partners and their teams	15
Round 2	IPO leaders, Forest Foundation partners, other resource people	18

TABLE 2 (CONT'D)

	CALUDA	9
	BLUPPENTRAS	13
Round 3 (N=62)	MILALITTRA	10
	MANTALA	10
	PTTA	8
	NAMAMAYUK	12

Interviews were conducted in three rounds. In the first two rounds we performed in-person and phone interviews. These rolling interviews lasted over a nine-month period (see Table 2). After performing a text analysis of the first two sets of interviews, we conducted a third set of interviews which combined traditional name-generator surveying techniques with open-ended questions. For this final round, we specifically sought to speak with actors at the frontlines (forest guards and community elders) for these final set of interviews ($N = 62$). The results of all these analyses are reported in the succeeding sections. In the next part, we describe the governance landscape in Mount Kalatungan. This description is informed by a review of the literature, document analysis, and interview records.

Representation of almaciga or Manila copal, *Agathis philippinensis*

Challenges and Opportunities for Indigenous Peoples' Community Forestry in and Across the Kalatungan Mountain Range

"As expressed by our ancestors, we are part of nature and must begin to express an idea of community rather than conquest. Native teachings can help us understand our relationship with life and creation as well as expand our awareness of nature and natural cycles. We can begin to see that the earth is a resource for all our needs, in fact, our only resource."

(Robyn 2002)

Rising as much as 2,824 meters above sea level and spread across an expanse of some 213 km², the Kalatungan Mountain Range is one of the few places left in the Philippines where old growth forests can still be found. Mount Kalatungan is an active volcano and the mountain range spans three municipalities and one city in the province of Bukidnon: Talakag, Maramag, Pangantucan, and Valencia City. The mountain range's forests are important carbon sinks (Lasco and Pulhin 2000) that mitigate climate catastrophes. They also house substantial biodiversity—a key biodiversity area, in fact—and some critical watersheds. Four river basins flow through the mountain range (Pulangi, Cagayan, Muleta, and Maridugao rivers) which connect the landscape to over 35 river systems. These forests also prevent soil degradation and flooding; thus, their absence is consequential for downstream communities. The value of these ecological services became apparent in December 2011 when Tropical Storm Sendong (Washi) tore through Northern Mindanao. Sendong caused the Cagayan de Oro river to overflow, resulting in 1,268 confirmed deaths. The scale of the devastation has been attributed to deforestation and catalyzed efforts to improve forest conservation in the Kalatungan Mountain Range. Because much of the forested land in Mount Kalatungan lies within the ancestral lands of Lumad peoples, they are ideal partners for these initiatives.

Indigenous peoples' status as stewards of the forest cannot be taken for granted. Forests are sites of material and symbolic struggles between actors with different status, wealth, claims to rights, and gender (Fortmann and Bruce 1988; Fortman 1985 cited in Sikor 2006), which manifest as conflicts based in competing claims to the forests that draw on different degrees of legitimacy (Sikor 2006). In this crowded institutional field, the Lumad also struggle against development aggression, violence from skirmishes between the military and rebel groups, poverty, and other outside influences.

The diffuse nature of authority, knowledge, and material resources in the landscape can make grassroots stakeholders, like indigenous peoples, feel powerless to address crucial, landscape-wide challenges (Bodin and Prell 2011). Crucial decisions may lay in the hands of elite actors who use their power to carve out rules that can run counter to their own institutions (Irvin and Stansbury 2004; Fisher et al. 2013; Kellert et al. 2000). During our study, for example, the IPOs that we observed were erecting tribal halls as part of a Forest Foundation-supported project. Tribal halls are considered a sacred space which custom dictates must be built with freshly harvested native trees because:

We will be placing the tribal rules inside that hall. That is where we will bring to life our history and our ancestor's legacy. (Subject 55)

However, harvesting native trees is illegal in the protected area. Moreover, the entire Philippines is under a nationwide logging moratorium. To address this problem, the project manager appealed to the Department of Environment and Natural Resources (DENR) so that the project might

leverage an exemption which allows planted trees to be harvested with the agency's approval. This example illustrates the reciprocity between the IPOs and the government in the landscape. These types of relationships provide opportunities to find support for community forestry. What is happening in the Kalatungan Mountain Range offers evidence that there may be alternatives to the problematic community forestry arrangements observed in other studies (e.g., Lasco 2010, Shackleton et al. 2002, Li 2002).



Representation of agila or Philippine eagle, *Pithecopaga jefferyi*

One thing that distinguishes the Lumad of the Kalatungan Mountain Range is that they have organized into a consortium, the Kalatungan Tribal Council. The council works alongside many formal and informal partners across the landscape to govern its forests. The Kalatungan Tribal Council is headed by leaders from PTTA (president), MILALITTRA (vice president), and NAMAMAYUK (secretary). It is an important forum for promoting community forestry initiatives:

I attribute a lot of success in that area to the tenacity of the head of the Kalatungan Tribal Council. To make progress, IPO leaders and elders left their fields for 2–3 days and their families suffered, believe me. Their labor input is so crucial to their families, that when they attend meetings their families really experience hardship. And for him to keep on pushing them to attend meetings, that shows vision and tenacity. (Subject 11)

Subject 56 tells us, “We [the chieftains of the IPOs that belong to the Council] are like cousins, like brothers.” This is reflected in Figure 3, which depicts the governance network that has emerged through the IPOs’ self-advocacy. In Figure 3, IPOs are represented by teal circles while Forest Foundation supported project managers are represented by gold circles. At the network’s center are PTTA, MILALITTRA, and NAMAMAYUK. Activities organized by actors at the landscape level constitute a second level of forest governance, the first level lies within the community. The Kalatungan Tribal Council represents the majority of the landscape’s IPOs at various platforms like the Protected Management Board (PAM-B), where important decisions are made about forest governance in the landscape.

According to interviewees, the collaboration and coordination that can be observed across the landscape today are fruits of the sacrifices made by indigenous peoples and of leaders like Subject 56, then-Protected Area Supervisor (PASu), Subject 144, and Subject 11 from the Philippine Association for Intercultural Development (PAFID). To illustrate, we

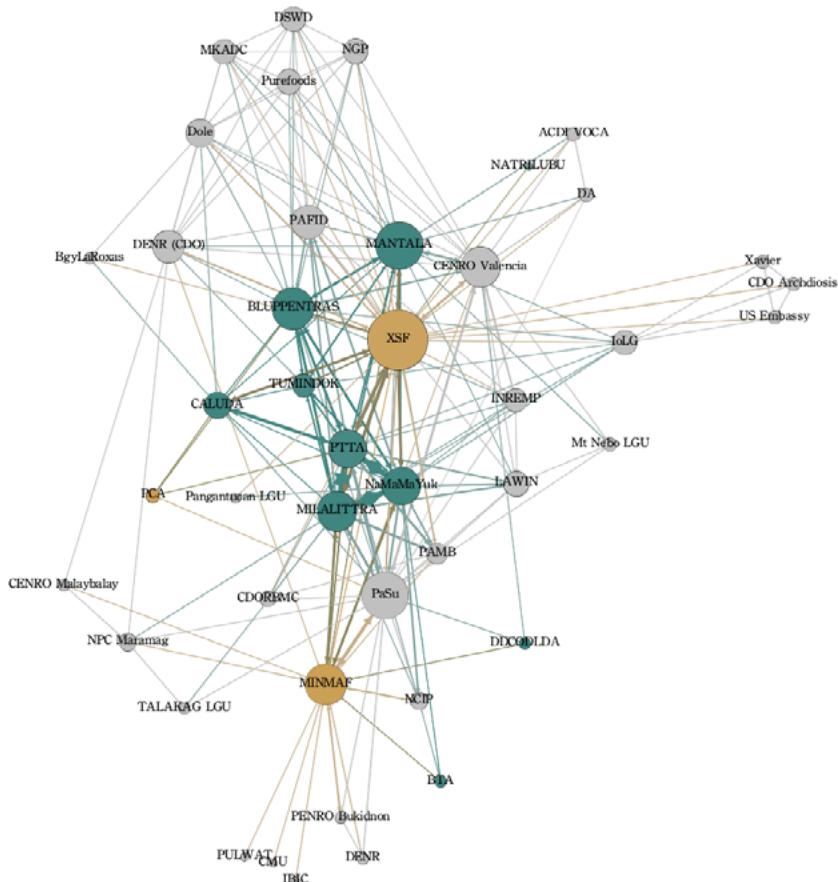


FIGURE 3. Network Map of IP Governance Structure

briefly describe the evolution of the relationship between the indigenous communities and the PASu.

Today, PASu of the DENR sees himself as an advocate for our six IPOs. To facilitate current relationships, both sides had to overcome significant barriers and a violent history, including the murder of a PASu by an indigenous person:

The park supervisor was killed by one of us. Yes, it was very hurtful . . . but before, when members of our community would build homes, he [the PASu] would incarcerate them. If there were outsiders that took our natural resources, he would allow them. But we did not hide the killer, because he needed to answer to the law. (Subject 57)

When the conflict was sparked, Subject 56 of a neighboring IPO recounts:

Although ours was the first of the applications for ancestral domain titles that [redacted] had processed and at that time, [the IPO that the assailant came from] was only in the second month of its Ancestral Domain claim, [Subject 144] spoke with me and the Task Force and requested that we put their claim first because it is a critical area. I agreed and said, “okay, let his go first.” (Subject 56)



Representation of rattan, *Daemonorops gracilis*

And then things improved further through the intermediation of Subject 144:

He asked us about our plans for the forest and we responded, “When it comes to protecting the forest, we won’t touch it because it is a sacred area.” He told us that it would be good if we could hold a dialogue with the barangay captain, mayor, and DENR so that we can harmonize our efforts. He told us, “You have headline, the laws of the tribe come first, behind you is the law of the PAMB, let us all agree so that there will be no more problems.” When [Subject 144] took responsibility for the protected area, that is when we were able to connect to one another. (Subject 56)

Today, the PASu even hires qualified indigenous people from area IPOs into their ranks. The current PASu describes how the relationship between indigenous peoples and government agencies can be beneficial to their agency:

[A]ll of our tribal leaders . . . there are even times when they represent our office in other forums. As members of the Council of Elders, they have a deep knowledge of our program operation.

The collaborative governance framework in place in the landscape today, while not perfect, offers many lessons for how conflicts can be managed, cooperation leveraged, and challenges overcome when efforts are made to put IKSP at the center of forest governance.

IKSP are complex systems of practices, rites, rituals, and rules cultivated through interactions with nature that span multiple generations. One of the main challenges confronting researchers and practitioners interested in supporting forestry is to develop community forestry alongside indigenous peoples so that IKSP is prioritized as the main driver of practice within the community. The indigenous peoples we interviewed are very open to learning and using scientific knowledge and tools:

Some of the teachings of our partner NGOs added onto our values. Learning from them raised our knowledge about the multiple benefits that forests yield. For example, about the carbon sequestration that a tree performs. The scientific knowledge that the NGOs taught us was good and we needed to work on that, which is why we gathered a lot from outsiders to raise our knowledge of the environment for the next generation. (Subject 52)

But while they are quite willing to take advice from scientific experts, they also insist on practicing community forestry on their own terms:

Slowly, we are continuing the projects that were started, following the parameters of our culture. We are thankful because in the past our culture almost was left behind. We could barely touch the forest. (Subject 52)

IKSP allow indigenous people to thrive in and sustain their own environments. The IKSP of each indigenous community, while sharing many features with others, is (as we observe) unique, drawing its uniqueness from the specific features of the land and the generations of human, plant, and animal life that have inhabited it (Grenier 1998). Subject 57 describes his people's IKSP in this way:

The life of the Talaandig tribe is intertwined with our forests . . . The forest provides livelihood, giving the Talaadig rattan and fruits. The forest is also a school, where our children become familiar with our fauna. It is a church, where we hold our rituals. And it is a healer, giving us herbal medicines. Among the four components of our tribal culture, the forest is the most sacred.

One uniting feature is that IKSP is always rooted in indigenous peoples' relationship with the environment. Here, we illustrate how commonly held relationships with the flora and fauna housed in the landscape bounds but also distinguishes the indigenous peoples, reflecting the differences in their forests and culture. We constructed a cultural network based on the information on cultural uses of native flora and fauna by four IPOs that was documented through MINMAF's project (Figure 4). In this diagram, the deep green circles represent tribal communities, while light green circles are plants and animals.



Representation of limukon or white-eared brown dove, *Phapitreron leucotis*

According to some estimates, there are around 429 species in Mount Kalatungan, many of which are important to forest dwelling communities

(Malate 2016). In Figure 4, the central cluster of cultural resources are flora and fauna that all four IPOs commonly ascribe cultural value to. For example, the *limukon/lumiken/alimukon*, or white-eared brown dove, holds a special significance for all of the tribal associations who participated in the study (although their practices and beliefs do differ). The common cultural use demonstrates that there really is a shared value for the forest among these tribal associations. Strong IKSP provides a firm basis for community forestry. Subject 122 provides the following assessment of how different relationships with nature among indigenous communities impacted project implementation:

In [Redacted], their guides were excellent compared with other groups... You can see it in all aspects from their forest restoration efforts, their monitoring and apprehension of illegal loggers.

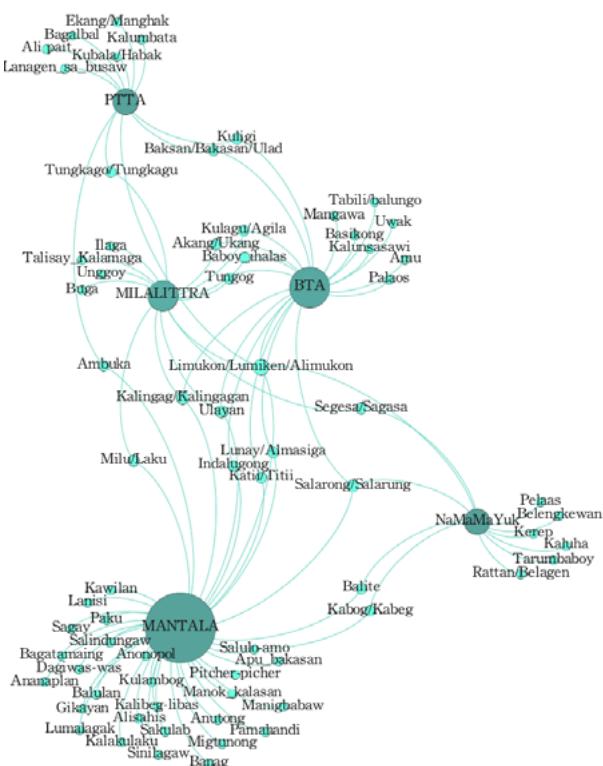


FIGURE 4. Local names of forest flora and fauna identified by respondents as valuable to their communities

These commonalities contribute to cultural practices, norms, and rules which smooth collective action and in turn facilitate forest governance within and across the landscape. In the next sections, we use SNA to better understand forest governance at the landscape level and at the community level.



Representation of bakaka or blue-capped kingfisher, *Actenoides hombroni*

Using Networks to Leverage Influence within the Landscape

We are happy that it is not only our ancestors who were concerned with caring for nature, but also other groups. This gives us more inspiration, and it strengthens our motivation, it also enriches our traditional approaches to taking care of our natural resources and gives us more strategies on how to manage them.

— Datu Minu

IPO leaders operate within a multilevel governance and therefore need to “manage upward, downward, and outward” (O’Toole et al. 2005, 46). Good leaders are willing and able to manage their relationships to introduce new resources to their communities or to circumvent problematic power structures. Subject 166 offers this insight:

What we need is some kind of landscape governance which gives a broader, ecosystem perspective. That’s what we need to introduce, especially to the young generation. We need to open their eyes . . . What we need right now is understanding, which would really bring or invite people to work together, collaborate, link up, network.

To examine IPO involvement in landscape governance, we use the interview records to build a 191-actor network. The actors in this network are indigenous peoples, local, provincial, and government officials from various sectors including the environmental, agricultural, and social welfare sectors, religious leaders, universities, research institutes, and foundations.

Network position determines the extent to which leaders can spread their ideas, garner support, and sustain a project from inception to implementation

(Balkundi and Kilduff 2006). It is measured using a range of graph theoretic calculations that fall under the category, centrality (Faust 1979). Favorable network positions enable individuals to influence others in the network (Bonacich 1987, Valente et al. 2008). In Table 5, we ranked each IPO leader's position in the landscape in terms of their network centrality measures (degree, power, and betweenness centrality). Since different centrality measures capture different types of network influence, these measures reveal their capacities to play various roles in the landscape.

TABLE 5. Network Position of Tribal Chieftains*

	RANK		
	DEGREE CENTRALITY	POWER CENTRALITY	BETWEENNESS CENTRALITY
BLUPPENTRAS Leader A	51	88	33
CALUDA Leader A	39	79	22
MANTALA Leader A	67	78	82
MANTALA Leader B	28	46	34
MANTALA Leader C	25	45	27
MILALITTRA Leader A	6	10	1
NAMAMAYUK Leader A	16	7	101
NAMAMAYUK Leader B	5	3	3
PTTA Leader A	2	6	2

* Names are anonymized to protect the identity of these actors. All of these actors are elders within their respective IPOs, which means that they also play a leadership position within their IPO.

Betweenness centrality captures an individual's capacity to serve as an intermediary between nodes and to direct resources in the network (Bodin and Prell 2008). We use it to gauge an individual's capacity to champion a project or cause within their community. Champions are key in "setting and maintaining clear ground rules, building trust, facilitating dialogue, and exploring mutual gains" (Ansell and Gash 2008). In other words, they manage the network. MILALITTRA Leader A has the highest betweenness centrality measure in the entire landscape (closely followed by PTTA Leader A and NAMAMAYUK Leader B). Moreover, BLUPPENTRAS Leader A and CALUDA Leader A are in positions which, if they were linked up with other partners in the landscape, could enable them to better champion community forestry initiatives in the landscape. In MANTALA, Leader B's centrality measures indicate that he can also champion projects within the domain if he takes on an even more prominent leadership role.

Degree centrality reflects an individual's overall level of connectedness. It is a count of an actor's contacts in the network which is then normalized against the network size. Leaders ranked high in terms of degree centrality could be good project sponsors. Sponsors can leverage their social status to raise a project's legitimacy and buy-in (Bryson et al. 2012). It is no surprise that the Leaders of the three IPOs that also lead the Kalatungan Tribal Council have the highest degree centrality. However, one disadvantage of having a high degree centrality is that actors can feel overwhelmed by their many responsibilities. This can take a toll on their leadership capabilities. In this regard, efforts by the Forest Foundation to harmonize activities in the landscape are important:

The Forest Foundation has really been trying to get us to talk and to discuss how we can be more harmonized not only in terms of making sure we are not causing scheduling conflicts, but also to increase synergies. (Subject 190)

Power centrality measures the influence an actor derives by being able to bridge poorly connected nodes to the rest of the network (Bonacich 1987). This means that they are able to bring new actors into the network. Actors with high power centrality can fulfill another important role, which is to empower and advocate for weaker stakeholders (Ansell and Gash 2008). Power centrality allows actors to loop in poorly connected actors into the network. In other words, high power centrality actors are in a position to "generate effective spaces for participation" by indigenous peoples (Adam and Etalyeb 2016). As reported in Table 5, the IPO leaders with the highest power centrality are leaders from PTTA, NAMAMAYUK, and MILALITTRA. One thing that makes these datu willing and able to fulfill this role is that they possess

that level of education and understanding that allow them to effectively represent the voice of the council. (Subject 19)

The fact that these leaders have high betweenness and power centrality indicates that they manage to be integrated within the landscape without losing their independence.

Project managers can also make use of their own centrality measures to assess their level of connectedness, their need to cultivate relationships, and critical resource people in the landscape. For example, even though Subject 183 of XSF is not an indigenous person, she also ranked top 10 in the network in terms of degree centrality and betweenness centrality, which is a testament to Subject 183's reputation as a trustworthy collaborator. This makes Subject 183 an ideal project manager (champion) and also an ideal resource person (sponsor).



Representation of talumbaboy or Mindanao tree shrew, *Urogale everetti*

Using Networks to Design More Effective Community Forestry Projects

The life of the tribe is dependent on the forest. It is also where we exercise the laws of the tribe. It is like a book that holds our history for our children.

— Datu Jhonny

The six IPOs that we study engage in community forestry to varying extents and have earned reputations as champions of sustainable forestry in the landscape. This is in part due to the effectiveness of these IPOs' forest guards. Officials in the landscape expressed admiration for their ability to detect and prevent illegal activities. Indigenous forest guards are motivated foremost by their communities' enduring relationship with the forest which, as discussed above, they hold as sacred. During the time of this study, forest guards were able to stop a group of individuals from illegally harvesting rattan seedlings (worth an estimated PHP 200,000). The forest guards apprehended and brought them to their elders where they were informed that:

the penalty for that is high, because it is as if you stole things from our home. (Subject 53)

It is this love for the forest that, as described by the PASu, inspires them:

There are times when, in enforcing these environmental laws, their lives are threatened—but they handle it, against all odds. They reason that regardless of who the PASu is, the forest is theirs and they must protect it.



Representation of salarong or Philippine deer, *Rusa marianna*

Forest guards contribute greatly to community forestry. They protect the forest by conducting patrols where they sometimes apprehend intruders and by establishing a fire line to mitigate forest fires; they collect, record, and report data on the forest to the DENR; and they revitalize the forest by providing labor to their seedling nurseries and participating in tree-growing (see Chart 1). This latter set of activities may also provide sustainable livelihoods. The activity which forest guards report as occupying the greatest share of their time is patrolling the forest. When patrolling the forest, guards also routinely collect and report data to the DENR. Some of this data is used to inform reforestation initiatives which span the whole process of cultivating the seedlings, identifying sites for planting, and the planting itself.

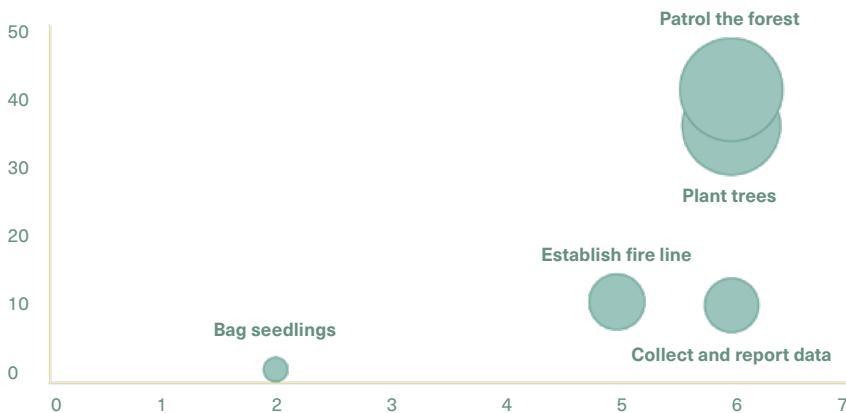


CHART 1. Forest Guard Main Activities*

*The x-axis reports the number of Ancestral Domains engaged in this activity and the y-axis reports the number forest guards that identify this as an ongoing activity.

There are many different types of forest guard programs, and some IPOs have more than one. Forest guards are selected by each community's elders. They receive different types of support from their partners (including the City Environmental Resources Offices or CENRO, the Protected Area Management Board or PAMB, and XSF). The level and type of support varies from training (e.g., basic mountaineering courses), to materials, and compensation. If forest guards receive payment, it tends to be too low to cover the opportunity costs of participating in community forestry, which include:

income and time for the education of our children, so that they can cultivate their knowledge of our culture and customs. (Subject 52).

Moreover, the current political climate has made it even more dangerous for environmental defenders like forest guards. Butts et al. (2019) find that 1,558

environmental defenders in 50 countries were killed in the 15-year period from 2002 to 2017. Global Watch argues that indigenous peoples are among the most vulnerable to violent attacks and ranks the Philippines as one of the top five most unsafe places for environmental defenders. At the same time, under-resourced government agencies must be creative in order to provide financial support. One LGU describes their struggle to support community forestry:

The environmental sector is not really prioritized, so every year we need to search for funds appropriation. Previously, the program's budget was taken from the city's Gender and Development program. This year we appropriated funds from the Peace and Order Committee. (Subject 64)

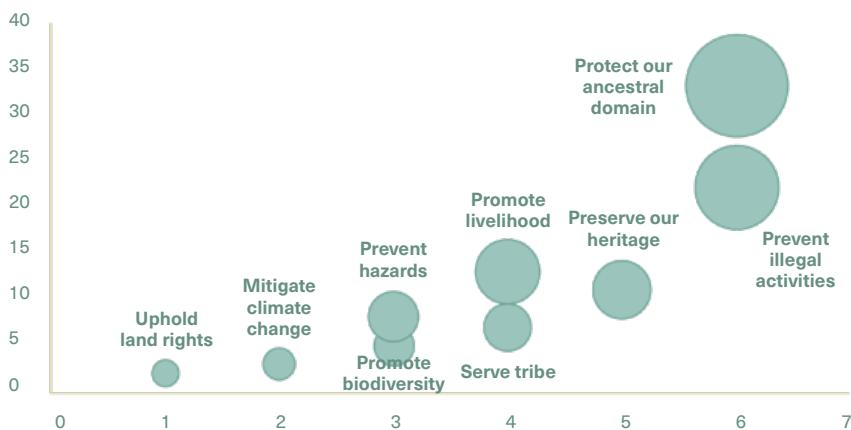


CHART 2. Indigenous communities' main community forestry priorities*

*The x-axis reports the number of Ancestral Domains engaged in this activity and the y-axis reports the number forest guards that identify this category as a priority.

IPOs identified nine key forest governance priorities, with securing ancestral lands from interlopers considered the main priority of community forestry (Chart 2). These forests are sacred and therefore their rules forbid setting foot within them without first asking permission through rituals or *pamuhat*. Otherwise, the priorities varied widely within and across IPOs. Climate change mitigation, promotion of biodiversity, and hazard prevention were key priorities in their ancestral domains. Joining these intermediary goals are objectives connected to Lumad identity, such as preserving their heritage, serving the community, and upholding indigenous peoples' rights to their land, which involves having and implementing a plan for natural resource conservation within their territories. The diversity of priorities identified by the forest guards reflects the complexity of the landscape, which requires that it be attended to in myriad ways (Kuuluvainen 2009; Pinho et al. 2015). This complexity requires IPOs to make difficult choices that involve complicated tradeoffs.

The priorities of the community may sometimes conflict. One priority that often runs counter to the other priorities is promoting livelihoods. Economic

hardship is one of the main sources of conflict in the community. It can lead community members to violate their indigenous principles and rules. Some of elders attribute these violations to poor cultural education:

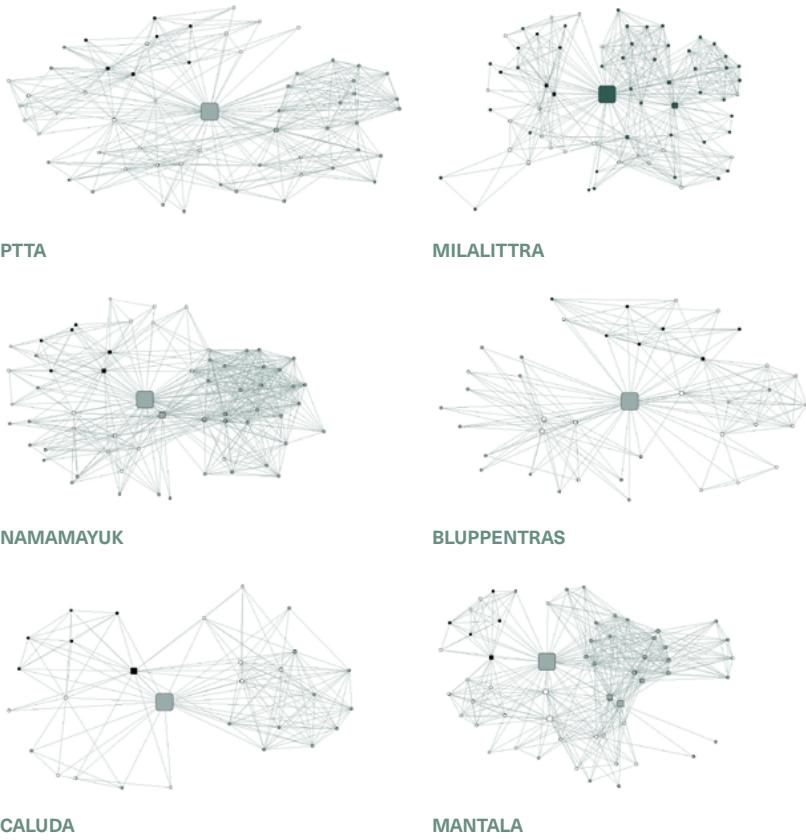
But there are also some who do not sufficiently pass down or socialize their children into the traditional culture and customs. So when they face problems, particularly hospitalization, they place a lien on their land. They see this as the only solution because their understanding of culture is insufficient . . . This is why they fail to recognize that the tribe is here to help them, especially in times of physical illness. This should be the center of our knowledge, to know that your neighbor is there to help you. (Subject 52)

Even outsiders with altruistic aims can, even when they are careful, trigger some internal conflicts over livelihood opportunities. This is why project managers must consider the impact that their interventions will have on the IPO with great care. In doing so, project managers and community partners can use SNA as a tool to improve project implementation (Bodin and Prell 2008; Valente et al. 2015).

Network measures like the clustering coefficient, density, and centralization provide clues about how communities are organized. This information can be useful for the development and design of the projects. We demonstrate how by building networks for each IPO, which include actors working on the frontlines (e.g., forest guards and DENR field officers), IPO elders, NGO partners, and government officials who are explicitly identified by community members as partners (see Figures 5–10).

Table 3 reports the clustering coefficient, density, and centralization measures for each of the IPO networks. These measures have been normalized for the size of the network. The IPO network clustering coefficients ranged from 0.487 to 0.716. Clustering coefficients tell us about a network's tendency to be organized into tightly knit subgroups. The tendency to break down into subgroups is driven by homophily (Bodin and Prell 2011), the predisposition of actors to connect with people who are similar to them (McPherson et al. 2001). Therefore, when clustering coefficients are high, there is a strong potential for goals to become misaligned, giving rise to conflict. Misaligned goals can stand in the way of program implementation, as one of the FFP partners discovered at the outset of their project:

It was when we started the project already, one of the organizations, a new set of officers came and there was a discussion. Their primary concern was with a livelihood program. But our project was never intended to have a livelihood component, so we decided that we could not work together at this time. The conflict stemmed from within the community: they are not united. (Subject 77)



FIGURES 5–10. Network representations of community forestry.
Activities within the community are mediated and steered by IPO leaders, represented as the large circles at the center of each IPO network.

TABLE 3. Network Measures and Validating Survey Score

	CLUSTERING COEFFICIENT	NETWORK DENSITY	NETWORK CENTRALIZATION
BLLUPPENTRAS	0.487	0.217	0.825
CALUDA	0.716	0.360	0.626
MANTALA	0.655	0.254	0.559
MILALITTRA	0.548	0.173	0.735
NAMAMAYUK	0.664	0.271	0.741
PTTA	0.547	0.203	0.810

It is therefore useful from the outset of a project to know how community networks are structured so that implementation roadblocks can be anticipated and circumvented (Valente et al. 2015). Based on the clustering coefficients, project managers are advised to invest energy at the beginning of a project to secure buy-ins from the communities with high clustering coefficient (NAMAMAYUK, MANTALA and CALUDA). Once the goals of all stakeholders are aligned, implementation in IPOs with high clustering coefficients will be smooth. Instead, in IPOs with low clustering coefficients, while less energy must be invested in the front end, communication needs to be more constant in the course of project implementation to keep any potential conflicts at bay.

Decision-making in the communities is deliberative. As described by one of the chieftains:

Although the leader has the final say, it is still necessary to consult the people and ask them what their opinions and thoughts are on the issue. For example, when there is a conflict, we call on our committee, the Panahusay, and hold a meeting where I ask them their opinion on it. So when we hold discussions on our tribe's history, we still involve the Panahusay and our Panagubod [Historian] who recounts what happened in the past so that we can avoid conflict by basing our decision on that as well. We used this process when discussing our current project with Forest Foundation. (Subject 58)

Deliberative processes are facilitated by network density. Density is measured by taking the proportion of relationships that are present in all relationships that could potentially be formed. High density indicates that a network has more trusting relationships. Trust raises the capacity for effective deliberation, negotiation, resource mobilization, and collective action (Hileman and Lubell 2018; Bodin and Prell 2011; Henry and Volland 2014). Trust lowers transaction costs (Emerson et al. 2012) and facilitates the development of rules, compliance with those rules and norms, and promotes knowledge sharing and learning (Ansell and Gash 2008). All of the networks have low density (density ranged from 0.173 to 360), due in part to the recent entrance of many new actors (e.g., the Philippine Coffee Alliance) who have yet to develop tight-knit relationships with the communities. Project managers could also benefit from accounting for such dynamics when considering whether a project is worthwhile.



Representation of ulayan or Philippine oak tree, *Lithocarpus caudatifolius*

Centralization provides a measure of leadership. It represents the extent to which a single actor dominates a network's relationship structures (Sandström and Carlsson 2008). When centralization is high, activities in the network are mainly organized by one or a few central actors. High centralization is a measure of strong leadership within the IPO. Leadership can be a decisive factor for jointly addressing a shared problem (Ostrom 2009; Huxham and Vangen 2005), like deforestation. It is necessary for establishing and enforcing agreed upon rules, especially when groups compete for access to resources. Strong leadership can also help guide deliberation, settle conflicts, and champion endeavors (Agranoff 2006; Bryson et al. 2006; Carlson 2007). In line with the literature, we observe that IPOs are advantaged in cross-cultural collaborations when their leaders are both grounded in their culture and possessing an understanding of Western science (Martello 2008; Mato 2000). For example:

[redacted] has a leader who is highly educated but still very grounded in his cultural values. He makes it easier for his community to understand what we're trying to do and also for us to understand why a tribe is declining to participate. (Subject 19).

Indeed, the effectiveness of forest governance in the landscape is widely attributed to IPO leaders:

First, it is the tenacity of the leaders. Even I would have surrendered many times, but not them. Second, these Datus have spotless reputations and credibility. They are very selfless; anyone can clearly see it. (Subject 11)

Centralization ranges from 0.559 to 0.825. CALUDA has a low centralization score because the community is a subsidiary of PTTA and so the community recognizes both its own leader and PTTA's. In the case of CALUDA, this does not seem to cause friction because the chain of command is clear (all members of CALUDA named their chieftain, and not the chieftain of PTTA, as the individual that should to be consulted over community forestry). Instead, the low centralization score for MANTALA, combined with the survey results, indicates some potential problems which can affect project implementation. When asked who in MANTALA should to be consulted regarding community forestry, forest guards named three different individuals. This lack of clear leadership can cause frictions, as one of the interviewed forest guards describes:

It makes it difficult to accept projects intended to help us because people will automatically disagree even without trying to understand what the project is about. Just like when [redacted] approached us with its project, the leaders were divided and some disagreed because it did not have a livelihood component. It was a challenge to convince them. Afterwards, everyone was thankful for what [redacted] did."

Project leaders could use centralization scores to consider how to approach IPO leadership and to assess the amount of support that their champions on the ground need to expend on getting the rest of the community to buy in.

To summarize, network measures like the clustering coefficient can indicate the intensity of early involvement required for the successful design and implementation of a project, while density indicates the level of trust within a network. Finally, centralization provides some clues on the need to cultivate champions within the IPO. Knowledge gleaned from these analyses can be enriched by insights offered by applying SNA to the landscape-wide network.



Representation of ekang or giant scops owl, *Otus gurneyi*

A Landscape Full of Opportunity?

The nearer that indigenous peoples are to the forest, the more relationships they have to it.
— Professor Toledo Bruno

During our time in the landscape, the leaders identified further opportunities for strengthening community forestry in the Kalatungan Mountain Range. All three of these are tied to IKSP.

First, indigenous peoples would like to continue to provide their children with an education that coheres with their own IKSP. When the mother culture of the indigenous community becomes too distant from its strong root in the environment, the consequences for the forest are dire (Malate 2016). The reverse is also true. This is why passing IKSP down to indigenous youth is a priority for these IPOs. One leader told us:

And now the forest is shrinking, this spells the end for our tribe because we are dependent on the forest. This is why I am grateful that now we have teachers who can teach our children here, within our ancestral lands.
(Subject 55)

And when it comes to their education, the IPOs are not willing to compromise on IKSP:

We placed a *sala-on* (penalty) on the school's principal, who was an outsider. The principal looked down on our culture. Word reached us that the principal insisted that the school was for study and refused to hold a ritual. We informed the division and the principal was sent away from [Redacted] Elementary and they paid their obligation (*sala*). (Subject 63)

The second way to improve community forestry is to uphold indigenous peoples' rights to their ancestral land. Modern life can threaten indigenous peoples' relationship with nature, a disruption which is intensified by land-grabbing.

The National Commission on Indigenous Peoples (NCIP) may seem like the obvious champion of indigenous peoples when it comes to upholding their land rights. However, the relationship between the NCIP and indigenous peoples in this landscape is fraught. Subject 57 (the head claimant of an IPO) articulates:

When the NCIP was formed, we believed that they were our advocates. As it turns out, and we absolutely did not expect this, it is as if they are our adversaries. They have initiated processes which would allow others to seek permission to ruin our forests.

The NCIP was formed and given the mandate of implementing 1997's Indigenous Peoples' Rights Act (IPRA). IPRA supports the overarching framework offered by community forestry (Pulhin and Inoue 2008) by recognizing that indigenous peoples' right to their ancestral lands is universal, indivisible, interdependent, and interrelated (Schippers 2010; Pulhin and Inoue 2008). More than two decades later, many indigenous peoples still struggle to secure their ancestral domains through IPRA, while in a few instances land titles were mistakenly granted to false and opportunistic claimants. The implementation gap has been attributed to a number of factors including (1) financial and technical barriers imposed on applicant indigenous communities; (2) inadequate government resources allocated to this process, (3) conflicts between IPOs and local government, (4) disagreements within IP communities about who the head claimant should be, and above all, (5) resistance, corruption, and incompetence at the NCIP (Drbohlav and Hejkrilk 2017; Garrity 2001; Molintas 2004; Carino, 2012; Capistrano 2010; Minter 2014; Ting et al. 2008). In consequence, IPOs have cultivated champions elsewhere, including local government.

Third, leaders expressed a wish for greater representation in local government. Community forestry is also shaped by local government: its capacities, its interests, and its stability. One project partner gave the following example:

Although the barangay is run by a barangay captain, in terms of population the majority are Talaandig who report to their community elders, so when there are government edicts that conflict with the culture of the Talaandig, who will be followed? (Subject 166).

When supportive, the LGU can be instrumental in promoting community forestry. However, it can also be an obstacle. When local government views IPOs as challengers to their authority rather than partners in governance, the results can be detrimental to both ecosystems and to governance writ large (Capistrano 2010). For example, one of our IPOs which spans four local governments and with its members living in one jurisdiction expresses positive sentiments about their local government:

It is my responsibility to represent the tribe's interests, especially the forest, at the (local government) by ensuring that we get a say regarding whether organizations or projects will be allowed in our ancestral domain. (Subject 88)

Another member of the same IPO living a neighboring jurisdiction claims that:

Our local government was not supporting the tribe's ideas and activities . . . This is one of our main struggles . . . For now, the barangay and the tribe are not united and this discourages tribespeople from participating in different initiatives." (Subject 135)

This underlines the need for an effective Indigenous Peoples Mandatory Representation (IPMR) in local government. Local governments at all levels are required by IPRA to have an IPMR, however this role and processes for the selection of IPMRs remains poorly understood. Empowering IPMRs represents just one of many opportunities for more effective community forestry in the landscape which go hand in hand with strengthening their IKSP.

Conclusion

In Kalatungan, the future of the forest and of indigenous peoples are inseparable. Across the globe, the future of the indigenous peoples and the future of humanity are inseparable. According to the IPCC, we have little more than a decade to reverse our course toward a hothouse earth (Steffen et al. 2018; IPCC 2018). Forests are key to taking us onto an alternative path. This is why it is important that the design of forest conservation and regeneration projects takes into account how these projects are shaped by and shape the experience of forest dwelling communities.

In this chapter, we described the current governance framework within the Kalatungan Mountain Range and describe how this framework is held up by relationship dynamics that emerge from efforts by the indigenous peoples in the landscape to protect their forests.

The section “Challenges and Opportunities for Indigenous Peoples’ Community Forestry in and Across the Kalatungan Mountain Range” uses network analysis to describe two types of relationship structures in the landscape. First, it shows how IPOs and other organizations are connected to one another through their participation in landscape governance. This analysis reveals that not only are IPOs connected to one another through their advocacy, they are also connected to many similar organizations, like Forest Foundation partners, XSF and MINMAF, as well as government agencies (see Figure 3). For indigenous peoples practicing community forestry, the network analysis reveals additional opportunities to form partnerships. For example, the SNA indicates that XSF is a key player in the landscape. This suggests that XSF can fulfill the role of a boundary organization that facilitates the transfer of technology and scientific knowledge to IPOs in the landscape. Less centrally located organizations like PCA could benefit from partnering with XSF. However, it is also important not to overburden indigenous communities. Participating in projects takes them away from their farms and means of livelihood. The network analysis can also reveal if too many projects are concentrated in one area of the landscape and whether there is a redundancy among projects and initiatives. Not only does SNA mapping provide important indications of who the most active network players are, it also indicates who the least connected actors are. For instance, the network analysis also suggests that local governments lie at the periphery of these networks. Bringing them more closely into the fold of the network may strengthen relationships between local government and IPOs, which in turn may help raise the sustainability of community forestry in the landscape. The second analysis illustrates how common cultural practices bind IPOs across the landscape together (see Figure 4). At the same time, it also shows—through unique IPO-to-nature relationships—the richness of biodiversity across the landscape.

The section “Using Networks to Leverage Influence within the Landscape” reveals intervention opportunities within the forest landscape by showing how different actors are positioned in the network. Projects benefit from the sponsorship of actors with high degree centrality. High degree centrality actors tend to have a strong and positive reputation in a landscape, and many people are likely to get on board with a project once it receives these individuals’ stamp of approval. When a project leader needs to access resources (e.g., knowledge or technological resources), it may be beneficial to work with individuals with high betweenness centrality because these actors are the networks’ “points of contact.” Finally, if project managers are interested in working with hard-to-reach or hard-to-serve populations, it may be good to work with actors who have high power centrality and can use this position to bridge to those target

groups. This analysis can help program managers understand who may be better able to advocate for or sponsor their project within IPO communities and across the landscape. In contrast, the analyses performed in the section “Using Networks to Design More Effective Community Forestry Projects” provide a profile of the structural characteristics of each community, thereby revealing hidden undercurrents which may facilitate or block a project’s success.

In the previous section, we make three recommendations to improve forest governance in the landscape (even if they don’t entail conventional forest conservation or rehabilitation) which are critical for preserving biodiversity in Mount Kalatungan and on all forests that overlay ancestral lands: (1) that activities that strengthen IKSP—particularly intergenerational learning on IKSP—should be supported; (2) IPO efforts to secure their Certificate of Ancestral Domain Title (CADT) should be championed; and (3) indigenous peoples should have stronger representation at all levels of government, particularly local government.

In sum, we illustrate how network positions can be used to understand actors’ positions (and influence) within the network, as well as crucial intergroup dynamics which may help or hinder project implementation. Network analysis can, for example, indicate if there is fragmentation or conflict within a community. Understanding whether there are tensions or fault lines helps project managers avoid triggering conflicts and/or helps them avoid disagreements with community members which may derail their project. We hope that this demonstration may be useful for project managers interested in implementing community forestry projects on indigenous lands.

It is also important to acknowledge the limitation of SNA. While SNA can capture relational dynamics, when applied as a tool for improving project implementation, network analysis cannot explain what causes these observed dynamics. Indeed, the local governance institutions and networks observed in this chapter are embedded within complex socio-ecological systems which require a wide array of approaches to fully encapsulate them. In other words, insights from SNA must be triangulated against and complemented with other methodological tools in order to fully unpack the complexities inherent to landscapes like the Kalatungan Mountain Range.

This chapter aims to offer insights into how SNA can be used to design projects as well as to evaluate their merits. We argue that SNA can be used to find ideal communities to target for intervention, to identify potential problematic relational patterns which can be mediated ahead of time, and to find champions and targets. SNA is just one of many tools that can be used to deepen project managers’ knowledge of the socio-ecological systems that they aim to sustain. Careful attention to relational dynamics not only raises the potential for successful project management; it can also ensure that the design, implementation, and evaluation of projects is more inclusive and ethical.

Notes

1. The Indigenous Peoples Rights Act (IPRA), or Republic Act No. 8371 of the Philippines, defines indigenous people as: “homogenous societies identified by self-ascription and ascription by others, who have continuously lived as a community in community-bounded and defined territory, sharing common bonds of language, customs, traditions and other distinctive cultural traits, and who have, through resistance to political, social and cultural inroads of colonization, become historically differentiated from the majority of Filipinos.”
2. These documents include funding applications and technical and financial reports on project progress.
3. This is the first project for MINMAF, and the second for XSF. XSF’s first Forest Foundation project was Payment for Ecosystem Services (PES), which was pilot-tested in 2014 together with the Miarayon-Lapok-Lirongan-Tinaytayan Talaandig Tribal Association (MILALITTRA) through the support of the Mindanao Development Authority (MinDA) and Cagayan de Oro River Basin Management Council (CDORBMC), among others.
4. Betweenness centrality measures how often each node lies in the path of two other nodes, relative to all other nodes in the network.
5. These networks were validated by consultation (interviews and focus groups) with partner organizations and other experts working in the region.
6. The authors would like to note that they also attempted to contact the NCIP, PENRO, and various LGUs multiple times to request interviews. They did not receive any acknowledgement of their inquiries.
7. The moratorium was established through Executive Order no. 23 in 2011: “Declaring a Moratorium on the Cutting and Harvesting of Timber in the Natural and Residual Forests and Creating the Anti-Illegal Logging Task Force.”
8. Interestingly, Kuizon (1963) points out that beliefs about this bird spans peoples worldwide, including communities in Ireland, Russia, and Spain. This speaks to the ecological connections which link humankind.
9. The authors describe environmental defenders as “people engaged in protecting land, forests, water, and other natural resources.”
10. In a few interviews, it was revealed that some Certificate of Ancestral Domain Title (CADT) applications have remained unresolved for decades.

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