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# Collaborative Community-based Governance in a Transboundary Wetland System in the Ecuadorian Andes

## Opportunities and Challenges at a Proposed Ramsar Site

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International mountain conservation paradigms have shifted in the past 30 years from establishment of centrally governed protected areas that exclude communities, to collaborative and community-based

conservation stewardship with communities that depend on resources for their livelihoods. The Convention on Wetlands of International Importance (Ramsar Convention) embodies this collaborative paradigm by suggesting that people and local governments can be collective stewards for the “wise use” of wetlands on which they depend for water resources and livelihoods. Although collaborative approaches are increasingly recommended to govern large and complex mountain waterscapes across multiple jurisdictions, recent international case study comparisons highlight the site-specific nature of institutional design and the effect that changing social relations and overlapping or conflicting rights and boundaries have on promised collaborative outcomes.

This article illustrates the usefulness of a recently developed community-based natural resource management comparative framework for assessing the feasibility of collaboratively governing a proposed Ramsar wetland in the Southern Andes of Ecuador across multiple communities and jurisdictional boundaries. By using data from a rapid ethnographic assessment, US and Ecuadorian students and faculty found local and institutional support for wetland protection. The framework’s preconditions were useful in identifying conflicts among and within communities, and among agency rules and resources; these conflicts could limit the feasibility of community-based and collaborative management unless coordination authority is clarified, especially at the proposed transboundary scale. This study showed that increasing attention to land tenure conflicts and institutional frameworks is needed for any collaborative governance design to be sustainable, which confirms political ecology findings.

**Keywords:** Ramsar; páramo; wetlands; governance; comanagement; Andes; Ecuador.

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## Introduction

Nearly 40% of the world’s population depends on water that originates from mountain sources (Beniston 2003; Buytaert et al 2006), and many countries have declared headwaters as protected areas. Given a lack of national management capacity and the recognition of livelihood rights, international conservation practice has shifted from the exclusion of people from protected areas to collaborative conservation models such as community-based natural resource management (CBNRM), comanagement, and adaptive management (Agrawal and Ribot 1999; Falletti 2005; Berkes 2007; Ribot et al 2010). These paradigms call for the decentralization and

devolution of some decision-making authority from the national to the local level: the intent is to balance environmental and socioeconomic goals; involve communities’ institutions, knowledge systems, and practices in regulation; and create linkages between constituents and levels of government for resource stewardship and sustainable use (Armitage 2005; Gruber 2010). Collaborative approaches are increasingly recommended for the governance of larger and more socially and politically complex natural corridors and mountain landscapes (Cash et al 2006; Heikkila et al 2011; Norman et al 2012), as evidenced by their use in guidelines for the management of wetland systems designated for their international importance under the

United Nation's Ramsar Convention (Ramsar Convention on Wetlands 2013).

However, the implementation of decentralized approaches can be especially challenging given the complex cultural, economic, political, and physical landscapes in mountain watersheds (Zimmerer 2000; Danby and Slocumbe 2005; Muhweezi et al 2007). To promote appropriate and comparative research and practice, Gruber (2010) recently synthesized case studies to develop a useful framework of design factors and conditions that accompany successful and failed approaches to community-based and collaborative resource management, which he defines to include collaboration at larger scales. The purpose of this article is to demonstrate the usefulness of such a framework for understanding the possibilities for community-based and collaborative transboundary conservation of the proposed Ramsar designation of the Saraguro-Oña-Yacuambi wetland system along the continental divide in southern Ecuador.

High Andean wetlands are a critical source of ecosystem services for local communities and downstream users and are world renowned for their biological diversity, harbor high levels of plant and animal endemism, and serve as important stopovers for migratory birds. However, most of these wetland systems are disappearing due to agricultural expansion, grazing, mining, and fire. In 2009, 8 South American nations adopted *The Regional Initiative for the Conservation and Wise Use of High Andean Wetlands* to promote conservation and sustainable development of the high Andean wetlands and recognition of their social and cultural as well as ecological importance, consistent with the principles of the Ramsar convention for involving multiple stakeholders in the "wise use" of the *páramo* lakes and rivers (Ramsar Convention and HAWS Contact Group 2008).

The Saraguro-Oña-Yacuambi wetland complex is prioritized for conservation in the regional development plan adopted by Ecuador's National Secretary of Planning and Development. The lakes and adjacent *páramo* are important to surrounding Mestizo, Kichwa, and Shuar ethnic communities within 3 provinces. Numerous internal conflicting land-use claims, mining, grazing, and the recent construction of a road through the area (Astudillo et al 2010) threaten the integrity of the wetlands. The research question for this article is: How might Gruber's (2010) framework be useful in assessing the possibility of CBNRM for transboundary mountain wetlands at multiple scales and to designing a collaborative management plan between national agencies and local communities for the Saraguro-Oña-Yacuambi, if designated under the Ramsar convention? Several regional agencies, universities, and nongovernmental groups have engaged in this and other social research that aims to be used in developing a management plan among the jurisdictions that integrate

several national and local protected areas within a larger biosphere reserve designation.

Gruber (2010) lists 12 principles for successful CBNRM, including several preconditions for the appropriate application of CBNRM (Table 1). Three preconditions are addressed in this article: (a) a high sense of community dependency on and concern with the natural environment, (b) a homogenous community organizational structure without disruptive divisions of interests, and (c) clearly defined boundaries of the resource system with institutions that can invest in capacity building and conflict management. Without the latter, a review by Sick (2008) found that weak social relations across larger landscapes can result in conflicts that destroy resources.

In keeping with the attention by Sick (2008) to social relations and by using preconditions by Gruber (2010), this article briefly summarizes findings from rapid ethnographic research (Hardwerker 2001) conducted in 11 communities and with officials located on the western side of the Saraguro-Oña-Yacuambi wetlands. The purpose of the research was to assess the communities' and officials' concerns for the wetlands and interest in collaborative watershed governance. Most informants expressed a strong dependence on the wetlands for water, which is delivered through ancient and community-managed aqueducts; however, they also mentioned conflicts regarding boundaries and land tenure rights. We conclude with the identification of possible roles for national agencies in creating the conditions for conservation and conflict management at the regional scale. Given that Ecuador leads the Andean *páramo* and wetlands initiative, and has aggressively pursued both indigenous rights and decentralized protected area management, the study also contributes to an understanding of the challenges and opportunities for collaborative watershed governance in transboundary, multijurisdictional watersheds in Latin American mountain systems.

## Study area and methodology

The Saraguro-Oña-Yacuambi wetland complex is 3000 masl and contains numerous lakes, with Condorshillu, Laguna Grande, and Tres Lagunas being the best known (Ordoñez-Delgado et al 2010). The lakes and wetlands are part of the *páramo* ecosystem, which is dominated by shrubs and *pajonal* vegetation (Burneo et al 2011), which store water and provide important bird habitat and medicinal plants (Astudillo et al 2010). The wetlands span 3 provincial boundaries in southern Ecuador, Azuay, Loja, and Zamora Chinchipe (Figure 1), and proximate corresponding communities located within the *cantones* of Oña, Saraguro, and Yacuambi (*cantones* not pictured). The proposed Ramsar area includes 2 existing protected areas, the Shincata Protected Forest, which is a nationally

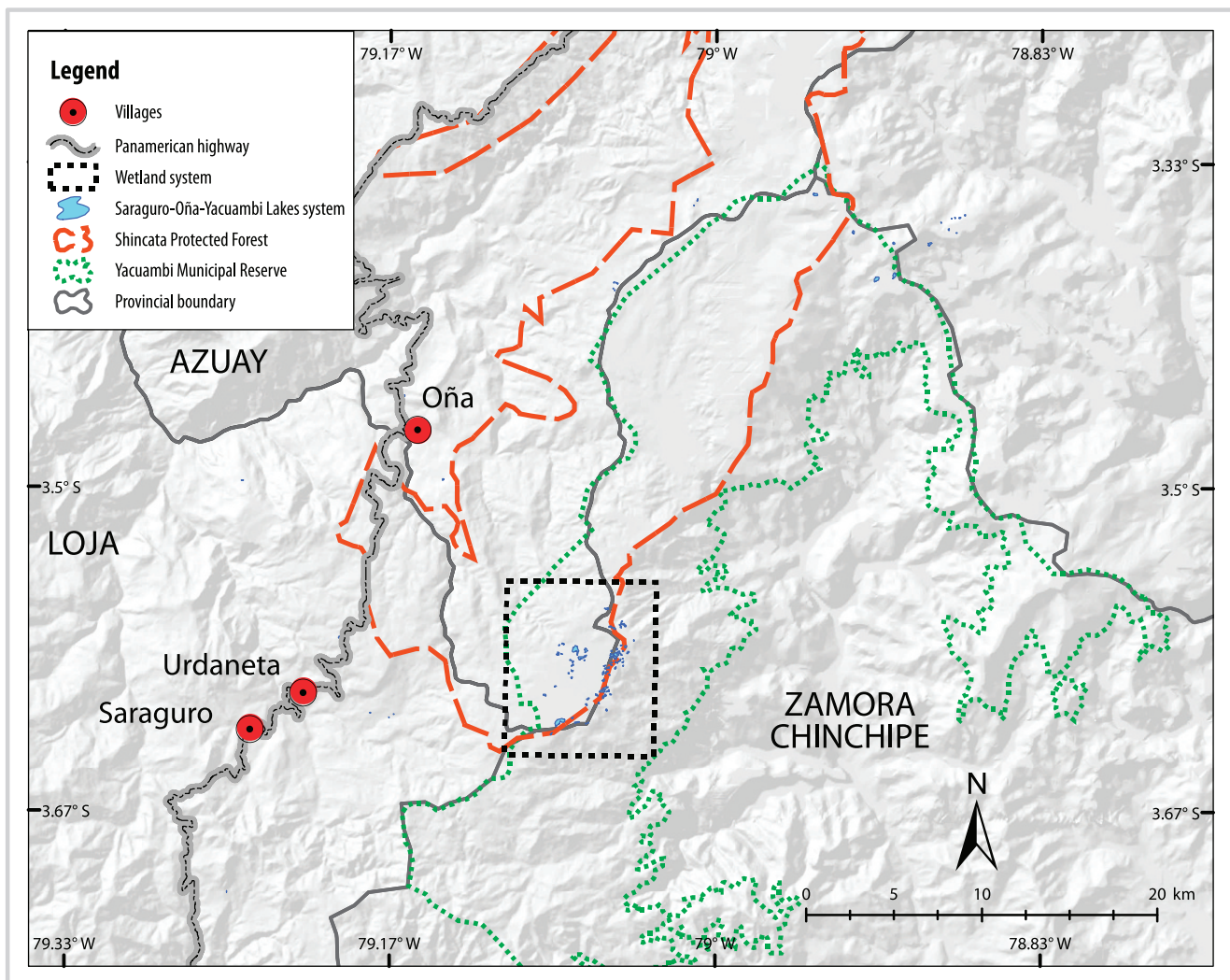
**TABLE 1** Principles for the design of successful CBNRM, a summary from Gruber (2010: 56; Table 1) focused on Principles K and L, Preconditions, and Design for Conflict Management and Cooperation (reproduced with kind permission of the author and publisher).<sup>a)</sup>

Gruber's (2010) Principles	Key characteristics	Description
A	Public participation and mobilization	Public participation will directly impact public trust, confidence, and legitimization. Seek diversity of stakeholders with programmatic, operational, scientific, and legal knowledge. Provide for participation of stakeholders at all stages of decision-making.
B	Social capital and collaborative partnerships	Networks and collaborative partnerships to share resources and responsibilities. Ownership by community members and other stakeholders enhances design, implementation, and operation; commitment, and cohesion.
C	Resources and equity (social justice)	Recognize local values, support and improve the local economy, fairly distribute costs and benefits of conservation, and fairly administer sanctions.
D	Communication and information dissemination	Well-designed information supports social learning and decision-making, transparency, and linkages while clearly stating limits.
E	Research and information development	Decisions based on broad and systematic information that includes experimentation, science, and experiential local knowledge with a local role.
F	Devolution and empowerment	Clear rules and procedures developed with those most affected, devolution of decision-making control between rural and regional bodies; nested and multiple layers of government. Local leaders are integral to efforts in establishing trust and credibility.
G	Social capital building	Participatory approaches to problem solving and decision making are critical to building legitimacy and trust.
H	Monitoring, feedback, and accountability	Effective feedback systems to learn from mistakes, uncertainty, and crises. Local appointed or elected representatives of communities must themselves be accountable to their constituents if community based.
I	Adaptive management and comanagement	Adaptive comanagement and adaptive leadership are dynamic and focused on processes, with roles for local government, local community members, NGOs [nongovernmental organizations], and private institutions, rather than static organizational roles.
J	Participatory decision-making	Well facilitated with scientists, policy-makers, resource users, and community members to holistically understand human-environmental systems.
K	<b>Enabling environment: Optimal preconditions or early conditions</b>	<b>Community has a homogenous social structure, common interests, and shared norms and a local social structure in which divisions are not too serious or disruptive of cooperation.</b> <b>There are clearly defined boundaries of the resource system.</b> <b>The public is unsatisfied with the status quo but is not feeling hopeless.</b> <b>Citizens and stakeholders are willing to participate because they have a high sense of community and/or dependency on the local natural resource.</b> <b>There is adequate support and investment of financial and other resources to support transitional costs.</b>
L	<b>Conflict resolution and cooperation</b>	<b>Develop capacity and strategies for conflict management and resolution.</b> <b>Recognize the central role of institutions outside of the community-based organization to transcend organizational rivalry and competition between organizations or stakeholder groups. Design participatory decision-making processes that promote dialogue and reduce factionalism.</b>

<sup>a)</sup>The last 2 principles, in bold, are the ones relevant to the present study.



**FIGURE 1** Study area that shows protected area boundaries, Saraguro-Oña-Yacuambi wetland system, and main villages where fieldwork was conducted in 2011 and 2012. (Map by María Verónica Iñiguez Gallardo and colleagues)



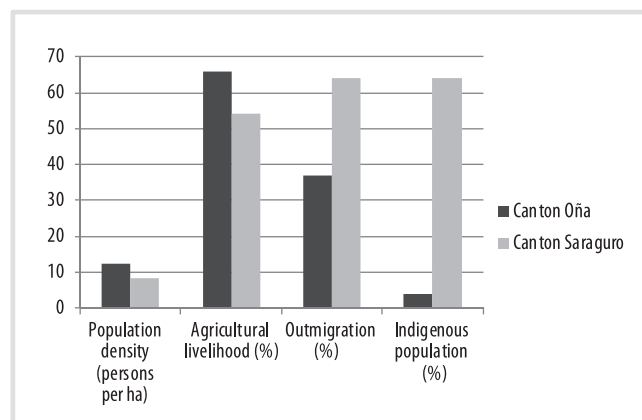
registered “forest,” and the Yacuambi Natural Reserve, which is classified as a self-governing municipal reserve and is not nationally registered. The boundaries of the 2 protected areas are contested among local governments. The lakes span both parks.

The shared wetland area and dependent watersheds support largely Mestizo and Saraguro communities on the western side through community-maintained aqueducts and indigenous Shuar peoples on the eastern side. The Saraguro Kichwa-speaking people, along with Mestizos, have been crossing the lakes to graze cattle, seek minerals, or claim land in the upper part of Canton Yacuambi. The pace of destruction to the *páramo* and wetland system from these uses has escalated since the 1950s with migration along ancient footpaths and an unauthorized road through the lake area in Yacuambi and Saraguro *cantones*. For the past 3 years, the Universidad Técnica Particular faculty (UTPL), local nongovernmental organizations, and the Region 7 office

of the national planning agency (National Secretary of Planning and Development, SENPLADES) have been asking the locally elected leaders of the adjacent provinces, *cantones*, and *parroquias* whether they would be willing to include the 2 existing protected areas in the national system and participate in their comanagement (Burneo et al 2011).

This article reports primarily on fieldwork in Azuay and Loja provinces. Subsistence agriculture dominates the wetland complex, with close to 60% of land in each province used for grazing or cultivation (INEC 2011). In Loja province, fieldwork was conducted in Canton Saraguro, which is the center of the Saraguro Kichwa-speaking indigenous group. Many people in this *canton* depend on dairy production and cattle grazing in Saraguro and across the wetlands in Yacuambi. Canton Saraguro is approximately 1082 ha and has a population density of about 8 persons per ha (Figure 2). Fieldwork took place in the villages of Urdaneta, Saraguro, and

**FIGURE 2** Basic demographic information for study areas and land area.  
(Source: INEC 2011)



several smaller villages, including Turucachi, Bahín, and Gurudel. In Azuay province, fieldwork was conducted in Canton Oña, which is an important source of agricultural products for the region. Canton Oña is approximately 294 ha and has a population density of about 12 persons per ha (Figure 2). Fieldwork took place in the village of Oña and the smaller villages of Oñazhapa, Morasloma, Cuzcudoma, Rodeo, and Paredones. Both *cantones* expressed increasing dependence on household members who have migrated to work in coastal plantations (Figure 2).

We used a mixed-methods rapid ethnographic approach to triangulate information (Chambers 2008) from 17 key informant interviews with community members and 83 quantitative surveys within the communities. Working through municipal contacts known by UTPL faculty, key informants were selected for their knowledge (Bernard 2006) of community institutions, sources of livelihood, occupations, and leadership responsibilities (Welbourn 1991). Topics included knowledge and connection with the *páramo*; current land and water use patterns; and natural resource governance concerns, conflicts, and protected area management recommendations. The structured interview questionnaire was constructed to gather general background about livelihoods, uses of the wetland system, satisfaction with natural resource protection and management, and the drivers of land use change. Given time and budget constraints, surveys were conducted opportunistically by approaching persons at public town centers, schools, businesses, and churches at different times of the day and week. Thirty-nine surveys were conducted in Canton Oña and 44 in Canton Saraguro; approximately 60% of respondents were women. A native speaker conducted interviews and surveys in Spanish with assistance from US students.

Survey data were analyzed by using SPSS and interview transcripts with NVIVO and coded for the key preconditions for successful CBNRM identified by Gruber (2010) and Sick (2008). Results from these communities

were compared with 25 exploratory semistructured key informant interviews collected in 2011 on the eastern side in Canton Yacuambi (Zamora Chinchipe province). In 2011, students also conducted 17 interviews with local and national government officials regarding their interest in working with communities on a Ramsar designation and management plan.

## Findings

Collaborative paradigms are criticized in many disciplines for falsely assuming an ideal of uniform and egalitarian communities (Agrawal and Gibson 2001), for overlooking rapid political and economic changes and accompanying resource competition and conflict (Sick 2008), and for being applied without sufficient understanding of social, state, and land tenure institutions (Naughton-Treves et al 2006). Especially on larger scales, outcomes may depend on the structure of decentralized accountability, authority, and legitimacy among social and government management institutions (Agrawal and Ribot 1999), and the nature of relationships across multiple community scales (Zimmerer 2000; Carter and Currie-Alder 2006; Naughton-Treves et al 2006; Andersson and Ostrom 2008; Sick 2008). Therefore, our findings are organized according to the preconditions for community-based and collaborative natural resource management identified from the literature by Gruber (2010) (Table 1, Principle K): concern and interest, shared accountability to legitimate social and political institutions, and boundary clarity with mechanisms for conflict management at multiple scales. Recommendations relate to Principle L regarding conflict and cooperation.

### Wetland values, drivers of change, and desire for protection

Survey responses and key informant interviews indicated that the Saraguro-Oña-Yacuambi wetland system is critically important to local people for drinking water, irrigation, grazing, and recreation. Close to 88% of survey respondents reported growing crops, with maize being the dominant crop, and 75% owned some type of livestock. Many households raise cows, sheep, chickens, and guinea pigs. Respondents reported clear links between protection of the wetland system and continuation of these livelihoods. Even though many residents of Oña had not visited the lakes, they reported negative changes to the wetland system over the past 5–10 years associated with land use changes in the *páramo*. Grazing in the wetlands “has deteriorated the natural sponges [*colchones de agua*] and decreased the supply of water in the canals that come to Oña . . . they damaged a lot of territory that was a natural sponge,” said one cultivator. Approximately 56% of survey respondents reported that the amount of *páramo* vegetation had decreased, and 59% noticed changes to water resources during this same time period. The most



**FIGURE 3** (A) Recent burning of *pajonal* and grazing activity in the highland *páramo*, Azuay province, Ecuador. (B) Initial phase of road construction through Saraguro-Oña-Yacuambi wetland system, Azuay province, Ecuador. (Photos by Jessica Helsley, June 2012)



commonly stated change for water was a decrease in quantity due to the burning of *pajonal* for agricultural expansion, increased grazing, and construction of new roads (Figure 3A, B).

Regarding these changes, communities expressed trade-offs between protecting the integrity of the wetland system and local economic development. For example, municipal governments in Loja and Zamora



Chinchipe provinces recently began constructing a road that will connect the towns of Saraguro and Yacuambi, which improved access to markets. However, this new road directly passes through the proposed Ramsar Site, which threatens some of the lakes and drinking and irrigation water sources. One Oña municipal official expressed mixed feelings about the road:

*On one hand, I believe that they [roads] would benefit us for commerce [purposes] to transport products straight to the "Oriente" [Amazon basin] and to transport products from the "Sierra" [Andes region] as well; it would [provide] direct access to the Oriente. But on the other hand, the natural environment will be destroyed, because, when opening the road, they might have to cut down entire forests; forests that have been there for thousands of years purifying the air.*

Some blamed the ethnic Saraguro, who graze their cattle in the uplands, for these changes, whereas others expressed concern with other migrants establishing *comunidades* in the area between older communities and the *páramo*. Others blamed increased use of chemical fertilizer and pesticides for harm to the soil and the water, and the recent loss of commercial tomato crops to disease.

Different perceptions of conservation are reflected in survey responses to questions about increased protection of the wetland system. Although respondents from both provinces supported protecting the wetland to safeguard its water resources (approximately 77% of survey respondents in each province), they also wanted protection to ensure continued access for grazing and plant collection (approximately 55% in each province). At the same time, they reported an increase of in-migration to the uplands and the problematic planting of crops and trees upstream.

### Social institutions and relationships of accountability

The wetlands system has historically been managed as a commons, but, as population and resource demands increase and in the absence of government and local resources for the enforcement of Shincata Protected Forest, there has been a rise in competing land claims to this commons (MAGAP 2012). Social institutions historically manage water resources and continue to manage aqueducts and access to irrigation water. Traditional irrigation associations have been legitimized by the National Secretary of Water (SENAGUA), which devolves responsibility to Community Water Committees. These committees provide concessions for water, collect user fees for maintenance, and organize community members in *mingas* to clean the irrigation water canals, as explained by a local grower:

*There is a water committee for the canals Ingachaca and Quinguyacu, and they are those who organize and gather the community members to clean the canals. In summer I go [up there] to clean up along with the rest of the community. We cut what is covering [or plugging] the canal, take out the dirt that is inside, and remove the weeds to prevent water overflow.*

However, local leaders reported being unable to control new users. The water committees are focused primarily on water supply, not water quality, which remains under the authority of the Ministry of the Environment (MAE). They also have no authority over land uses that affect water, such as the cutting of vegetation that affects water supply or the use of chemical fertilizers that impacts water quality. Thus, the impact of these local institutions on governing the commons is limited by the extent to which they can restrict access to the water supply and hold customary users accountable (Ostrom 1990). Several informants echoed the statement by one Morasloma-Oña *parroquia* leader:

*We want those lands to belong to the community or to be declared as a protected area. We want that for the benefit of the community, not to sell it, but to protect the community, to look after the area, reforest it and not destroy it.*

Informants reported gaps in both social and government institutions for land use planning, land tenure, and conflict management. Within the Shincata Protected Forest, new residents have begun to form *comunidades*, such as Marco Pérez, which are informal organizations of local citizens. Interviewed *comuna* leaders reported their purpose as overseeing the protection of the wetland complex. According to their president, they first work the land to secure communal title through the agricultural reform agency by using prescribed documentation. For title acquisition, the next step after possession is to develop a management plan and secure a "certificate of no impact" from the MAE, which certifies no impact to the National System of Protected Areas. As described by a leader of the *comuna* Marco Pérez:

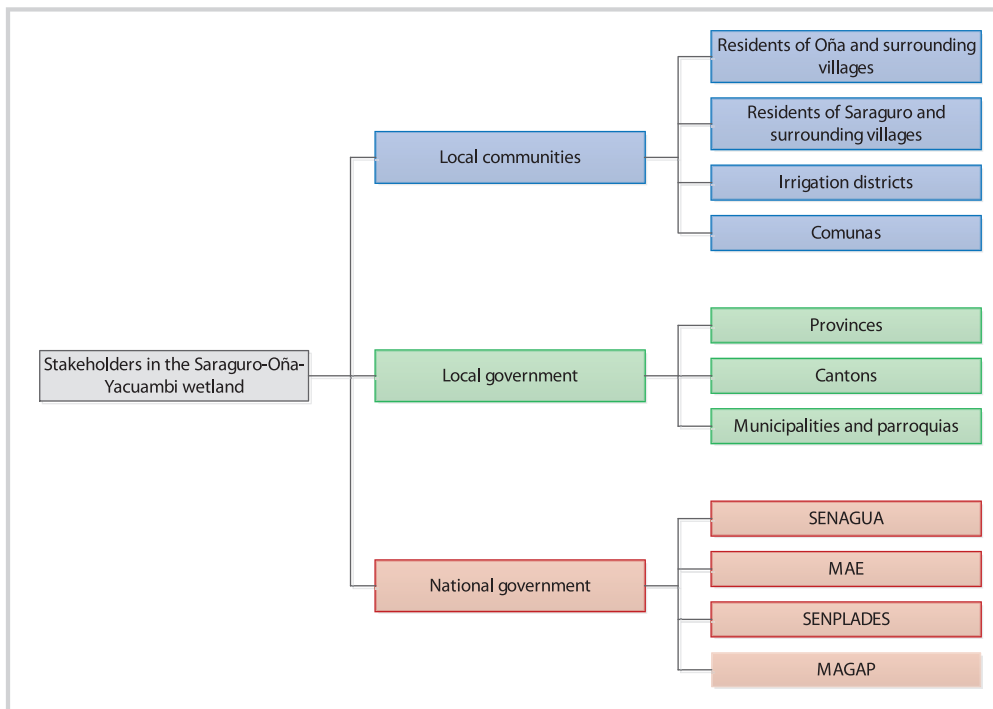
*The title of ownership is supported by the [Ecuadorian] Constitution in Article 58, which says that "communal parcels of land are indivisible, unable to expire, inalienable," so then there will not be any person who will be able to enter and invade this area with the story that after 5 years of possession, they are going to give me a title because I have already worked this area [through grazing or agriculture]; and neither will leaders be able to come and divide it, because the Constitution prohibits it. The interviewed leader of the group discussed his plan to protect the wetlands once the title is awarded to the comuna.*

However, some residents complained that settlers were claiming common lands and had no legitimacy to regulate resource uses, as stated by one employee of Junta Parroquia Urdaneta:

*Before, everyone could go and let their cattle graze; anyone could go to take some grass or to take some trees for construction. But now, if you want to go there to take wood or a piece of land to plant your crops, you have to be part of the group. These*



**FIGURE 4** Network of stakeholders involved in management and use of the Saraguro-Oña-Yacuambi wetland system.



*small groups declare themselves owners on the mountain [páramo]. These groups were created overnight [de la noche a la mañana]. Before this, no one said anything because this was community land.*

Competing claims occur both within and across provinces, and a lack of clear and secure land tenure appears to be the main underlying driver of land use changes in the study area.

#### Conflicting boundaries, multiscale actors, and institutions

Many informants and survey respondents were unclear as to the exact boundary of the Shincata Protected Forest, just as those interviewed in 2011 were unclear as to the location of the Yacuambi Natural Reserve. A complex network of stakeholders is involved in management and use of the Saraguro-Oña-Yacuambi wetland complex (Figure 4). Whereas, 2011 interviews with government officials and communities demonstrated a shared commitment to protect the wetland system, *parroquia* leaders expressed frustration with boundary conflicts between *cantones* in adjacent provinces, and the lack of MAE enforcement in the Shincata Protected Forest. An Oña local official stressed that the race to establish formal land titles based on demonstrated uses was also occurring across provincial boundaries:

*We have other worries regarding the highlands, according to the boundaries; we do not have clear official registration [legal borders] of the highest parts, especially where the páramo is. We have some*

*reports that people from Saraguro [Loja province] are infiltrating this area and planting pine and that is something that we do not agree with and is not good for us either. People from Saraguro, especially in a part called Urdaneta, they are infiltrating the southeast of our canton; we are trying to get together with the authorities of Oña to verify the boundaries to see that we can do something about it [infiltration].*

Interviews suggested interethnic and intercommunity blame and conflict, which should be further explored in subsequent research. Whereas a regional development plan exists that includes protection of the Saraguro-Oña-Yacuambi wetlands, agency implementation is not coordinated by SENPLADES. The agency has no role in a national Ramsar designation, according to UTPL faculty, nor does the MAE have authority over lands outside of national protected areas. Grazing, road building, settlement, and tree cutting appear to continue within the protected area as well, due to the possibility of obtaining land tenure in what have been common or national lands. Even though both leaders and locals look for protecting the wetland system, the results show that there is currently no organization coordinating implementation of the plan between different national and local actors.

#### Preferred comanagement options

When community members were asked about their preferred management structure they also expressed a desire for strong community involvement in partnership

with local and national authorities. In household surveys, most respondents said that the community should be the primary management institution of water, forests, plants, and animals under the guidance of and with financial support from government organizations such as the MAE, as indicated by a local SENAGUA official:

*I believe that those who should make the decisions here are the people who live from this, people who day to day are there; but they are not able to make decisions because they are not organized. It should be the Ministerio del Ambiente (MAE) who supports the community regarding water and the lakes and every type of natural resource.*

Or in the words of an official of Junta Parroquia Urdaneta:

*I think that would be the Local Government supported by the Ministries of the State, like local institutions [provinces and cantones]. We all together could do many things with the forest, wetlands, and grasslands because the only things we do not have are the [financial] resources.*

At the same time, a Ministry of Environment official noted that the MAE was not enforcing protections in the Shincata Protected Forest and was expecting local communities to enforce conservation without help:

*We have protected areas . . . but realistically, we do not have the human resources necessary. Therefore, in order to give novelty to the situation of conservation, we want to give a better category of management. . . . We are at a national level, and if we declare a protected forest, it is directly from the state. Therefore, if you have a better hierarchy it is much stronger.*

According to government officials, the Shincata Protected Forest, as well as the overlapping Yacuambi Natural Reserve, would have to be included in the National System of Protected Areas to receive funding, putting it under the authority of the MAE. *Parroquia* officials were adamant that local people should be involved in any protection plan to choose how resources are used and how communities benefit from protection. However, as evident in Figure 4, an inclusive form of collaborative management would be more complex than just the provincial or canton level. Interviews from 2011 in Yacuambi canton suggest the need for more research into the goals of local and national protected areas and the accountability of migrants and settlers. Although some communities may prioritize conservation, others seek enforceable boundaries to exclude other users and retain livelihood resources for their own community.

A particular concern in this study area is the high degree of land tenure conflict. Results of our research show that local communities have begun to establish “private” land claims to the wetlands area through the

cultivation and grazing of land. This is an attempt to take control of an area that was previously managed as a commons but that is degrading into an open access situation due to increasing population and resource pressures. The existence of competing *comunas* within provinces and conflicts across provinces suggests that community members are accountable to multiple leaders (Agrawal and Gibson 2001) even within the national Shincata Protected Forest, which is the largest and most inclusive of the 2 protected areas. Given these community dynamics, it is difficult to ascertain whether populations from the same community have a shared concept of watershed governance; moreover, there is the added difficulty of integrating shared concepts across provinces.

Wetland governance and potential comanagement between national and local institutions are further complicated by a lack of integration between national agencies at the regional level, water management (SENAGUA), protected areas management (MAE), and land tenure (Ministry of Agriculture, Livestock, Aquaculture and Fisheries, MAGAP). The current trend in Ecuador is to decentralize conservation responsibilities to the local and regional level (Article 238 of the Constitution) without decentralizing authority, to address conflicting policies. Although SENPLADES helps the local governments to develop their own plans and has created a regional environmental protection framework, it has no implementation authority to coordinate the regional operational plans of MAE with those of sectoral agencies responsible for land tenure, transportation, mining, and water supply. In this regard, Ribot et al (2010) often blame failures of decentralization to promote local conservation on the tendency of national governments to devolve responsibility without devolving authority and resources.

This application of the Gruber (2010) framework to understanding social aspects of the Yacuambi-Oña-Saraguro wetland system suggests that institutions for managing conflicts are lacking, especially across *canton* and provincial boundaries. More research is needed on how historic land right conflicts between indigenous and Mestizo people factor into boundary conflicts, a topic raised by several informants. A better understanding of the entire regional Andean human ecology is needed for the design of a feasible collaborative management arrangement (Zimmerer 2000).

## Conclusions

Gruber (2010) provides a helpful framework for analyzing the feasibility of using decentralized and comanagement approaches to collectively manage the high Andean Yacuambi-Oña-Saraguro wetlands. Positive local preconditions include an evidenced commitment

by *parroquia* leaders who are very aware of how important the wetlands are to their future livelihood. According to previously conducted interviews by the 2011 research team, regional offices of national agencies stand ready to assist once local governments decide on a protection strategy. Canton Oña, in particular, has a socially organized system of aqueducts, *mingas*, and water associations that provide an institutional framework for water conservation. In addition, agencies such as SENAGUA are providing support and legitimacy to many of these institutions, with additional investments by 2 nongovernmental organizations: Acroiris in Zamora-Chinchipe and Fund for Nature in Loja.

Missing preconditions include a culturally and socially uniform population that is accountable to local leaders. Instead, a mobile and changing population uses competing laws to compete for land tenure rights. Interviews suggest historic conflicts between the Saraguro, Mestizo, and Shuar peoples, with migration impacting Shuar homelands and watersheds. People are confused about protected area boundaries and are aware of political boundary conflicts between *parroquias* and *cantones* in different provinces. In addition, a migrating population may not be socially accountable to local leaders, as noted by several informants who wanted more national enforcement of conservation policies in the Shincata Protected Forest. Many land tenure reform laws require clearing and cultivation, which conflicts with both customary law and conservation policy in the same countries and regions. Resource competition and ambiguous borders and authority are especially problematic for voluntary conservation practices (Pinel 2009). As Sick (2008) suggests, stakeholders from different communities have few existing social relationships that they could call upon to mediate diverse interests, especially at the regional and transboundary scale.

The proponents of the Ramsar designation suggest that local *parroquias* could manage the area with national support. Although water conservation concerns do motivate local leaders and residents in our study, our findings suggest resource competition within and around the designated local and national protected areas. Competition for resources could trump collaborative local management without a stronger organizing entity to arbitrate conflicting land rights and local boundaries, coordinate national and local actors, and balance development goals.

This research further demonstrates the importance of understanding the specific land uses, social institutions, government rules, and spatial boundaries and identities in the design of any transboundary management plan. These challenges are not unique to Ecuador, but apply broadly to transboundary mountain, wetland, and watershed governance (Attwell and Cotterill 2000;

Zimmerer 2000; Danby and Slocombe 2005; Heikkilä et al 2011).

## Recommendations

Discussions are ongoing between UTPL, the local government leaders, national agencies, and *parroquia* leaders regarding a feasible management plan for the entire wetland system. The application of Gruber's principles (Gruber 2010, Principle L) could be used to design a CBNRM plan. The *cantones* of Oña, Yacuambi, and Saraguro have recently indicated an interest in having both the Shincata Protected Forest and the Yacuambi Natural Reserve included in the National Protected Areas System, which could make national assistance possible. For collaborative management of the Saraguro-Oña-Yacuambi wetland complex to move forward, regional authority, accountability, and legitimacy need to be further integrated (Anderson and Ostrom 2008). Given competing resource claims among groups, one agency may need to be empowered to coordinate and oversee land tenure and watershed governance discussions for implementation of a Ramsar wetland conservation plan. In our study site, SENAGUA invests in community water organizations, MAE is responsible for protected areas, and MAGAP is responsible for land tenure regulation. Given its accountability and relationship to all levels of provincial and nested governments, perhaps SENPLADES could be nationally empowered to coordinate actions by other agencies such as mining, agriculture, road construction, and land tenure, all of which affect the wetland system. However, MAE has authority over registered national protected areas, including the Shincata Protected Forest. Further discussions are necessary as to the proper mix of centralized and decentralized rules and resources.

In addition to choosing and authorizing one agency to coordinate and oversee watershed governance discussions and implementation of the Ramsar site, residents within the Saraguro-Oña-Yacuambi wetland system need more secure development opportunities. Although the best mechanism for economic development in this study area still needs to be vetted with regional authorities and community members, possible options mentioned in our interviews included ecotourism; agricultural zoning, which is currently allowed under national law for protected areas; and enrollment in the country's national payments for ecosystem services program (de Koning et al 2011). In keeping with international Ramsar principles for "wise use," researchers are proposing that management scenarios and trade-offs be vetted with stakeholders in the next step of the research to clarify the perceived local meaning of a protected area and ensure some harmonization between local and national visions of conservation.



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