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<td>AEDES</td>
<td>Asociación Especializada para el Desarrollo Sostenible</td>
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<td>ALA</td>
<td>Autoridad Local de Aguas</td>
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<td>ANA</td>
<td>Autoridad Nacional de Agua</td>
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<td>ANP</td>
<td>Áreas Naturales Protegidas</td>
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<td>APCO</td>
<td>Asociación de Productores de Cultivos Orgánicos</td>
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<td>APROPLAME</td>
<td>Asociación de Productores de Plantas Medicinales Ecológicas</td>
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<td>DFID</td>
<td>Department for International Development of the United Kingdom</td>
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<td>IADB</td>
<td>Inter-American Development Bank</td>
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<td>INEI</td>
<td>Instituto Nacional de Estadísticas y Informática</td>
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<td>INRENA</td>
<td>Instituto Nacional de Recursos Naturales</td>
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<td>IPROGA</td>
<td>Instituto de promoción para la gestión del agua</td>
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<td>IWRM</td>
<td>Integrated Water Resources Management</td>
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<td>JNE</td>
<td>Jurado Nacional de Elecciones</td>
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<td>JULU</td>
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<td>SERNANP</td>
<td>Servicio Nacional de Áreas Protegidas por el Estado</td>
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<td>USAID</td>
<td>United States Agency for International Development</td>
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<td>WUA</td>
<td>Water User Association</td>
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On the global level, agriculture consumes more water than any other industry. All non-industrial agriculture has one dominant challenge in common: the sufficient and sustainable management of irrigation water. Irrigation management simultaneously shapes social relations, economic practices, kinship, human and environmental health issues, and defines geographical boundaries of communities. The overall objective of this research is to understand how communities will adapt to new water management laws, and which community and organizational characteristics facilitate that adaptation in a water-scarce province in the southern Peruvian Andes. This research addresses issues of great importance to water and agricultural management and policy in rural Peru, where implementation of best practices for successful natural resource management could have broad impacts, such as decreasing conflicts and out-migration from rural provinces.

This dissertation investigates how the creation and administration of new water laws in Peru affect local politics, social relations, and environmental considerations of rural water users. In this research, I take an interdisciplinary approach, combining measurable units of analysis such as social network analysis and cultural consensus
analysis, with the ethnographic description of the lived experience of those intimately involved with and affected by the implementation of new water management practices.

I argue that the implementation of national-level water management policies in rural, subsistence-based agricultural communities is decreasing access to social capital. This diminution of social capital, coupled with the erosion of the cultural system of reciprocity, known locally as ayni, negatively impacts the collective sense of responsibility for resource management and conservation, while simultaneously increasing inequity in water access and the economic benefits associated with water. The impacts of this research are important for groups concerned with social theory of organization, community-based natural resource management, and the implications of national level policy changes on local level politics and practices directly related to subsistence activities.
CHAPTER 1
INTRODUCTION

The overall objective of this research is to understand how communities will adapt to new water management laws, and which community and organizational characteristics facilitate that adaptation. More specifically, this research aims to understand the relationship between the implementation of new water management strategies and rural social and political organization, existing cultural norms, locally-derived economic systems, and variation in irrigation water access in a water-scarce province in the southern Peruvian Andes. This research will show that existing cooperative institutions, such as *ayni*, may potentially be incompatible with new laws. It will also show that two small communities that are seemingly the same exhibit key differences when it comes to adopting the new norms, with the number of canals and predominance of certain types of economic exchanges being important factors affecting adoption. Historical differences in family power relationships also play a key role. What at first seemed a simple research project to examine the way social network position and the new water laws affect water access, turned out to reveal a much more complex system. This research addresses issues of great importance to water and agricultural management and policy in rural Peru, where implementation of best practices for successful natural resource management could have broad impacts, such as decreasing conflicts and out-migration away from rural provinces.

**Background**

In 2008 the national water authority, *Autoridad Nacional del Agua* (ANA), was created under the Peruvian Ministry of Agriculture and charged with the responsibility of designing and managing sustainable water strategies throughout the country. In April
2009, the Peruvian government signed into law the *Nueva Ley de Recursos Hídricos - Ley No.29338* (New Law of Hydraulic Resources - Law #29338). It is most challenging for ANA to make an impact in rural communities, where irrigation water management is directed by autochthonously-organized *Comités de Regantes* (Irrigation Committees), with very little oversight from exogenous actors. These challenges are especially pronounced in the southern Andes, where water management is not only an economic issue, but also a cultural and religious one (Gelles 2000). Goal Seven of the UN’s Millennium Development Goals addresses environmental sustainability, stating that the best solutions for water scarcity will not be technological advances, but changes in the way resources are used and managed (UNDP 2008). For the goals of both ANA and the UN to be met, rural communities will need to accept and integrate changing irrigation practices.

This dissertation provides evidence to irrigation scholars and practitioners of the local social, political, and economic implications of water management, and provides empirical and ethnographic evidence as to how national level changes are affecting current rural Andean water management. As Peru forge ahead with the implementation of the *La Nueva Ley de Recursos Hidricos* (Ley No. 29338) (heretofore referred to as the “New Water Law”), new policies based on principles of cultural plurality and multivocality are being produced at the national level. This period of temporal overlap of state and traditional irrigation water management strategies provides a unique circumstance in which innovative management strategies can be learned and modeled, helping protect governments and communities from imminent threats of decreasing water supplies not only in Peru, but throughout the world.
On the global level, agriculture consumes more water than any other industry (Postel 1992). All non-industrial agriculture in arid regions has one fundamental challenge in common—the sufficient and sustainable management of irrigation water. Irrigation management simultaneously shapes social relations, economic practices, kinship, and human and environmental health issues, while also defining geographical boundaries of communities. It embodies the economic, the spiritual, and the political values of a community, and the past and the future concurrently. As a result of its complexity, water management theories are forged across disciplinary boundaries and are representative of the ascent of an interdisciplinary approach to empirically-driven theory building. Anthropologists, economists, political scientists, historians, and natural scientists have all contributed to the theories that have shaped the use, practices, and meaning of water management.

My research is grounded in the anthropological and political theories concerned with organizational aspects of irrigation water management. The progression of work beginning with historian Karl Wittfogel’s original hydraulic hypothesis, anthropologist Julian Steward’s cultural ecology approach to Wittfogel’s hypothesis, ecologist Garrett Hardin’s approach to the common’s dilemma, political scientist Elinor Ostrom’s influence on common-pool resource management, and the current work being done by anthropologists Stephen Lansing, Paul Trawick, and Peter Gelles, and hydraulic engineer Rutgerd Boelens have all influenced the construction of theories of irrigation water management. The work of James Scott on the mechanisms of control employed by the state have also greatly informed this work. These provide the foundation for this study, which expands upon the work of these theoreticians and practitioners. My work
has also been influenced by the political ecology work of Tom Waller (1995) and Susan Lees (1994, 1997), who have demonstrated how science in the field of irrigation is not neutral and has often served the purposes of the powerful.

Relevance

The hydraulic hypothesis, as posited by Karl Wittfogel in *Oriental Despotism: A Comparative Study of Total Power* (1957), states that, in order to manage large-scale irrigation-based agriculture, there need to be complex, centralized bureaucratic administrations established to mobilize labor and capital. Simply put, the rise of centralized bureaucratic power was inexorable where hydraulic agriculture was the major productive activity. Originally intended to provide a historical explanation, the hydraulic hypothesis has been tested by both archaeologists (Hunt & Hunt 1974; Chang 1983; Erickson 1993; Scarborough 1993, 2003) and ethnologists (Steward 1955; Geertz 1980; Gelles 1986; Lansing 1987, 1991; Trawick 1994, 2001, 2002), all of whom generally disagree with Wittfogel’s deterministic model of causality (Erickson 1993).

This dispute has bred a competing theoretical model of water management that precludes the necessity for centralized state management. In his work with Balinese “water temples,” Stephen Lansing (1987, 1991) argues that the ritualized and ceremonial systems of irrigation management in Bali are complex and intricate systems requiring coordination; however, he maintains that the management is carried out through kin-based networks of affiliation. Although the modern state defines and officially recognizes these groups of water users, the management of the water systems never *necessitates* state intervention.

An alternative theory used in this research is the common-pool resource (CPR) management theory. Popularized as a reaction and rebuttal to Garrett Hardin’s article
Tragedy of the Commons (1968), decades of studies have been dedicated to demonstrating that shared rights, responsibilities, use, and conservation norms exist in lieu of state or private resource management. Studies of the commons are complex and multifaceted, taking into account such ideas as equity, conservation, efficiency, and sustainability. It is beyond the scope of this paper to evaluate all of these terms, or even begin to compare the estimated 35 factors associated with common-pool resource management (Agrawal 2001). Rather, I will focus specifically on the role of institutions developed locally around resource management. I chose to focus on the organizational and institutional aspects of CPR, due to the direct impact the New Law of Hydraulic Resources in Peru is having on local organizations and institutions. I draw heavily on the work of Elinor Ostrom and others to highlight that there is an internal logic and established, though unwritten, set of norms of water management in my research area. Agrawal (2001) calls for comparative, rather than case-based analysis of the commons. This research project responds to this call, and takes a comparative approach to make empirical contributions to the theory of common-pool resource management.

In addition to the competing theories of the centralized, bureaucratic style and common-pool resource management, I draw heavily on substantivist theories of economics, and use James Scott’s concepts of “legibility” (Scott 1998) and “hidden transcripts” (Scott 1990) to understand the agency of the state in making and unmaking the social and economic relationships in rural communities via management of water. Treating the state and the institutions they are creating (such as the Local Water Authority) as constitutive actors in the process of development (Meyers and Jepperson 2000) allows for the analysis of the interactions and relationships among individuals,
communities, and the state. I argue that Peru is in the process of implementing an intransigent and uniform policy that assumes no difference. Using the lens of legibility to look at the transformation of the complex and multidimensional rural water management system, we can see how the state is attempting to “rationally engineer all aspects of social life in order to improve the human condition” (Scott 2000:88). I do not go so far as Scott to say that the rural sectors of the country are the factories for creating “(dis)utopias” (2000:89), though I do argue that these reforms are accelerating change faster than communities are ready to adopt them. This, in turn, is creating and perpetuating conflict and confusion among residents. Finally, the “hidden transcripts” of resistance and dominance, and the tensions these breed, are discussed in the context of rituals associated with water management where they become “public transcripts.” The conflicts that arise during these rituals are empirical evidence of resistance to change, and the recoding of some symbols and resistance to changing others are indicative of the tensions associated with the shifts in power associated with the changes in water management.

**Geographic Setting**

Cotahuasi Canyon is representative of all the ecosystems and Life Zones found between 900 and 6100 meters altitude (Cano 2005). The massive canyon swallows the majority of the water from the Cotahuasi River, making irrigation activities dependent upon alpine springs and glacier melt, both of which are vanishing as desertification increases in the region. Due to changes in climatic conditions, Peru’s Andean glaciers have lost over 22% of their surface area since 1980, reducing the amount of available water by drastic proportions (Bradley et al. 2006). This dramatic decrease in available
water is causing social and environmental pressures that have garnered attention from the Peruvian government, World Bank, and United Nations.

Politically, the Cotahuasi Canyon is known as the Province of La Unión. It is one of eight provinces in the Department of Arequipa. La Unión, which is composed of 11 districts, is known widely for its capital, the town of Cotahuasi. Of these 11 districts, visits pertaining to this research were conducted in all of the districts except three (Tauria, Sayla, and Quechuella). The population estimate for the Province is 15,662 inhabitants in an area that covers 4,745 km² (1,833 mi²) (Municipalidad de La Unión 2010), making the population density in the region 3.3 people/km². The predominant ethnic group is Quechua. The *lingua franca* is Spanish; however, in many communities, Quechua is still spoken in the household and between neighbors.

Health services and food security in the Province are worrisome for national officials. Given that the closest well-equipped medical facility is eight hours by truck from Cotahuasi (meaning for some communities it could be as far as 22 hours in truck), many otherwise innocuous injuries and illnesses can be life threatening. The life expectancy in the province is 54.33 years; a full 20 years lower than the average for the country of Peru (Cano 2005). The principal livelihood activities in the Province are agriculture and mining (Municipalidad de La Unión 2010). The average household farm holding is 0.91 hectares, with the majority (87%) being subsistence agricultural production for household-level consumption or local trading and sale (Cano 2005).

Most of the Province falls within the boundaries of the Ministry of the Environment’s Natural Protected Area officially recognized as the *Reserva Paisajistica de la sub-cuenca del cañón de Cotahuasi*, but known locally as the “ANP”. This is
important because by virtue of the designation, the national government is allowed to enforce resource use sanctions and penalties on the citizens of La Unión. Cotahuasi Canyon was designated an ANP in May 2005, and just received its first resident employee of the Ministry of the Environment during my fieldwork in 2010. Very little communication or enforcement of ANP rules had actually been implemented before and during time of my fieldwork.

Of particular interest in this study were the two towns of Antabamba and Charcana (Figure 1-1). Antabamba¹ is a small community in the district of Huaynacotas, located north/northeast of the provincial capital of Cotahuasi. Antabamba is home to approximately 130 residents, most of whom are primarily engaged in subsistence agriculture. A key characteristic of the water system in Antabamba is the dependence upon only one canal that carries water to the entire community. Charcana is a slightly larger community in the district of Charcana. It is located 42 kilometers south/southwest of Cotahuasi. It has approximately twice as many residents (estimated at 270 permanent residents) as Antabamba. Unlike Antabamba, Charcana’s geographical isolation has limited the infrastructure and opportunities for Charcaninos to participate in many provincial functions and meetings. Water in Charcana is distributed through a system of multiple canals. Though there are four canals that channel water from different springs located in the mountains above and behind Charcana, water is still considered a scarce commodity, and the access to it is highly regulated within the community. Unlike other communities in the Province that have multiple springs and

¹ It needs to be made clear that the town of Antabamba in this research is not the same Antabamba where Andean anthropologist Peter Gose (1994) conducted his research. He worked in the Antabamba district in the Antabamba Province, which is located in the Department of Apurimac. As the crow flies, the Antabamba in Gose’s research is located approximately 75 kilometers due north of the Antabamba to which I refer in this study.
sufficient water supply, Charcana is still utilizing the maximum amount of water available for their agricultural activities.

The difference between multi-source (Charcana) and single-source (Antabamba) canal systems in these communities is important in understanding the extent to which comparisons can be drawn between the two communities as a whole. The analysis conducted at the canal level was representative of larger social dynamics in the community. Analysis at the canal level allowed me to formulate questions that were then ethnographically and empirically administered to the whole communities.

**Social Context**

Prior research on social organization in the Andes has shown that families customarily have strong traditions of mutual support based on solidarity fostered through events requiring communal work (Buechler and Buechler 1971). In Peru, these relationships are clearly expressed in the sphere of water management (Gose 1994). Since out-migration is an omnipresent feature in this part of the world, fictive kin relations such as *compadres* (godparents) are commonplace, and provide familial support systems to adjust for missing kin (Buechler and Buechler 1971).

Evidence of irrigation in the Andes dates back thousands of years, supported by archaeological remains at sites such as Tihuanaco and Isla del Sol, Bolivia, and along the communities on the banks of Lake Titicaca near Puno and Juliaca, Peru (Orlove 2002). Andean people’s knowledge of their ancestors is that they had emerged from the land; the relationship between the land and the water they use to irrigate the land is symbolic of this connection (Spalding 1984). Prior research on social organization in the Andes has shown that families customarily have strong traditions of mutual support based on solidarity fostered through events requiring communal work (Buechler and
Buechler 1971). Communal cleanings, dredging, and blessing of irrigation canals define water rights to this day, and perpetuate the symbolic human/environment relationship with *pachamama* (earth mother). Andean irrigation systems are extremely diverse, which leads to unique interactions not only between people, but also among technology, environment, economy, and sociopolitical organizations.

State-organized water management in the Andes has its roots in the more centralized “bureaucratic” model of the Spanish tradition (Gelles 2000), similar to the organizational principles purported by Wittfogel (1957). Although some literature exists on state water management in Peru from a hydrological perspective (cf. Boelens et al. 2008), there is little documented about the effects of state integration on farmers’ social capital or the best practices to be learned from these transitions and models.

The literature on irrigation studies extends across various disciplines, but as Donald Worster suggests, “one of the most serious weaknesses in that literature, it must be said straight off, is that the modern experience with irrigation hardly appears in it” (Worster 1985:30). Since then, a cadre of scientists has begun to focus solely on this issue. Those who have explored the topic extensively on systems in Peru, Bolivia, and Ecuador (Trawick 1994, 2001, 2003; Gelles 1986, 1994, 1995, 2000; Guillet 1992; Mitchell 1991, 1994) have usually emphasized common-pool resource management and not state-managed systems. While valuable in their contributions and rigorous in their execution, the dearth of scholarship on the actual process and implications of converting a common-pool resource management system to a state-integrated management system remains. I focused on the irrigation communities of La Unión Province in Arequipa Department of Peru, with the hopes that the rich empirical and
ethnographic data collected will shed light on the effects of transition, and capture a moment in time when both community and national norms regarding water management are being mutually reshaped.

Some critiques of case studies of small-scale farmer systems (Price 1994; Kaplan and Manners 1972) denounce them as problematic because they are situated in communities highly dependent upon irrigation water and farming activities for the majority of their economically-productive labor. However, small-scale irrigation communities allow analysis of the concrete formation and implementation of otherwise intangible concepts (Hunt and Hunt 1976), which in the case of La Unión Province includes centralization and consolidation of power, social capital, the role of unwritten normative systems, and gender dynamics in both public and private spheres.

**Overview of Dissertation Structure**

The original design for this research aimed to compare two seemingly similar communities that only varied in the degree to which they were adopting the New Water Law passed by the government in 2009. After visiting both of the communities and beginning my research, it became clear that the issue of water management in rural Andean communities is far more complex--and interesting--than I had originally anticipated. This dissertation is an attempt to untangle, analyze, and reassemble the complex social, cultural, economic, political, and environmental components that are interwoven into water management in the Andes. To successfully accomplish this, it was necessary to investigate and analyze these components both quantitatively and qualitatively, as individual elements and then together as a whole system. Quantitative and qualitative data and discussions are therefore interwoven throughout this dissertation to paint a picture of the complexity that I observed.
A mixed methods approach was used to understand the changing landscape of water management in La Unión province. In Chapter 2 I present a description of the various quantitative and qualitative methods used in this research. This research operationalizes economic principles of ayni and socio-economic principles of social capital through social network analysis. I test the theoretical political science principles of Elinor Ostrom’s Institutional Analysis Development framework through cultural consensus analysis. Finally, I attempt to operationalize James Scott’s theory of “legibility.” Through using algorithmic models applied to social network analysis metrics, I demonstrate that efforts to decentralize resource control actually work to consolidate government power. I also introduce my various ethnographic interview methods that were crucial to contextualizing and explaining the results of the quantitative data.

This dissertation carries and weaves together various social, political, economic, and cultural elements involved with water management. The principles of contemporary water management in La Unión are the result of thousands of years of resource management in the region. Influenced by the Huari, Incan, Spanish, and contemporary societal influences, my research addresses the political, cultural and economic elements of what is now considered to be “water management” in La Unión. Chapter 3 provides a condensed account of the important political, economic, and cultural histories of the region. In this review, it becomes clear how the thousands of years of history have shaped and influenced (both culturally and physically) contemporary water management practices in the Cotahuasi Canyon. Beginning with a review of archaeological evidence and progressing through time to both archaeological and historical document analysis, this chapter traces the swings between autonomous and
centralized water management practices in the region, concluding with an evaluation of the impacts of the land reform and water laws of 1969.

Before fully understanding contemporary water management in La Unión, it needs to be understood that water management happens in a context that is larger than the resource itself. The prolific Andean scholar, John V. Murra, noted that in applying exogenously-derived theories to the Andean waterscape, it becomes clear “how little has been done to study water management and its socio-economic correlates, either archaeologically or through written sources” (Murra 1970:16). Unlike Western notions of water management that are dissociated from the cultural context of its usage, water and the accompanying infrastructure in the Andes is a medium of other expressions of cultural, political, and economic values and norms (Mitchell and Guillet 1994). Water in the Andes, as in other places in the world, not only carries its own economic value; the importance of the contribution of water to other economic activities such as mining and agricultural production can be just as economically important in subsistence agricultural communities. In the Andes, it has been noted that water is one of the basic means of mobilizing people, and can be understood through an investigation of the common property management institutions and local resource distribution and power dynamics (Gelles 2000; Ore 2005; Boelens et al. 2009).

In Chapter 4, a working definition of *ayni* is presented, and the three existing types of reciprocal exchanges are outlined. As an economic system, *ayni* can successfully operate in a cashless society and in lieu of monetized debt (Buecheler and Buechler 1971; Mayer 2002). I argue that not only is *ayni* an economic system, it creates a sense of trust and a safety net in the community. When the need for assistance or products
arises, these needs can be met through this system based on social contracts within the community. In La Unión, shared resources such as canals and ayllu affiliations influence socio-economic relationships expressed through ayni.

Of particular interest in this study is the culturally-specific economic system of ayni. The three types of reciprocal exchanges are linked to characteristics of the community that include social structure and kin relations. This analysis allows for an understanding of the economic activities and power dynamics in Antabamba and Charcana. The relationship between economic productivity and power in each community is directly related to water management, in that it takes both human and natural capital to be economically successful in these water-scarce regions (Murra 1970). I will show that in Antabamba, ayni relationships are more similar to cliental relationships. The abundance of mink’a (commonly referred to as asymmetrical exchanges), which will be described in more detail in chapter 4, creates relationships of exchange whereby labor assistance is not evenly returned. This asymmetrical exchange creates uneven economic opportunities within the communities, influencing political power and thus control over water management. This cycle of power associated with water management, agricultural productivity, and political authority creates a strong dynamic resistant to change.

In Charcana, the predominance of waje-waje (symmetrical exchange) creates opportunities for more equal access to labor and equipment (De la Cadena 1989; Earls 1992). The dependence on extra-household labor is reciprocated with labor, which means that human capital is not as inequitably exchanged as in Antabamba. In Charcana, those who desire human capital have a greater opportunity to access it. This
is a very important difference from the system seen in Antabamba. The influence of these different types of *ayni* exchanges will be discussed in further detail in Chapter 4.

Currently, the major catalyst for the social and economic change in La Unión is the 2009 ratification of the New Law of Hydraulic Resources. The restructuring of water management responsibilities at the national level has begun to be implemented, and the effects of this reorganization are having impacts at the local level. Billed as an effort to decentralize water management and increase participation in the decision-making and management efforts, the government has established new organizations with the specific purpose of managing water at the departmental and provincial levels. The creation of three new organizations—National Water Authority (ANA), Administrative Water Authority (AAA), and the Local Water Authority (ALA)—was an attempt by the government to systematically and effectively disseminate and administer the New Water Law throughout the country. The Local Water Authority (ALA) has a direct presence in the province of La Unión, and is tasked with ensuring that the process of political and legal reform is accomplished at the local level.

Chapter 5 investigates the organizational and institutional landscape both at the provincial level and community level. Using the theory of common-pool resource management (Ostrom 2007[1990]), analyses of meso- (provincial) and micro- (community) level organizations were conducted to better understand the relationships among organizations within each level, and between the levels of management. At the provincial level, network analyses uncover the collaborative relationships among organizations that are involved in irrigation water management. This analysis reveals the disproportionate role that government organizations and agencies are playing in
what is purported to be a more decentralized system. In addition to network analysis, interviews with organizations reveal that misperceptions exist about the capacities and specializations of other organizations in the province, resulting in an under-utilization of the resources available within the province.

Water management involves not only formal laws but also unwritten social policies and norms. In order to test whether or not there are understood norms associated with water management that are being followed in lieu of written policies and laws, I conducted a cultural consensus analysis study in eight communities. These communities represent varying degrees of transition from traditional management to state-imposed management. Results from the cultural consensus analysis indicate that most of the communities have clear rules for water management that are perceived as internally logical and consistent. In Antabamba, the community lacks consensus surrounding water management; I discuss the factors that may lead to this observed lack of consensus.

Finally, Chapter 5 concludes with a discussion of the creation of a water working group composed of various stakeholders that resulted from this research. This highlights the capacity of local organizations to work independently without the coordination of the government agencies or under the direction of the newly established ALA office.

At the community level, water management is changing from a user-invested system (a system in which users are the owners of the resource and control its allocation) to a concessionary system (one in which people buy rights to water access). This transition to a semi-autonomous system (Moore 1973) of management has varying
impacts on the communities and how they internally organize around water management. The dissolution of community-level autonomy in norm-making processes is being met with various levels of resistance throughout the province. In Chapter 6, I highlight the different reactions expressed in Antabamba and Charcana. In Antabamba, reformation and organizational-restricting initiatives signal an attempt to conform to the new regulations and an acceptance of the changes at the community level. What these actions do not reflect, however, is the dissent among the less powerful in the community who prefer not to change. In Charcana, the reaction is different. As a whole, the community is resistant to implementing the reforms associated with the New Water Law. The conditions under which water is managed and used in Charcana and Antabamba are different; I argue that histories of social structural and economic elite capture contribute to these differing reactions.

Building upon the understanding of the political structure gained in previous chapters, Chapter 6 addresses the specific actions certain groups of irrigators are taking to incorporate or reject these new management practices and why. Chapter 6 begins by looking at representative social structures of two varying canal systems using social network analysis. For this comparison, I studied one representative canal in Charcana and the one existing canal in Antabamba. Because Antabamba and Charcana are in different stages in the adoption of the New Water Law, canal systems within these communities provide an opportunity to look at how social structures and ayni are different in these two contexts. Using social network analysis to operationalize ayni, this chapter opens with an analysis of the reciprocal network structures of the two canals. These quantitatively-derived, representative structures provided the groundwork for
generating qualitative ethnographic questions that were then used to make comparisons of economic, political, and cultural components of water management at the community level.

The ethnographic and qualitative analysis focuses on: (1) finding key characteristics about economically powerful people in the two communities, (2) better understanding why they are so powerful (i.e., Do they have large land holdings? Are they from a certain family? What types of crops do they grow?), and (3) is their power simply a function of a short term political position such as being water chief or president, or is there a historical component to their authority and control over resources and economic activity in the community?

Chapter 6 also looks at the impacts of the New Water Law on gender relations at household and community levels. There is a body of literature that suggests a historical principle of gender complementarity in the Andes; however, this notion of ubiquity is highly debated (Harris 1978, 1980; Spedding 1997). Accompanying the implementation of the New Law of Hydraulic Resources is the Gender Quota Law. I present an example from Charcana that highlights the impacts of these laws on the day-to-day lives of women who, by virtue of the Gender Quota Law, are coerced into participation in irrigation water management. The result is a perplexing harsh reality that questions the ideology currently associating the passage of such laws with discourses of decolonization of gender and equity (Burman 2011).

One of the most important elements of water management that needs to be included is that of the purpose it serves as a medium of symbolism and focus for individual, family, and community rituals. Chapter 7 highlights three rituals associated
with water to show the various levels of importance of ritual, and more specifically, the role of water in these rituals in Charcana. Ritual performance has always been, and continues to be, a place of contestation (Sklar 1995). Through the investigation of ritual, the contention over the role and importance of ayni in building community becomes evident. Ethnographic observations reinforced the importance of ayni as a social construct that culturally determines water rights while also illustrating the tensions that arise between the old and new systems. The lack of consensus about the role of ayni versus the role of cash in the local economy, and larger issues of identity and what it means to “be part” of the community of Charcana are also discussed.

**Contribution of Dissertation**

Water, the most precious natural resource humans depend upon, is fundamental to the survival of everyone. It is one of the few natural resources that is ubiquitous to nearly every type of economic production, is a key symbol in various world religious and cultural systems (Scarborough 2003), and is simultaneously necessary for human survival. The contributions of this dissertation will be to learn how management decisions of this universal resource with such unique characteristics can impact the lives of rural populations that are confronted with changes to their management practices.

This dissertation is intended to make both empirical and ethnographic contributions to on the study of water management in rural settings. More specifically, the political ecology framework employed allows for a more holistic analysis of the organizations and stakeholders involved at the international, national, provincial, and community levels. The comparative design of the research is intended to provide the reader with an understanding of the various impacts and reactions to the changes
imposed by a new water management framework. My incorporation of analyses of the social network structures of irrigation management enhances our understanding of the principles of reciprocity and water management in the Andes, and the role of social capital in local level resource access. Furthermore, I take steps towards creating a methodological framework for operationalizing ayni. The analysis of organizations aims to elucidate the role of institutions in the implementation of new policy, and outline a framework by which analyses of collaboration among institutional stakeholders can be assessed. The explanation of cultural and political systems centered on water management is intended to shed light on the unrepresented qualities of water in many national and international policies. These unrepresented and exogenously undervalued features are imperative to understand if new policies of natural resources are going to be effectively implemented and integrated.
Figure 1-1. Map of the research communities in La Unión Province, Arequipa, Peru

Source: Map elaborated by Forrest R. Stevens, 2012.
Political Ecology Framework

Blaikie and Brookfield (1987) succinctly defined political ecology as an approach to understanding relationships that combine ecological concerns and broadly defined political economy. Together, these encompass the constantly shifting dialectic between society and land-based resources (1987:17). This approach provides a framework for understanding the differential access certain people have to naturally available resources such as water, land, and wildlife (Mulder and Coppolillo 2005). This research focuses specifically on one of the principal issues of political ecology—how certain social, cultural, and political factors affect access and use of water in the rural Andes (Agrawal 2005).

How water should be allocated so that farmers receive their equitable share, regardless of whether they are near or far from a canal head, has been a challenging issue in the Andes given that water sources are usually located far from community centers. Joshi et al. (1998) found that in a sample of 114 cases of farmer-based irrigation management operations in Asia, “somewhat more water was available” (1998:13) to the houses that were within a closer geographic proximity to the canal head. The UN Food and Agricultural Organization (FAO) has turned to the institutionalization of water management as a preferred method for solving water inequality and conflict that arises based on these types of geographical disparities (Tang 1992).
Institutionalization of water management via Water User Associations (WUAs) in Latin America has sought to create a framework whereby users will be exogenously organized (under the ultimate control of the state or a private entity) to create a political and social environment conducive to successful collective action (FAO 2007). This process of institutionalization of social structure and organization is predicated upon the specification of rules and regulations to community members, and their subsequent internalization and action in line with the new policies. Most important to the successful transmission of new activities and the creation of new norms is that the community members benefit from the imposed changes (Ostrom 2007 [1990]). States often see the most effective way to achieve institutionalization of social structure to be through development interventions that require coordination across scales. Though various actors are involved during a transition of this type, the populations most affected by these reforms are the local communities.

**Social Capital**

Narrowing the gap between theoretical models of development and development practice continues to be a challenge, which can unintentionally create a space for critiques that only offer to impede the thinking and progress in this arena. One of the concepts that has received attention from both the theoreticians and practitioners of sustainability-focused development is social capital. The attractiveness of the social capital concept is that it necessarily involves actors from all levels and scales of the development process, from the local civil society organization to state and international governing and trade bodies.
Defining social capital

Differing in their definitions, ideas of social capital have been used in the context of social theory dating back to 1916, when West Virginia’s State Supervisor of Local Schools, LJ Hanifan, discussed the importance of ‘social ties’ in increasing productivity and quality of education for students in rural West Virginia. Since then, the term has been used in reference to the importance of social ties in productivity, and both social and technological advancements. In 1978, economist Glenn Loury discussed the idea of social capital as a variable in explaining income disparities between racial groups in the US.

Expanding on the concept of social capital as a variable, sociologists James Coleman and Pierre Bourdieu took very different approaches to social capital that have remained at the core of disputes about the application of social capital theory in development work. Bourdieu (1986) saw social capital as one of the three forms of capital, the others being economic capital and cultural capital. He defines social capital as “actual or potential resources … linked to possession of a durable network of institutionalized relationships … to membership in a group” (1986:248). Bourdieu’s Marxist approach to social capital highlights the fact that in industrialized societies there are inequalities within any group, and it is by way of harnessing the social form of capital that the material form of capital (read “economic capital”) can cross between social and economic classes. A resounding difference in the concept of social capital that sets Bourdieu apart from Coleman is the former’s attention to the primacy of cultural context and history in the formation of social capital.

Coleman’s theoretical position is focused on social structure, but rooted in the economic postulation of Loury (1978), who focuses on the ideas that a primary criterion
of social capital is that a social relationship has some sort of function. Coleman states that social capital is made up of a variety of components; however, regardless of the components, commonalities between all forms include: (1) some aspect of social structure, and (2) mechanisms enabling interactions between actors within the structure (1988). The first element of paramount importance to Coleman in creating social structure is the existence of a closed group or “network” that is comprised of individuals all cognizant of rules that govern their interactions (such as rules for water use), as well as the sanctions that punish deviation from those norms. The second is the establishment of an organization that was created for one purpose (such as the establishment of a Water User Association), which then becomes utilized, organically, for another purpose (such as a group that may function to share seeds or labor during harvesting).

Although others had spent years discussing the ideas, properties, and measurement tools associated with social capital (cf. Lin, Burt, Flap, Ben-Porath, Loury, Portes) the popularization of social capital really came about in the 1993 and 1995 publications by Robert Putnam. Putnam’s operationalization of social capital was in the measurement of participation in voluntary organizations in developed nations, with regard to membership and participation in social groups and civic organizations. This was a very important moment in the development of the idea of social capital, because Putnam took social capital to be an attribute of society, as opposed to a variable that may or may not be present. In Putnam’s work there is an explicit positive correlation between the number of, and subsequent number of members in, political or civic groups/associations, and the extent to which social capital exists in a community.
From theory to action

What has been distilled from the debates on the definitions of social capital and the competing theories is that it exists and can be categorized at two levels: the structural level and the cognitive level (Lin 2001). The structural category is external, and is evident in the social networks of groups or communities. It is facilitative in nature, and helps individuals and the groups meet their needs. The cognitive category is internal, and expressed through shared community norms and beliefs. The cognitive category is an indicator of the extent to which people are in agreement with the rules needed to support collective action (Grootaert & van Bastelear 2002).

More contemporary researchers such as Nan Lin (2001, 2002), Ron Burt (1992, 2000, 2005) and Mark Granovetter (1973, 1985) have promoted the social network approach to analyzing the structural component of social capital. Within this category of social capital, two theories of what constitutes “productive” social structure emerge—the theories of bridging and bonding. Bridging relationships refer to mechanisms that create linkages to people or resources outside of the normal social group. These relationships are more hierarchical in nature, and are facilitated by key personnel from each group who have the ability to communicate across groups. Bonding relationships, in contrast, are those that tend to reinforce group norms, and are seen as exclusionary by outside members. They facilitate collective action and reinforce intra-group linkages. Social network analysis in social capital research can be used to test the bridging and bonding concepts.

The cognitive category of the research is less developed, however, and analysis of group norms is required to understand the level of agreement within each group. In order to try and account for both categories of social capital as it pertains to irrigation
water management, I use social network analysis to understand the structural component, and cultural consensus analysis to understand the cognitive component. Cultural consensus analysis is used to uncover whether or not there are any agreed upon rules regarding irrigation water distribution, and if so, the extent to which community members are knowledgeable about those rules (Romney et al. 1986). Although I include a cognitive component in my work with irrigation water distribution, the majority of my research focuses on social capital as defined in structural relationships.

Methods

In order to understand how communities adapt to new water management laws, and which community and organizational characteristics facilitate that adaptation, I employed a variety of qualitative and quantitative methods. Fieldwork was conducted during three trips (May–June 2009, February–November 2010 and May 2011) totaling 12 months. I established relationships with various institutions in the Province. My main institutional partners at the beginning of my research were: (1) the Junta de Usuarios de La Unión (JULU), the provincial water user association, and (2) the Asociación Especializada para el Desarrollo Sostenible (AEDES), an Arequipa-based nongovernmental organization (NGO) that has been working in La Unión Province since 1996. It was through these two organizations that I was introduced to the other organizations working with irrigation water in the Province. JULU also allowed me to attend a meeting of every irrigation committee and commission in La Unión, which is how I was able to gain access to the communities. It was through conversations with commission and committee presidents and water chiefs that I was able to select the two main research communities of Charcana and Antabamba.
Charcana and Antabamba are characterized by two very different water management styles. These villages represent the extremes in water management autonomy and organization. Many of the general conclusions I make in this dissertation about water management at the provincial level are based on extensive interviews and fieldwork in these two communities, as well as less intensive research completed in six other districts across La Unión. Conclusions specific to water management in Antabamba and Charcana are clearly described as being specific to those communities, and in some instances are explained down to the specific canal level.

**Participant Observation**

Participant observation allowed me to understand the point of view of my informants by both working with them and seeing activities, frustrations, joys, and interactions through their eyes. It allowed me to better understand my informants and their daily activities (Spradley 1980). By living in La Unión Province, I interacted daily with irrigators, policy-makers, and technical extension agents, as well as non-irrigation-related private and public sectors of the population. My biggest strategy in gaining rapport with people was by participating in activities, such as planting, harvesting, irrigating, selecting seed, fishing and herding, and participating in festivals and rituals.

Within my first two weeks in the field, the NGO AEDES was planning a full day’s program for World Water Day. I volunteered to help make a video that was projected on a screen made of bed sheets in the Cotahuasi town plaza. Participation in this activity opened lines of communication to both institutions and the municipal government, who was supporting this effort; it also provided me an entrée with community members whom I interviewed as part of the video. This activity also facilitated the community becoming familiar with my presence. As one of the few non-Peruvians in the Province at
that time, there was a curiosity about me, but this video made it clear that I was interested in being part of the community and very interested in irrigation matters in the province.

**Social Network Analysis**

Because of the importance of the composition of community social relationships in the Andean context (Buechler and Buechler 1971), I used social network analysis (SNA). Social network analysis not only investigates ties through kinship, but accounts for other close social affiliations, providing a clearer understanding of the relationship structures within a community (White and Johansen 2004). Boelens et al. (2008) calls for an investigation into the local social relations embedded in Peruvian irrigation management paradigms, because they provide unique opportunities to learn about and model successful adaptive water management strategies. He contends that, “the active construction and re-construction of ‘territory’ is inherent and key to [user’s] localization efforts but requires strategic, broad networking” (2008:62). Social network analysis provides an effective modeling tool for uncovering micro-level interactions and helps researchers draw conclusions about the effects of those interactions on macro-level patterns of behavior, which then feed back into micro-level interactions (Granovetter 1973). Moreover, this approach allows for comparison of structural characteristics across communities that can be used to understand variation between actors from different networks.

I used a whole network approach, which allows for a complete view of the social structure for any bounded group (Burt 1992). The *a priori* conceptual framework I used to bind the whole network was the official list of canal users made available to me by the community water committees. Antabamba had 43 distinct users listed as having rights
to water on the one and only canal in the village. In Charcana, there are four canals total and the canal that I chose to analyze in the community of Charcana was called Paccha, and had 55 people involved in irrigation activities. Since I was conducting whole network analyses, I attempted to collect data from every user on the list. Some registered water users were not physically present at the time and had representatives who worked their land; therefore, I was only able to interview 36 of the 43 registered users in Antabamba (84%) and 45 of the 55 registered users in Charcana (82%). Note that this is still higher than the 70% response rate that is considered sufficient for whole network analysis under many circumstances (Kossinets 2006). I chose to operationalize three preselected tie types (Burt 1983) with the following questions:

1. **Transaction Relations**: “Who in the community would you go to if you needed to borrow money?”

2. **Communication/Authority Relations**: “Who do you ask about, or hear information from, regarding irrigation turns or new rules about water access?”

3. **Instrumental Relations**:
   a) “Who have you asked for help with labor in agricultural work in the past 12 months?”
   b) “Who have you asked to borrow equipment from for agricultural work in the past 12 months?”
   c) “With whom have you traded seeds or products in the past 12 months?”

**Community network analysis measures**

Betweenness centrality is a measure of social position. Betweenness is calculated by finding the shortest path (geodesic) between every pair of actors (nodes). For any given actor, betweenness is the number of shortest paths that they lie on. Conceptually, someone with high betweenness is a broker, and information will tend to flow through them (Freeman et al. 1991). ‘Flow betweenness’ is a measure of betweenness where a maximal amount of information is continuously transmitted.
throughout all of the actors (Freeman et al. 1991; Newman 2005). Flow betweenness takes into account not only the shortest paths but also non-shortest (non-geodesic paths), which is more realistic for the flow of information, goods, and even materials (Newman 2005). I argue that this measurement is appropriate for analyzing the data collected in the research for two reasons.

The first is that this research is situated within a cultural system that has the principle of reciprocity, known locally as ayni, at its core. In the Andean context, ayni is reciprocal exchange pertaining to services and assistance required to complete any extra-household tasks (Mayer 2002). Familial relationships heavily influence ayni relations. Because of that, the network measure of betweenness would potentially be biased towards people who have large families, which may not be an accurate indicator of a person’s position in their community network. By using flow betweenness and taking into consideration the multiple paths by which goods and information can move, I hope to reduce the impact the stated factors have on understanding the relationships within the canal networks.

Another reason for using flow betweenness is that it is not necessarily important if you have a direct connection with someone (shortest path – betweenness). If X trades with Y, and Y trades with Z, it is often the case that Y may exchange items received from X with Z. What is important to know in this relationship is how much of the total goods flowing through a community are moving through or originating at each individual node.

As explained above, data was collected and analyzed at the individual, registered water user level. These measures are very useful on their own in helping to understand
the structural properties of canal-level reciprocal exchange networks. However, in applying these data to better understand the actual social, economic and political relationships and activities in the community of Antabamba, I learned that this unit of analysis was deceptive. What appeared to be more important was to look at the structure of the network through family affiliation. This analysis had to be done quantitatively. Essentially, the unit of analysis at which the data was collected was too fine grain for the answering the questions that ultimately mattered. For this reason, many of the results from Antabamba are discussed in terms of family name, not individual name.

Organizational network analysis measures

At the outset of my research, I had intended to interview and analyze government institutions in the Province. As my fieldwork progressed, it became increasingly clear that an analysis of all the organizations working in the water sector, not just governmental ones, needed to be included in this study. I expanded my analysis to any organization involved in irrigation water management in the Province. This included government agencies, nongovernmental agencies, non-profits, community associations, producer groups, educational institutions, and private companies involved in water management.

I utilized the snowball sampling technique, replicating the method used by Charles Kadushin (1968). At meetings with representatives from organizations that self-identified as being involved in water management in the Province, representatives were asked to name all of the other organizations in the Province that they would consider to be involved with irrigation water management in some way. Sixteen organizations were identified. I interviewed various members of each organization, attended meetings in
Cotahuasi as well as any workshops they did in communities, and observed their participation in larger multi-organization forums. I was careful not to accompany these organizations when they traveled to any of the communities where I was doing network analysis so as to prevent any confusion about my role in the community, and assuage any fears that I was a representative of the government or any other provincial authority.

**Cultural Consensus Analysis**

In order to test whether or not there are understood norms associated with water management that could then be compared with written policies in the New Water Law, I conducted a cultural consensus analysis study in eight communities that represent varying degrees of transition from traditional management to state-imposed management. I conducted cultural consensus surveys of individuals to measure the level of agreement on cultural norms concerning irrigation water management.

Consensus theory and domain analysis provide conceptual frameworks used to determine whether something is part of a cultural domain. Borgatti (1999) defines a cultural domain as concepts, entities, or objects that are recognized as related or associated by a bounded cultural group. This can be empirically informed by using cultural consensus analysis, which makes salient existing agreements or consensus about certain cultural domains. By asking individuals about specific domains, we can estimate what type of cultural norms and knowledge is held in common, and who are the informants most knowledgeable about the community norms (Weller and Romney 1988). For water management to be successful, the same norms would presumably need to be understood and followed by everyone in the community. Unequal distribution of knowledge can be expected within a cultural domain (Romney et al.)
1986), and in the case of water management in this context, it could result in the amount of water access being unequal as well.

The cultural consensus questionnaire consisted of 35 items posed in an agree/disagree format (Appendix A). Questionnaires were administered in eight of the 11 districts of La Unión Province, totaling 207 respondents. Data were aggregated at the community and provincial levels. Inclusion criteria for respondents were anyone who works in the fields during irrigation and has personally had to request water for their family. Often this is someone other than the listed water user on the committee or commission registry. Women are often responsible for requesting water, though traditionally they are not listed as landowners and therefore may not be listed on the water user registry. By widening the inclusion criteria beyond listed water users, I was able to increase the number of women respondents and include a more heterogeneous range of ages.

**Open-ended Interviews**

Throughout the course of my fieldwork, I conducted various site visits with irrigators and conducted open-ended interviews. Many of these interviews focused on having people recite to me how they access water in their communities. I would ask them to describe the process, from requesting water to actually receiving the water, and then describe their responsibilities and actions once they completed irrigating their fields. Many times these interviews turned into full descriptions of the corruption of water officials and skepticism regarding the national government’s new interest in governing their water use. I found open-ended interviewing to be the most useful method for soliciting information about conflict. When I did try to ask about conflict directly, people often told me there would always be conflict about water, but they would
not expand on the topic. However, in open-ended interviews, they would share information about conflicts, often reciting stories about a conflict and how it was or was not resolved, and what their opinions were on the resolution and process.

Open-ended interviews were also utilized to collect environmental history narratives. The qualitative information received through this method was very important to understanding how irrigators conceptualized changes in their climate. Many times people would reference *cambio climático*, climate change. In learning about people’s perceptions of the change in resource availability over the years, it was clear that their understanding of blame for lack of water does not rest solely with the political powers that be. There is an acknowledgment that there are multiple factors at work that cause shifts in water availability.
CHAPTER 3
THE RISE OF STATE-CONTROL OF RESOURCES IN PERU

Water management in the Andes is highly adaptive over the long term. This is evidenced by the change of management techniques across time to endure shifts in politics, building materials, and locations of water sources that have changed throughout the centuries. It is also seen within communities dealing with different topographic challenges, cropping patterns, and water availability. The ingenuity in technological innovation in the Andes has been well documented in a series of archaeological works looking at the transformation of irrigation technology across time (Kosok 1965; Denevan 1986; Kolata, 1993; Jennings 2003; Schreiber and Rojas 2003). It is important to note that these adaptations are engendered through a series of locally debated decision-making processes with their own rules and internal logics. The results, repeatedly, have been systems of water management that sufficiently resolve topographic, hydrologic, and organizational challenges (Guillet 1992).

Water Management Up To and Through the Middle Horizon

Little is known about the earliest forms of social organization in the Cotahuasi Canyon region. Very few archaeological studies have been published on the region. Interviews with local representatives from the Instituto Nacional de la Cultura (INC) corroborate much of the published archaeological conclusions. Based on this research, it is believed that this region was home to the Huari during the Middle Horizon period, which ranged from CE 700 to 900 (Chavez 1982). Ceramic potsherds provide evidence of the Huari culture, the widest spread Andean culture of that era (Trawick 2003). Although the chemical signatures of obsidian tools found in the region can be dated as far back as the Early Horizon Period (900BCE – 200CE), it is difficult to surmise much
more than the fact that there were people who lived in the region at least seasonally. There remains a lack of material culture and evidence of landscape transformation associated with irrigation and agriculture (Burger and Asaro 1977; Burger et al. 1998).

Supporting the patterns of results derived from Denevan’s work (1986) in the Colca Valley Project, the more recent Cotahuasi Archaeological Project (Jennings and Yepez, n.d.; Trawick 2003) provides evidence that the majority of the terrace building operations were undertaken during this Middle Horizon period. Across the region of the southern central Andes at this time, many of the terracing projects are believed to have been conducted under the political control of the culturally dominant Huari civilization. However, Jennings (2003) argues that this simply may have been a replication of Huari style, though with a different construction technique (Trawick 2003). Independent of the origin of architecture style or the political power that was commissioning these construction projects, it is clear that construction of domestic dwellings was correlated with the location of agricultural fields and water sources. This construction signals the first real visible movement towards permanence of terraced agriculture and intensified agricultural expansion in the region (Trawick 2003).

The advances in agricultural and irrigation infrastructure realized during the Middle Horizon Period secured a sedentary population in the valley despite the disintegration of the Huari State. Accounts from residents in the region corroborate Jennings’ (2003) and Trawick’s (2003) archaeological work that most of the pre-Incan-style canal construction is located in the higher altitude regions (3500 – 4200 meters above sea level) of the valley, and that the lower altitude canals display more resemblance to the canal construction of the Inca. The canals most dissimilar from those of the Inca can be found
in the eastern portion of the valley, near the communities of Cahuana, Alca, Huillac, and Puyca. It is widely believed that either Puyca or Cahuana served as the regional capital (Chavez 1982; Trawick 2003). Both Puyca and Cahuana are higher altitude communities that, according to the archaeological evidence (Jennings and Yepez n.d.; Jennings 2003) are presumed to have had a relatively large population prior to the Inca arrival in the area.

**Inca Arrival and Water Management During That Time**

It is in the lower altitude, and presently more densely populated, communities in the valley that reflect a type of canal construction that is most widely identified as being constructed during the time period of Inca expansion. The handwork on the canals is surmised to have been built by Incan engineers and soldiers, in return for the communities’ quick assimilation and peaceable conformity to the new systems of governance and tribute established by the conquering Incas (Trawick 2003). Research performed in the Colca Canyon region of Arequipa indicates that the Inca were adept at building in low-lying areas of valleys, and drawing water from rivers topographically upward from the primary source (Denevan 1986; Treacy 1989). This type of irrigation is markedly different from the traditional contour-constricted (sloping downward) irrigation that marks much of the Cotahuasi Canyon’s landscape. Various studies have found similar patterns of valley floor irrigation development during the Inca expansion (Murra 1960; D’Altroy 1987; Levine 1987). Many of these studies suggest that the intensification of agriculture in the valleys was almost exclusively for the increased production of goods needed to send back to Cusco as tribute.

Although the agricultural frontier expanded into new regions of the canyon during the time of the Inca, there was certainly an effort made by the Incas to improve the
irrigation canals that already existed in the region at the time. Time and again, when I explained to residents of the canyon that I was studying water management, I was told to visit the canals that channel the water flowing down from a spring located high above the villages of Huillac and Puyca, in the eastern portion of the canyon. With two guides, ropes that were utilized to anchor ourselves to the side of the mountain, and a heavy-breathing donkey trailing behind, we climbed up to the most quintessential Incan canals in the region. The canals connecting Huillac and Puyca were the main veins of life during the period of Incan rule. Flowing to the west, these canals watered the fields of Willaq (today known as Huillact) “guardian” or “sentry”, and Qhawana (Cahuana) “observatory” or “look out” (Trawick 2003). Flowing to the east, they watered Peccte and lower portions of Puyca. Ultimately, it is believed that the administrative centers of the canyon were located in Huillac, and at a fortress built directly above Puyca called “Mawka Llaqta.”

These positions allowed for protection of the main access road the Incas had laid in stone, which connected Cotahuasi with Cusco, the imperial center. Although the geographic distance between the two points is roughly 120 miles, the multiple Andean mountain passes of greater than 6000 meters altitude make this a treacherous trip that would sometimes take over a week on foot, when it was passable at all, and not covered with snow. Although there are no archaeological data to elucidate what specifically was being transported from the canyon to the capital, satellite imagery does show the evidence of extensive Incan roadways, stop-over houses, abandoned terraced fields, and trading points along the route, indicating that Cotahuasi was part of a well-traveled and well-connected network extending eastward from Cusco and south from
Ayacucho Province. It can be concluded that in the eyes of the Incan empire, Cotahuasi was considered a fertile valley worth the investment of infrastructure and agricultural expansion.

The expanse of the greater Ocoña basin region, which encircles the Cotahuasi Canyon, has been a place of resource exploitation and extraction since the Inca Period. In addition to the fertile soils, endemic flora and fauna, 12 life zones, and three eco-regions that are all part of the canyon landscape, a vast amount of seemingly invisible resources lay within the mountains and in the river on the canyon floor (Cano 2005). Of the many resources available in the valley and the greater Ocoña basin, rock salt was one of the most valuable at the time. Peru had only two sources of rock salt in the entire country, and one of those is the mine of Huarhua, located due west of the town of Cotahuasi (Llano Zapata [1761] 1904). In the Cusco dialect of Quechua, warwa means “salt;” there is a phonetic similarity between the village name and the mineral name (Lira 1970:418; Trawick 2003). In conversations with residents, the sentiment was that it was named after the town; however, there is little in the way of evidence at this point to substantiate that claim.

Although no archaeological studies have been conducted in the high altiplano of the western side of the canyon, evidence of large road systems similar to Incan constructions head not only northeast in the direction of the imperial capital of Cusco, but also northwest, across the village of Charcana in the direction of what is today the Province of Ayacucho. Salt was making its way through the empire, and the demand for steady production required reliable water (Tripcevich 2008). The amount of water needed at the salt mines, along with the impacts of concentrated salinization of the soil
over centuries of run-off, greatly influenced the canalization of the Canyon, and continue to influence the management of water today.

In addition to the agricultural exports and the primacy of salt extraction, the valley was a critical resource for other, non-irrigation-associated products. Fish were caught in the Cotahuasi River and, salted with the salt from Huarhua, preserved, and sent to Cusco (Hyslop 1984). Other minerals and some precious metals are also found in great abundance in the region, though their exploitation was not on the same scale as the salt extraction operations. Gold and obsidian, which was used in mining activities during Incan times (Burger and Glascock 2000; Jennings and Glascock 2002), were the other dominant products exported from the region (Trawick 2003).

Trawick (2003) extends his views of the Inca attitudes towards the residents of the Cotahuasi Canyon similarly to the way Poole (1987) does about their attitudes toward the Condes of Chumbivilcas. This perspective indicates that people there had a certain degree of autonomy. Even today, Cotahuasi, and in particular its hinterlands, are considered by all accounts to be remote. However, the impact and investment of the Inca is clear and still visible on the landscape today in the irrigation infrastructure that remains in use in many parts of the valley. Whether or not the Cotahuasiños were afforded any type of extraordinary autonomy beyond what would be afforded to them by the sheer remoteness of their location is debatable. However, the observations by Trawick (2003) that the treatment by the Incas of Cotahuasiños was anything but marginal are indisputable. One cannot deny the impact the Incan hydrologic technology had on the landscape, and its continued impact on the livelihoods of Canyon residents today.
Dualism, Social Organization, and the Legacy of the Incan Ayllu Structure

In trying to understand the social, political, and economic aspects of water management in Cotahuasi, it is necessary to understand the actors in their historical and cultural contexts. As was stated earlier in the chapter, the historical influences of pre-Incan and Incan politics and economics had a large role in developing the irrigation infrastructure still present in the region today.

The impact of the Inca on the landscape and the development of new technologies and expansion of the agricultural frontier in the region is one of the lasting impacts the empire had on the valley. The other less visible and less recognized lasting impact the Inca had on this region comes in the form of social organization. Unlike the other major empire in the New World, the Aztecs, who let their newly conquered populations maintain their own socio-political organization (Sanders and Marino 1970:65), the Inca implemented a highly structured sociopolitical system that was replicated in every community throughout the empire.

The archetypical system upon which others were modeled was found in Cusco (Sherbordy 1982; Guillet 1992). In this system, a chaupi (center) was identified where the Q’oricancha complex in Cusco stands (presently known as the monastery of Santo Domingo). From this center in Cusco, 41 ceques (sightlines) radiated to distant landmarks that included mountains, rivers, rocks, and other large landscape features present within view (Guillet 1992). It was initially thought that this was the division for the 41 original ayllus (Guillet 1992); however, now it is more generally believed that these divisions referred to the spatial layout and mental mapping of the geography for the population, more so than how they viewed their lineage and common ancestors (Sherbordy 1998). What seems to resonate from both interpretations is the evidence of
long-standing relationships between *ayllus* and environmental features, such as rivers, springs, mountains, boulders, and glaciers.

The Incans often used water sources as points of origin in creation myths. What is usually glossed over in most texts regarding the creation myths of *ayllus* is that these people were already there, and often had a different creation myth prior to the point of contact with the Inca. A group of older residents in the community of Suni, which is considered to be one of the most “traditional” of the communities in the Canyon, began to debate the veracity of their *ayllu* origin myth; that they came from the waters that ran from the foot of Mawka Llaqta down to their community and fields. A few argued that their ancestors were birthed by mountain spirits of Nevado Coropuna. In this discussion, there was no explicit implication that the origin of the water myth was tied to the Incas, or that the myth implicating Coropuna was tied to an earlier group. What this incident does indicate is that the conclusions of other anthropologists such as Trawick (2003), Gelles (2000), Sherbondy (1982), Guillett (1992), and Zuidema (1964) about the explicit efforts of the Inca to tie *ayllu* creation myth to water sources may be at work here in the province as well. Guillett expands on this hypothesis and concludes:

> The myths [of water as the origin of social groups] shifted emphasis to the water that was essential to the expansion of an irrigation-terracing-maize complex throughout conquered Inkan territories… Myths connecting the origins of the ayllus to local sources of water gave these groups preeminence (1992:19).

This could not be truer for the agriculturalists, who today make claims about their preeminence in the region and their right to the water, irrespective of the government’s degree of concern or desire for involvement.
Dualism

Inherent in this *ayllu* structure was what has become known as the Andean concept of “dualism.” The concept of dualism impacted all forms of organization—the physical landscape, political and social arenas, and cosmological worlds. It is beyond the scope of this work to explain in full the entire system of dual organization in all aspects of Andean life; however, it is necessary to discuss how this organization impacts resource sharing and access within a seemingly united community. In addition to many of the cultural, political, and social elements discussed earlier in this chapter, this system of dual organization is also a relic of the pre-Colombian organization in the Andes (Gelles 1995).

David Maybury-Lewis (1960, 1974, 1979, 1989) has written extensively on the dual system of organization. This system in La Unión Province is based on the system imposed by the Inca. Traditionally, and in some larger communities in the Province today, communities were divided into moieties.¹ In the local Quechua dialect of the region, these two moieties are divided into *anaq* and *uray* (upper and lower, respectively), and when referred to as discrete units are called *aransaya* and *urinsaya* (upper moiety and lower moiety, respectively). Historically, this system was used to rank moieties within larger geographical areas and corresponded to the division and/or order of resource access (Urton 1984; Zuidema 1964, 1989, 1990). It is thought that the system of dualism, in a slightly different form, was part of Andean culture prior to the era of the Incas, though the Incans clearly defined the system and promulgated it in areas where it was not previously in use (Maybury-Lewis 1989). When the Spaniards

¹ “Moiety,” as it is commonly used in anthropological literature of the Andes is a derivative of the French word *moitie*, which translated means “half.”
conquered the region, theyconcertedly preserved the saya (moiety) system, viewing it not as a ritualistic, pseudo-religious form of organization (as it also was) but only as a system of economic and political division, which in outward appearances served the Spaniards well. This logic of resource division and distribution was orderly, and efficiently allowed the Spaniards to extract surplus from the communities (Benavides 1991; Guillet 1992; Gelles 2000).

In the Cotahuasi valley, the presence of aransaya/urinsaya varies by community. In the 11 districts that comprise the Province of La Unión, at least one village in each district still maintains the moiety divisions; however the extension of its functionality in social, economic, religious, and political aspects of daily life differs greatly. For example, in the community of Antabamba, an annex of the District of Huaynacotas, there is no distinction between moieties or ayllus. Neither land distribution, water sources, irrigation canals, residential patterns, economic relationships, nor spiritual groups or activities are structured in this pattern. This is most likely associated with the fact that there was an era of land consolidation during the period of time when large haciendas were dominant in this part of the canyon. Due to the fertile soil and relatively accessible location of Antabamba, much of the arable land was highly desirable by ex-colonists. Because of this, land was appropriated by large, powerful landholders, restricting indigenous residents access to arable land in this part of the canyon.

Furthermore, there is only one main canal (as of the time this was written) that feeds the fields in Antabamba. In other communities, multiple springs are channeled to a variety of canal systems that may feed either aransaya or urinsaya fields. This was explained to me by an individual who is considered a "mayorista" (one who owns more
than three *topos*\(^2\) of agricultural land), as a function of their being so few fields in Antabamba. Another resident in Antabamba explained that this was due in part to the fact that the *mayoristas* in Antabamba were not interested in channeling other water sources to the community. This informant believed that this functions so that *mayoristas* can still have people labor on their large swaths of land. The impression was that other communities had more cohesive water commissions that were working to channel the water, and therefore Antabambinos were losing out on the resources.

Conversely, the *aransaya/urinsaya* division is prominent in the higher altitude, more remote community of Charcana, located 42 kilometers from the provincial capital of Cotahuasi. Charcana is laid out in a very compact fashion. At first glance, the construction of houses, roads and canals seems haphazard, and may initially strike a visitor as a matter of pure function since the slope on which the community is built is the most commanding physical feature in the village. However, the logic of the physical structures and layout of the community is consistent with the principles of dualism. Figure 3-1 is a satellite image of the village of Charcana with the two *ayllus* outlined and labeled. To the northeast of the plaza, one enters into the *urinsaya*, known as *ayllu* Humara, and to the southwest of the plaza, one enters into the *aransaya* known as *ayllu* Supalta. Due to the relatively small body of literature regarding 21st century agriculture in the Andes, there is a prevailing belief that these systems of dualism are no longer functional in the social bifurcation of communities and really only pertain to the division of resources (Gelles 2000:99). I argue that Charcana serves as an exception to this assumption.

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\(^2\) The *topo* is a unit of measurement used in rural Andean communities. It is more or less equivalent to one-third of one hectare. In acres, one *topo* is equivalent to about 0.83 acres.
Over the past 50 years has experienced steady population decline, with a 20-year low in 2007 of 367 inhabitants inclusive of the two ayllus (INEI 2007). According to local residents, population numbers since this official census number was generated is said to have actually declined. A census taken over the course of six monthly meetings during my fieldwork revealed an average number of residents at any time in the village of Charcana at 287 (including children, and excluding teachers from the school and the two police officers who are brought in from the city of Arequipa). The bias in the numbers collected by the census officials can be attributed to fines levied on households that are not present for the census. With many (nearly one third) of the “residents” of Charcana maintaining dual residency in Charcana and another population center such as Cotahuasi, Arequipa, or Lima, they usually return to Charcana for the census to avoid fines and to increase the chances of Charcana receiving money from the state. Municipal budgets are meted out proportionally to population size initially (INEI 2007), so there has been a movement to have dual residency community members return in hopes of increasing the district budget.

**Rejecting Dualism as Evidence for the ‘Hydraulic Hypothesis’**

In 1949, Julian Steward published an article in *American Anthropologist* titled “Cultural Causality and Law: A trial formulation of the development of early civilizations.”

In this article he states the following about civilizations in the Andes:

> It is not sufficient to say that the agricultural, social, and religious institutions merely diffused as a unit, for that would be merely stating distributions in historical terms but failing to explain process. Incipient farming appeared first, and it diffused before the other complexes developed. The latter have a functional dependence on intensive farming. They could not have been accepted anywhere until it developed, and in the course of its development similar patterns would undoubtedly have emerged, whether or not they were diffused (1949:4).
This passage actually predates the publication of Karl Wittfogel’s ‘hydraulic hypothesis’ (1957), though it extends the same idea—that water would be the organizing principle when it is paramount to livelihood production. In the case of the Andes, this was presumed to be the basis for what Steward interpreted as the development of pan-Andean polities (Boelens et al. 2009).

Arguments to the contrary claim that these theories are implausible in the Andes for a variety of reasons. The first argument is that Andean water systems are too small, and localized (Boelens et al. 2009). The theory behind this is that due to the spectrum of water availability, geographical constraints, and user demand on the system, it is difficult to believe that the same technology and type of administration would have even been possible in every location. Another argument, on a much broader scale, is that the Inca specifically did not impose widespread changes in water management to communities they conquered (Gelles 2000). Rather, it is becoming evident that they deferred to the local system of water management, since the local technologies and norms for distribution were already negotiated and agreed upon. Thirdly, there are hypotheses that the plurality and diversity of rules present today in systems that are geographically close in proximity can only be explained as remnants of a system in the past that was tolerant of different rules and sanctions (Guillet 1992; Gose 1994; Gelles 2000; Boelens et al. 2009).

To be clear, the existence of dualism in most Andean communities in the region during the Inca period is not a direct reflection of the preeminence of hydrology in socio-political organization. Furthermore, there is no evidence that all communities divided into aransaya and urinsaya practiced the same management practices as sayas in other
communities. The command and control management laid out in the ‘hydraulic hypothesis’ does not accurately describe the water management style of the Andes now, and there is little that gives evidence to that argument until the arrival of the Spaniards in the 16th century (Guevara-Gil 2005).

**Contemporary Role of Dualism in Village Socio-Environmental Organization**

Charcana still incorporates some elements of the *saya* system today. First, as can be seen in Figure 3-1, the community still divides residential areas in Charcana by *ayllu*. The sector of Humara is considered the upper moiety (*aransaya*), and the sector of Supalta is considered the lower moiety (*urinsaya*). The distinction in residential *saya* affiliation is most notable during *fiestas* (celebrations) and *faenas* (communal work parties). During *fiestas*, each sector is responsible for nominating a *patrón* (party sponsor) who will provide food and music for the festivities. This is a very important and expensive cargo, though fulfillment of this cargo is very prestigious. A more in-depth look at the role of the *saya* in fiestas is provided in Chapter 7. The role of domestic *saya* division is exhibited during *faenas* associated with anything other than agricultural work. Agricultural and canal *faena* obligation are correlated to canal membership, whereas communal work parties for nonagricultural-related tasks such as roof thatching, clearing roads or pathways, home building, etc. are associated with one’s *saya* membership.

The two *saya* categories have also been used as a reference to the location of fields within Charcana. Fields located closer to the reservoir tanks and/or the higher altitude parts of the canals are referred to as *aransaya*, and those lower down the canyon and closer to the village are referred to as *urinsaya*. Although this is a derivation of the original use of the words, these terms reflect the amount of water one
can expect to have, and often connotes the type of crops that a person is capable of producing. It is not only the altitude that is related to the types of crops, but the amount of water that is available. *Aransaya* fields are commonly thought to receive more water due to the fact that there is less seepage and water loss closer to the canal source. Therefore, to be *aransaya* in field location is highly desirable.

As was explained earlier, the concepts of dualism are relics in the community of Antabamba. Due to the small number of residents and relative centralization of resources, field locations, and village residence, dualism has fallen out of favor. Many residents cannot remember a time when the community was divided as such, signaling one of a few possibilities. The first, which is most doubtful given the history of many other villages in the Canyon, is that dualism was never part of organization in Antabamba to begin with. The second is that the population decreases over the centuries since the Spanish arrival decreased the population to a point where dualism and the *saya* system lost its function in Antabamba. The third is that the colonial system and eventual *hacienda* (large landholding) system had such a strong impact on land and resources that the inscription of everyone into servitude on the *hacienda* permanently dismantled the *saya* system. I believe the third to be the most probable, given the deep-seeded roots of the *hacienda* system in this village and that some communities in the surrounding area, such as Charcana, still have remnants (to varying degrees) of the *saya* system and experienced less historical land consolidation.

**Colonialism and Water Management**

Following the arrival of Francisco Pizarro and his army of Conquistadors from Spain in 1531, the Incan Empire was dismantled, and the roughly 140 years of Incan control in the Andes and parts of the Amazon came to an abrupt end. Beginning in
1532, different regulations began to be implemented throughout Peru pertaining to resource management. In priority areas, namely Lima and the southern coastal regions of the country, water was to be controlled and administered by the colonial powers themselves. For a while, what is now La Unión Province was sheltered from the Spanish invasion due to its remoteness and altitudes that needed to be crossed to arrive to the region. When the Spaniards finally arrived in the region, they immediately began to divide the communities into *repartimientos* (tribute-paying populations) (Trawick 2003). The organization dictating whether or not these *repartimientos* were paying directly to the royal crown or not varied. Some communities in the Canyon were linked directly to the crown, paying tributes accordingly; other communities gave *repartimientos* to individual conquistadors or their wives as *encomiendas*, or grants of land and people to work the land (Levillier 1925; Cook 1975).

One of the most important shifts during the first 100 years of Spanish rule in the region was the political division that occurred between seemingly united communities. Some parts of what today is called the Province of La Unión were distinct communities in the different Departments of Ayacucho, Arequipa, and Cusco. This political division, in conjunction with the resettlement projects, called *reducciones*, of 1572 was under the direction of Viceroy Francisco de Toledo and the “extirpation of idolatries” (Arraiga [1621] 1968) served to sever traditional ties and reorganize communities. Paul Trawick (2003:49) discusses the connection between the “extirpation of idolatries” and the intention of keeping indigenous populations from returning to their ancestral lands. In speaking to historians from the Universidad Nacional San Agustin (UNSA) based in Arequipa, I was told this was really a coordinated effort across a century to dislocate
people, one generation at a time, from their means of production and their spiritual relationship with the land and *apus* (mountain deities).

Trawick (2003) makes the case that it was only in the 18th century that new settlements, which were more proportionately representative of the annexes and smaller communities of today, were allowed to form. Unfortunately, there is very little archaeological work done on the actual canals that run through the villages of today. Most of these canals are dug from the earth, and retrenched many times annually. Other canals located closer to the larger villages and the provincial capital of Cotahuasi are now lined with concrete, muting any apparent historical relationship those canals may have had to prior settlements in the region.

In addition to the displacement, it is important to note the decline in absolute numbers of indigenous peoples during the two hundred years of Spanish occupation of the Valley. This is due to a couple of factors. The first is that there was an all-out massacre against those communities that defiantly resisted incorporation into the Spanish system upon arrival, either due to the lack of participation in Catholicism, or land reformation. These were the leading causes of deaths at the hands of the Conquistadors (Cook 1981; Trawick 2003). Another major contributor to the population decline was illness. Outbreaks of smallpox, influenza, and measles were particularly damaging (Diamond 1999). Though this area was thought to be less affected by these epidemics than other, more densely populated areas coveted by the Conquistadors (Trawick 2003), the impact was still prevalent.

Mining and forced labor also contributed to the population decreases in the area over time since the invasion of the Spaniards. It is not very well known that the
Cotahuasi Canyon region was one of the very first destinations for the Conquistadors in their quest for large deposits of gold. It has been reported that in 1550, one of only two gold-mining settlements in the entirety of Peru was located in the area of Chaucalla (Chavez 1982; Boggio 1983; Trawick 2003). The impact of the mining settlement was grave on human health, indicated by the population declines of the time. The close quarters of the camp became a vector for already rampant disease, and the accidents and occupational hazards associated with mining activities and rudimentary technology of the time only increased the death counts in the region. Within another 100 years, more mineral deposits had been discovered in the region, including the three most famous of Huayllura, Palmadera and Montesclaros (Raimondi 1887). Labor for the mines was recruited using the *mita* system, which were conscribed work parties of natives.

This period of Spanish occupation and slow take-over of fertile farmlands and rich ore deposits was the beginning of a long and oscillatory transformation of resource ownership and use. The relationships between dispossessing laborers from their land, separating laborers from their means of production, and controlling and (to a lesser extent) financing labor are indicative of the key characteristics in the origins of capitalism (Wood 2002). I argue that, in some respects, the economic forms of production during the colonial period were more closely related to capitalism than they are now. What really solidified these relationships, and thus influenced the access and norms associated with water management in the region, was the rise of the *hacienda*.

**The Rise and Fall of the Hacienda**

As a result of the increased mining in the region, systems of muleteering and transportation became more sophisticated, and allowed increased commerce between
the Cotahuasi valley and the larger urban centers of Ayacucho, Arequipa and Cusco. A side effect of this exchange was an increase in the profitability of agricultural production and trade in surplus agricultural products from the variety of ecological zones across the valley. The three departments of Ayacucho, Arequipa, and Cusco all had administrative rights within the valley, since technically the divisions made under Viceroy Toledo persisted until the independence of Peru from the Spaniards in 1821.

Soon after the official recognition of independence in 1821, the elite families of the region protested the split arrangement, which divided the watershed and physically contiguous landscape, and petitioned for unification of the region into an independent province. In 1835, local populations took up arms against the government. They successfully attained recognition as an independent province of the Department of Arequipa on the fourth of May that same year (Trawick 2003). The name of the province became La Unión, and it has remained under the political authority of the Arequipa Department ever since. Fueled by their victory and their recognition as a regional supplier of ore and wool, the markets in Arequipa became more responsive to the increasingly growing urban populations. This drove an increase in demand, and thus production, in the newly established province (Flores Galindo 1977).

Large tracts of land that were once given to Spanish landholders by the crown quickly fell into contention after independence. In the case of many of the larger and most fertile districts in the Province such as Cotahuasi, Tomepampa, Alca, Huaynacotas, and Pampamarca, the colonial families kept control of the land. In more remote villages such as Charcana, Puyca, Machuanca, Suní, Huillac, Tauría, and Sayla, there was a resurgence of local control, and many of the colonial families retreated to
the larger towns and cities. The first agrarian census was not taken until 1968 (DNE 1968), so it is difficult to truly estimate the number of native and non-native landholders during the 150-year period between independence and the agrarian census. However, interviews with residents who were born during the beginning half of the 20th century all indicated that many of the large landowners were products of the *hacienda* system.

Historical documents cite that irrigation-user participation had been something included in Peruvian water management since Viceroy Toledo’s water ordinances of 1577 (Dougnac 1994:427-428). At that time, the definition of “users” was skewed and written in favor of those who owned land, which were only the Spaniards. This was perpetuated up to and through the first 70 years of independence until 1902, when the 1902 Water Code was passed. Mainly modeled on the 1866 Spanish Water Law (Palerm-Viqueira 2009), this code mandated the establishment of water user associations, or *comunidades de regantes*, who were responsible for participating in the management of water. This code was considered a failure by many (Ore 2005). Klaren (1976) cites one of the most problematic issues was that it mainly focused on land tenure and *not* water management. Although the Spanish Water Law of 1866 was a success in Spain, the inequity that replicating that code produced in Peru became a structural and long-standing impediment to equitable water access.

This law, which was not fully reformed until 66 years later, declared that water management and access was proportional to landholding size (ADLP 1904; Basadre 1968). When I asked the older men and women who worked on their own fields during, or directly under the *hacienda* system, many of them laughed at the idea that water access was proportional. I was consistently reminded that water was power, and that
the rich colonos had the power, and therefore the water. This Spanish-style law reinforced the power dynamic associating large landholders with water rights. It was tautological, and it wasn’t until the agrarian reform of 1969 that this changed.

Of utmost importance during the hacienda period was the need for peones (indentured servants who worked on haciendas) to work the land in order to pay back debt that they were assigned whenever they needed other resources. Indigenous and other non-landed residents in the area were forced to buy everything associated with both work and daily life (e.g., foot plows, seeds, food, wool, etc.) from the hacendados (hacienda owners). Even though technically considered comunidades de regantes, those who owned land outside of the haciendas experienced intervals between irrigations that could reportedly last up to 100 days between water turns. Irrigating three or four times a year is hardly sufficient in the most fertile of places, let alone in the arid and seasonally rain-fed mountains of the southern Andes.

Framework for the Demise of the Hacienda System

In 1917, after revolts on the northern Coast of Peru in the Department of Lambayeque, the State implemented a system that was supposed to monitor the distribution of water more closely, without actually reforming the laws. Technical Commissions were established in each province, and the point was to minimize the inefficiencies in water management, provide assistance with infrastructure initiatives, and ultimately “rationalize” usage (GPER 1993). Considerable confrontation and discontent emerged in many rural areas of Peru, until the pendulum of power swung far enough to the side of the local and non-landed population that the passage of the Agrarian Reform of 1968 redefined land use, broke up the hacienda system, and was supposedly laying the ground work for radical changes in water management (Velasco
[1968] 2005). On the heels of one of the most active and prolific peasant movements in South American history (Starn et al. 2005), General Juan Velasco took control of the government on October 3, 1968, and the invasion of haciendas and estates by locals was in full force. Realizing what the famous Peruvian poet and author, José Maria Arguedas, referred to in “The Pongo’s Dream,” the peones all over the countryside were preparing to receive sweet vengeance with the extirpation of the hacendado commencing.

The Pongo’s Lost Dream: No Honey at the End

Following the Agrarian Reform, the Ley General de Agua No. 17752 (General Law of Water No. 17752) was passed, and for the first time, water was declared property of the state. This was also the first time in Peru a distinction was made between ownership of property and natural resources. It was possible to own territory, but natural resources such as water, were now owned by the state. In light of these changes, adjustments in the administration of irrigation water were necessary. An appointed technical administrator of water became the bureaucratic extension of the state in rural areas. The term “irrigation districts” was also implemented at this time, which shifted the focus from user-oriented units of control to watershed-oriented units of control. This was an important because the cognitive association with water was relocated from the local level to a wider, less tangible level that involved myriad actors and agents who could exogenously control water resources.

It wasn’t until three years later, in 1972, that a district office was established in La Unión Province. The transition and implementation in Cotahuasi Canyon was not as smooth as Guillet (1994) describes the transition to the new system in the more easily accessible Colca Valley in 1970. In Cotahuasi, the transition was met with rigid
resistance. One of the main reasons was that there was a lack of roads to many of the large districts, and though the community members were accustomed to traveling to and from their villages for eight to 12 hours at a time on foot or on horse, the government employees were not.

The realities that technicians faced when placed in these rural departments was more challenging than the government had originally thought (Guillet 1994). According to an employee in the regional Arequipa office of the Ministry of Agriculture, not being able to be present in the communities had damaging effects on their ability to gain the communities’ trust. According to older residents in La Unión, the absence of the water technicians was verification that the government was not interested in helping the campesino (rural farmer). The haciendas were broken up, yet the power dynamics in the region never really shifted, and the inability of the government to effectively wrest control away from the hacendados reproduced the same economic and political systems as before.

In Arguedas’ “The Pongo’s Dream” (1985), he writes of a dream had by a servant where both the servant and the master are dead, standing in front of Saint Francis. Angels cover the master in honey and the servant in a foul mix of gasoline and excrement. In the story, the master laughs as he hears this dream being told, exclaiming that Saint Francis and the heavens are on his side. However, the final command of Saint Francis in the pongo’s dream is that the two spend the rest of eternity licking each other clean.

This metaphor (some rural Peruvians consider it a parable), though powerful in concept and motivation, was never made a reality. Hacendados changed their methods
of control, and the poorly implemented breaking up of the hacienda system left peasants with land but very little equipment, seeds, or financial capital to improve the land (Dobyns et al. 1971; USAID 1982). The redistributive properties of the reform never came to fruition. In the end, the pongo’s dream was just that—a dream that never made the transition to reality. In effect, the hacienda system was damaged, but the structure, control, and spirit of the system were never broken.

Summary

The importance of the role of history to contemporary Andean water management cannot be understated. Though water management practices and laws have changed over time, the correlative social and political processes involved in water management have been more resistant to change, and represent a thread of culturally-bound values that have found their way into everyday practices.

Little is known about the political aspects of water management during the Huari period. What is known about that period is that it was an infrastructure-intensive time in the region, indicating that sedentary populations were intensively involved in agricultural production since the Early Horizon. Archaeological evidence (Jennings 2003) does show that during the Huari period, active trade routes had been established and residents in this area did not exist in isolation.

Arguably the most impactful stage in the history of the Cotahuasi Canyon region was the relatively short though central period of the Incan empire. Communities in this region were physically and genealogically restructured through the implementation of and creation of the ayllu system. These relationships formed among individuals in the community, as well as between the community and their natural resources. These relationships are still important in socio-economic and political organization today. An
important characteristic revealed through an analysis of the Inca period is the political organization. Ultimately, resource management decisions were centralized in Cusco, though through necessity, semi-autonomy was permitted. Local authorities were given limited discretion about water management because of the physical conditions, demands on the resource, and the balance needed between the salt-mining industry and agricultural production (Hyslop 1984; Poole 1987). This model, later destroyed by the Spaniards, was extremely effective in managing and preventing both socio-economic problems and water availability problems. This balance is important when thinking about the direction water management is headed in the future in this vulnerable and variable region.

The conquest of the Spanish and the establishment of the *encomienda* system turned water management in the province on its side. Land ownership and rights became codified; however, this was not dissimilar to the usufruct and inheritable rights to land that existed under the *ayllu* system (Benavides 1988). More importantly, this was the first time in the known history of the region when water was essentially privatized (Trawick 2003).

Greater inequality and drastic changes to the culture-bound economic and social systems of previous centuries were all related to this alienation from the water management process. The rise of the *hacienda* system after independence in 1821 perpetuated these inequalities, despite the hopes and dreams associated with the independence. Tensions among the rural peasants came to a head in 1968 when General Juan Velasquez successfully took control of the Peruvian government and promised a return of land and water rights to the majority peasant population. One year
later he passed the General Law of Water (Ley No. 17752). This was intended to promote a break-up of the haciendas, and return land to the peasants and the peones that had been working the land. Ultimately, this was an unsuccessful maneuver and did not accomplish its ambitious overall goals. However, there were some positive results of this legislation for the rural communities.

For the first time since the arrival of the Spanish, owning property did not equate to automatic water rights. The long-term impact of this division has been that the state has had to create distinct boundaries between policies for land and water, requiring the establishment of separate bureaucratic bodies of governance and administration. For the communities, the long-term impacts created an opportunity to reconnect and regain control of the resource locally. Economic, social, and political relationships with water were revitalized. As will be discussed in Chapters 4 and 6, the effects of the colonial and hacienda periods have not been completely eliminated, and traditional management practices have not been reestablished everywhere.
Figure 3-1. Satellite image of Charcana with ayllus demarcated

Note: Ayllu of Humara (urinsaya) is outlined in blue, and the ayllu of Supalta (aransaya) is outlined in red
CHAPTER 4
CULTURAL INSTITUTIONS AND ECONOMICS OF WATER CONTROL IN RURAL COMMUNITIES

Much of the anthropological work dedicated to studying human-resource interactions is focused on what can be called resource control systems. For decades these systems, such as land tenure, trade, and production, have been central to macro-theories about socioeconomic organization (Hunt and Hunt 1976). In some respects, issues of land tenure are still contentious in the Andean waterscape, and common property regimes of land management and agricultural production, known locally in Quechua as laymi, are beginning to fall out of favor. However, of primary concern now is the management and access to the scarcest source of all in the region, which is water.

Water management in this region of the Andes is not only a subject of study, but it is a reflection of a larger set of social, political, economic, and cultural relationships that construct the daily lives of residents in these communities. This chapter outlines the economic, political, and socio-cultural institutions and processes that exist in La Unión and contribute to the set of variables that influence water access in the traditional system of localized water management. To illustrate, descriptive examples will be drawn from the research communities of Antabamba and Charcana.

Beginning with an overview of ayni and its relationship to water management, I describe the correlative aspects of socio-economic systems of exchange. Specific attention is given to the three different types of ayni exchanges, which are exhibit in the two research communities. An investigation into how the different types of ayni are used in each community will shed light on the power dynamics within those communities. The relationship between socio-economic powers as they relate to water
management and access in each setting is also discussed. I also interrogate the impact that having one or many sources of irrigation water in the community may complicate reciprocal relationships and people’s ability to make decisions about engaging in symmetrical or asymmetrical exchanges.

The Economics of Water Management

The study of Andean production has been stimulated by the writings of John V. Murra whose seminal work on the original idea of “verticality” (Murra 1956) in the Andes has spurred an interest in the relationship between ecology and economics in the rural Andes. Building on the foundational work of Murra, a dedicated contingent of anthropologists have since focused their attention on the issue of rural economics in the Andes using ethnographic description of these economic systems (Brush 1977; Fonseca 1972; Golte 1980; Mayer 1974, 1985, 2002) and of the ecological complementarity underlying this system of production and exchange (Orlove and Godoy 1986; Deere 1990; Guillet 1992; Mayer 2002). Every household in the study sample is involved in subsistence agriculture activities, though the same cannot be said for commercial production. Most families participate in some sort of intra-community trade, since households still need cash-on-hand to purchase other foods as a complement to what they grow in their fields. Since this study is focused on the issue of water management, I will engage the topic of verticality as it relates to intra-community dynamics and priority of water access. Some families in the far more steep terrain in the community of Charcana have land on various pisos ecológicos (ecological tiers) that may affect their own personal choices with how they want their water time allocated, though this is usually an individual choice as opposed to a decision by the water chief or
distributor. The most important economic institution pertinent to this research is that of reciprocal exchange (Mayer 2002).

Reciprocity as a concept in this context simply implies the exchange of goods and services between individuals (Mayer 2002). The presence of long-term, reciprocal exchange relationships is not unique to the Andes. Anthropologists have been investigating these “gift” or exchange systems for decades, though mainly as a characteristic of “primitive societies (Malinowski 1922; Mauss 1954; Levi-Strauss 1969; Sahlins 1972). Case studies in reciprocal exchange have come from all over the world, though most recently ethnographies are beginning to focus on the decline of these systems in places such as Mexico (Lomnitz 1977), Egypt (Singerman 1995) and Botswana (Yellen 1990). The Andes represents a region of the world where reciprocity is still practiced, and historical exchange relationships are still reflected in the economic, social and political workings of contemporaneous everyday life.

Known locally as *ayni*, it is widely recognized that there are variations in notions of what constitute reciprocal relationships (Buechler and Buechler 1971; Godoy 1986; Mayer 2002), and as markets become more pervasive in what were once self-contained economic systems, the system of reciprocity becomes increasingly difficult to define. It has been written that market exchange is a depersonalized, morally neutral, and pure exchange of money for goods or services (Schwartz 1967). The work of Marcel Mauss (1954) identifies the differences between reciprocal exchanges and market exchanges. He writes that forms of non-market-based exchanges, which he equated with the Western notion of gift giving, are “in fact obligatory and interested” (1954:1), and not altruistic and pure gifts in the sense that we may be familiar with in our own concept of
the “gift.” Mayer (2002) has written extensively on the various types of reciprocal exchange common in the Andes, and has concluded that ayni is an interested system of exchange that is categorized when “calculating behavior is masked or covered up by the etiquette of the supposed voluntary giving and receiving of gifts” (2002:106), concealing underlying intentionality from public view.

In the province of La Unión, as in other parts of the Andes, the reciprocal exchange is quite often an exchange that Westerns would consider to be an asymmetrical exchange. Rarely is the exchange exactly a one-for-one exchange. Economically speaking, the exchange of labor for product is not uncommon, and in some instances is at the crux of a relationship between two individuals. Mayer (2002) identified three types of exchanges: (1) voluntad; (2) waje-waje; and (3) mink’a. Exchanges in the type known as voluntad were exchanges that were required and based on a preexisting relationship, such as kinship, and were usually equal. Waje-waje exchanges were voluntary, and could initially be refused when requested. However, once engaged, there was an expectation that equal exchange would follow, as similar labor, food, etc., when the person who was owed the waje-waje requested it. Finally, in a mink’a exchange someone requests labor and in exchange they are given food or other goods or services (perhaps a specified quantity of dry goods or pasture land access). There is no expectation that this will result in an equal return of work in the future, and anyone can be requested to participate in a mink’a. Everyone also has the right to decline an offer to participate in a mink’a, regardless of kin status.

All three types of reciprocal exchange noted by Mayer were evident in the communities of La Unión. In both research communities of Antabamba and Charcana,
cash was *never* mentioned as compensation for agricultural labor within the community. It was common for community members to work on large farms in different communities as hired labor, and therefore be remunerated for their efforts. This labor was seasonal and backbreaking, though coveted, as there were very few options for cash-generating activities in the Province. Although contrasting in how labor is exchanged, as I will explore below, it is important to recognize that the two communities discussed in this work are practicing forms of, and dependent upon, *ayni*, or what Brush and Guillett (1985) refer to as “supra-household support mechanisms.” I contend that *ayni* and these supra-household mechanisms are one of the most important sources of social capital, and in Chapter 5 I will discuss ways that how and with whom you are entering into *ayni* exchange are changing with the implementation of the new law. First, it is important to understand how this exchange functions in each setting.

**Economic Exchange in Antabamba**

Exchanges of *waje-waje* were common in each community; however the *voluntad* and *mink’a* types of exchange were much more prevalent in Antabamba than in Charcana. As I began to understand the types of relationships between water users in each community, I became aware of the different forces at work in the communities. In Antabamba, there was a large and continually present family, the Loayza family, which consisted of multiple *mayoristas* (individuals who owned more than three *topos* of land - equivalent to one hectare) that were constantly engaged in *voluntad* reciprocity with one another. This created an incredibly reliable and, in this case abundant, source of labor, since kin-based reciprocity is considered obligatory. An unintentional but important result of this exchange within the Loayza family was their inability and lack of need and/or desire to assist other community members when called upon to engage in *waje-*
*waje* or *mink’a* types of exchange. Very few of the Loayza family members engaged in *waje-waje* exchanges. It should be noted that some of the younger Loayza kin were very helpful in agreeing to participate in some *mink’as* organized by family friends. More often than not it was the Loayza family members that requested *mink’a* from other community members.

When the Loayza family requested others to participate in *mink’as* on their fields, many informants told me it was considered to be unwise not to engage them in this transaction. This was because the Loayzas grew crops that many other people did not have the land or water availability to grow. Table 4-1 shows the total number of high value crops grown in Antabamba, and the percentage of that total grown by members of the Loayza family. For example, nearly every Loayza was growing alfalfa, a crop that is water intensive and coveted as a staple source of nutrition for everything from *cuyes* (guinea pigs), to sheep, to cows. Crops not considered to be *pan de llevar* (subsistence crops) were considered luxuries, though many times livestock were dependent on pasture or alfalfa fields for subsistence. Families that were interested in raising animals other than pigs or chickens were dependent upon grass or alfalfa, and thus, some families were dependent upon the Loayza to provide them with the alfalfa. Those that were not offered alfalfa in exchange for their labor were offered food and coca to sustain them while they were working, as well as cigarettes, alcohol, and sodas from one of the only main stores in town (which the Loayzas own).

The *mink’a* relationships in Antabamba serve as evidence that the built-in inequality of the asymmetrical reciprocity embodied in *mink’a* (Fonseca 1974; Gose 1994) is still a force in peasant communities in the Andes today. Fonseca (1974)
describes how the *mink’a* exchange is used as an economic system of labor exchange, but how it doubles as a cultural expression of community hierarchy. Antabamba was a complex tapestry of social and economic hierarchies that, at the risk of invoking an outdated Wittfogel allusion, solidified and perpetuated despotic relationships within the community. A particularly illustrative example of this is the case of Senor Pedro Bellido Vasquez.

Sr. Bellido Vasquez is an elderly gentleman who is the largest single landowner in Antabamba. Members of the community refer to him by many names, such as “*el hacendado*” (the hacienda owner), “*el mayorista*” (the large land owner), “Don Pedro”, “*tatay*” (father) and by some, “*el enfermo*” (the sick one). Before the agrarian reform and the dissolution of the *hacienda* system in the region in the 1970s, the Bellido Vasquez family was one of two haciendas in the outlying regions of Antabamba, the other being the Loayza family. Unlike many *hacienda* owners of the time, neither powerful family in Antabamba left the community for the city of Arequipa. Though he still maintains relationships with his children, siblings, cousins, grandchildren and godchildren in Arequipa, Don Pedro has continued to live in Antabamba, now managing his fields with the work of *peones* (common labor) in *mink’a* style exchange relations. He allows certain community members to *conducir*, or conduct farming operations, on his land. The agreement is almost like sharecropping, though the economic relationship is much more complicated than a simple amount of product that each farmer is entitled to when they begin to harvest.

Those who engage in this type of labor relation with Don Pedro not only invest highly disproportionate amounts of labor into his fields compared to the return, but they
are called upon for a variety of non-agricultural labor contributions as well. The Bellido family is also responsible for a large number of high value crops produced in Antabamba, given them a distinct bartering advantage (Table 4-2). While I was living in Antabamba, Don Pedro had two major projects ongoing with labor recruited through mink’a. The first was a project to re-thatch the roof of his personal home. The second was a project to rebuild fences around his property to, as he told me, keep other people’s animals off his pasture grasses. This work was grueling and tiresome. The wiry, dried icchu grass that was used for the roof thatching was sharp and often punctured the hands of those who worked with the material. The fences were constructed of thorny branches and spiny cacti, which left indelible marks on the workers as well. Cigarettes, cane alcohol, coca, and three hearty meals were provided each day for the workers. This was the expected return on their labor. In some instances, individuals had negotiated for fertilizer in exchange for their labor, though this was limited only to a few individuals who were engaged in sharecropping as well with Don Pedro.

Gose (1994), Allen (1988), Skar (1982) Weismantel (2001) and to some extent Malengreau (1980) have all discussed the role of food in the ayni/mink’a exchange system. Equating the act of providing food to an act of power and control imposed on the recipient of the food is certainly a plausible hypothesis regarding the role of food in mink’a. In my observations from Antabamba and Charcana, I argue that the provision of food is requisite for productive labor, and it is the provision of vices and stimulants such as alcohol, coca, and cigarettes that articulate power in the act of mink’a. Not to say that food is void of any power in these communities, but it has to be clear that
mink’a is different from everyday interactions. There are those more powerful members of the community who feed less powerful people nearly daily, but this is outside of mink’a. These interactions are out of a sense of obligation to the larger community. The elderly and infirm are cared for not out of economic indebtedness, but out of community responsibility. I believe this to be more similar to waje-waje since there is an explicit offer, and the food provider “banks” this benefaction and can use it as justification for assistance from the benefactor in the future. It may come across as trivial, but as I will demonstrate in the discussion of social capital, the context in which one begins to exchange goods or services becomes critical when a vital resource such as water is being exchanged or allocated.

**Economic Reciprocity in Charcana**

In contrast to Antabamba, ayni in Charcana is predominantly of the waje-waje type. There is still mink’a, though not on the same scale as in Antabamba. Charcana has more households than Antabamba, and has also experienced a very large outmigration in comparison to other districts in the Province. I was told that during the agrarian reform in the 1970s, many hacendados paid for the transport of their peones to accompany them in either new agricultural endeavors or as house help in the cities of Arequipa and Lima. Land is less consolidated in Charcana in comparison to Antabamba. There are still mayoristas who own very large parcels of land on diverse ecological levels, but they do not command the same type of patronage as the mayoristas in Antabamba. This is not to say there is a lack of social status differentiation in Charcana. Status exists, and it colors the social structure of the community, but the exertion of “power” that comes with that status is demonstrated in different ways, as I will discuss in Chapter 6.
Exchange through *voluntad* is extremely important and obligatory, though less pervasive than in Antabamba, where there are two major families that dominate the kin groups. Partly due to the larger size and partly due to the land grab that occurred during the agrarian reform, Charcana has a higher diversity of families and therefore fictive kin have become more important over the past thirty years.

The *compadrazgo* relationship is one type of fictive kin group that plays a major role in access to labor. The *compadrazgo* relationship is a fictive kin relationship that is rooted in the Latin American Roman Catholic tradition. Literally translated to “co-parenthood,” the role is assigned by the parents of a child prior to the child’s baptism. Although it is not based on financial wealth, it is advantageous to create fictive kin alliances with more wealthy community members, since there is some level of exchange inherent with this relationship. For the *compadrazgo*, the designation is a sign of social status. To have a large number of godchildren (*ahijados*) is a status symbol, and connotes a certain amount of wealth, since sponsorships of fiestas in honor of the child are expected from the *ahijados* parents. All exchanges between families with a *compadrazgo* relationship were described to me as being obligatory, classifying them as part of the *volutad* exchange system.

As mentioned, the majority of transactions and exchanges fall under the *waje-waje* category. My initial estimation of *waje-waje* exchanges was that they were extremely burdensome and had the potential to create resentment much more than the other systems of exchange. In Charcana, I learned that this is the complete opposite of how most people feel about these exchanges. It was described to me that this type of
exchange “es el base del pueblo,” or ‘is the foundation of the village.’ Don Rufino Bellido explained to me:

Without the support of others in my ayllu, I would have nothing. All of the food I eat and products I sell is because of their hard work too. The same can be said of the food they have on their table. We all work to make sure that our community does not suffer.

It should be noted that Don Rufino Bellido is a comparatively large landholder. However, this sentiment is not uncommon. Although there is a sense of “private” versus “public” property, the work and goods produced from “private” property ultimately benefit the public good through local product exchange.

In a response to a question about ayni in the community, Don Liner Alatta bluntly explained to me in the context of the impending changes in water management:

The state has never taken care of us before, and we have had to rely on one another. Now, we are supposed to believe that they will take care of us better than my neighbors whom I know I can trust and hold accountable? I don’t think so.

This feeling of the State attempting to interfere in local economic activities is a popular theme, though few people in Charcana really believe their system will change to the extent that ayni will become obsolete. I agree with them that the overall system will survive, though I contend in Chapter 5 that the importance of the three types of ayni - voluntad, waje-waje, and mink’a will have to change over time. The influence of market-based economic activities and increasing interaction of local producers with national and international markets is increasing. To integrate successfully into these markets one needs to become involved in the cash economy.
Socio-Political Organization

At the community level, Antabamba and Charcana are organized socially and politically in different ways. As mentioned earlier, Charcana has more residents, is the main village in the district also known as Charcana, and is socio-politically split into two ayllus: Humara and Supalta. The origin of the ayllu system dates back over a thousand years¹ and has traditionally been associated not only with kin ties but also with resources. Though Gelles (2000:99) makes an emphatic point to say that “Today it is only resources, not people, that are so divided” [emphasis in original text] the system in Charcana is still representative of both the division of people (to a certain extent) and resources. Antabamba on the other hand is one single community that lacks any division based on the ayllu system. This could be attributed to the fact that the community is much smaller in population, smaller in area, and really only has one main water source that everyone in the community is reliant upon for irrigation water.

La Junta de Usuarios de La Unión

The general political structure of water management in the Province can be understood through a hierarchical model. The hierarchical structure is very misleading. It is rare that a local comité would take direct orders from the comisión or JULU itself. The previous government administration office tasked with water management was the Ministry of Natural Resources and the Environment (the now-defunct INRENA). They imposed this organization to help facilitate decision-making processes that would mimic state processes, and to provide a framework by which conflicts over water access, infrastructure, theft, etc. could be mediated without the involvement of government

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¹ See Chapter 2 for a more detailed description of how ayllus are related to the history of regional water management.
employed provincial judges. However, the “head” of the organizational chart, the *Junta de Usuarios de La Unión* (JULU) held very little power over decisions on the ground and within each comité. JULU consisted of a democratically elected executive board with a president, vice-president, treasurer, secretary and four at-large representatives. All of these positions were voluntary, and this was reflected in the amount of time members on the board invested in JULU-related activities. These positions are filled by elections held every three years, and the elections take place in the Provincial capital of Cotahuasi. I was fortunate enough to have begun my fieldwork five weeks prior to the election of the 2010-2013 executive board members and was therefore present for the elections. With approximately 1100 registered irrigation water users in the Province of La Unión (AEDES 2012) there were only 73 irrigators present for the election of the new board. Of the 73 irrigators present, only eight were women. Everyone who won a spot on the board was either from Cotahuasi or a community that was within an hour’s walk from Cotahuasi. I asked the outgoing President, Don Flavio Alarcon (also from Cotahuasi), if this was a coincidence, and he responded, “This happens every year. Nobody wants to come in to Cotahuasi for meetings. Besides, only people from close by are here to vote.” The second part of what he told was mostly true, though some irrigators from more distant communities were present.

This political power, coupled with the fact that Cotahuasi is one of the least vulnerable communities in regards to water scarcity, creates a powerful minority who have disproportionate control of the province-wide water decisions. Hendriks (1998:305), who has worked with irrigation associations in the arid deserts of northern Chile, stated that: “when users with abundant water and less need for careful use of
available water have more weight in decision-making it affects the rationality of the system’s collective operation.” I believe this is not the case, yet, for the farmers and irrigators or La Unión. Although it could happen, the disconnected authority of the central governing bodies and the comités is advantageous to the users. As Scott points out (1998), the state tries to make people and resources legible and accountable. Until the state knows how much water is flowing through the canals, and how many hours each user has access, it is difficult for the communities to be controlled.

In addition to the elected board, JULU consisted of one paid “technician” who acted as the office secretary, accountant, bureaucratic paper-pusher, and referee between water users in any disputes. It must be said that the “technician” had no conflict mediation training, was not an engineer, was only paid part-time, and himself had personal and familial interests in water management in the Province. The important decisions in day-to-day water management were made by the water chiefs or distributors within each comité, though if compelled, JULU could make a decision regarding water management. This confusing form of legal pluralism produces conflict over authority, and is partially a result of the abstruseness of the bureaucratic establishment and borders and boundaries of jurisdiction.

**Single-Sourced Irrigation: The Case of Antabamba**

As with all irrigation organizations in the Province, there is a set political structure that, at least in name, mimics the bureaucratic organization of the State. In Antabamba, since there is only one source of water for the entire community, the political organization is streamlined into one organization, the comité of irrigators. With a governance structure that looks strikingly similar to the State’s structure, the comité consists of a President, Vice-President, Secretary, and Treasurer. From 2006 to 2007
the community voted to have a designated distributor, like many other larger communities have, though this was a short-lived experiment. Interestingly, it was the distributors themselves (there were two in this time period) who deemed the new position unrealistic. In interviews with both of the ex-distributors, the burden of having to work with the irrigators all day every day was said to be just too much. One did mention that if the position had been remunerated, he might have stayed on through his term.

If they paid me, I would have kept doing it. None of us has money and we live from our fields. This cargo [responsibility] takes me away from my fields and then what do I eat? Nobody just gives me food as a gift. You see, this is the problem with that system. It works if you are rich, but if you are poor, you don’t eat. Furthermore you don’t get respect, just people’s problems that they blame on you.

In Antabamba, it is true that distributors received no compensation. However, in other communities, the distributor was provided food for his family, and respected, or at least used to be before the new law. The former president of the comité at that time explained to me that JULU encouraged them to implement this model because it had been successful in other communities.

In analyzing this failed switch to “more effective” management, one problem is JULU’s implicit assumption that a single authority figure would be respected. Not to say that Antabambinos are not respectful of authority, but almost all enforcement of norms and regulations come from a process of negotiation (Guevara 2006), creating normative repertoires more than one set specific law and law enforcer (Boelens et al. 2009). The problem in Antabamba with the implementation of the distributor position was that it required more than just a respect for authority. The deeper issues were interrelated economic and social problems.
The lack of remuneration and decline in household production of the distributor coupled with the lack of community buy-in to the system to support the cargo of distributor, made the position unfeasible in Antabamba. In other communities, members recognize the economic constraints, and have agreed as a community to support, in kind, the water chief and distributors. I contend that this circumvention of community negotiation processes is what really doomed this position from the beginning. JULU requested changes, and the comité acted too quickly to give people the proper time to assess the impacts of this position, and whether or not it was something they wanted to support. Other communities have drawn up budgets and thought about the ramifications of one person dedicating their time and effort to this position. Some communities even have trial periods where they test the system for a month to see if it is worth the investment.

In the end, the community of Antabamba was very supportive of the institutionalization of the position. Seventy-seven percent were interviewed (71 of 92) about the distributor role. I was told this support was because of the potential of this process to wrest power from the two dominant families, and to incorporate an honest broker into the process. As it stands now, the role has been eliminated, and the political structure has reverted back to the four comité officers who are responsible for allocating water to the rest of the community (three of whom are from the two dominant families).

**Multi-Sourced Irrigation: The Case of Charcana**

The political organization of water management in Charcana is strikingly different than that in Antabamba. Some of the attributes that contribute to this difference include a larger area of land that is under irrigation. There exist several springs from which residents draw water, the community is larger in population, and spatially, the
community is divided into *ayllus*. Despite the absence of observations of many present-day *ayllus* in other parts of the Andes (c.f. Gelles 1998, 2000, 2002) *ayllus* continue to divide people in the community of Charcana. People who reside in different *ayllus* have land that lies in the territories of both *ayllus*. I found that on the whole, the *ayllus* did not divide resources as much as they divided people. It is important to note here that people may have fields that are part of different canal systems, and thus interact with more than one water chief and/or distributor at the same time.

Given the size and multiple springs that sustain the agricultural in Charcana, there is an added level of governance involved in local water management that is not seen in many of villages of La Unión. However, the role of that level of governance is limited as really it serves as a bureaucratic mechanism to simplify communication between organizations and government entities based in the Provincial capital of Cotahuasi and villages in the District of Charcana. Multiple *comités* exist within the community that correspond to the canals from which the water comes. These *comités* all “report” to a *comisión de agua* (water council), which serves as the conduit of information between Cotahuasi and the communities. Within each *comité* a similar structure to that found in Antabamba exists, though the cultural meanings of the positions vary.

The President of the *comité* is considered a figurehead. It is the distributor that is seen as the most powerful person in the domain of water access. This position is required at some point in their life by those who are considered to be *mayoristas* and have more than three *topos* of land. They are selected on July 29th of every year at the annual *fiesta de agua*. This is not a democratic process—it is a fight. Similar in intensity to the workload of the distributors in Antabamba, the distributors in Charcana
are also responsible for having the cargo of sponsoring the next year’s fiesta de agua. I would argue that in regards to responsibility, it is much more time intensive and burdensome both economically and socially in Charcana than Antabamba. Since Charcaninos irrigate de costumbre (customarily), they must go to the plaza every Sunday morning at 8:30AM and fight with everyone else on their canal to receive water that week. This is a violent, aggressive event that usually unearths underlying tensions between community members. It was described to me, jokingly, as the “tinku semanal”, or weekly tinku.²

Because of this weekly confrontation, the distributor was under great pressure to not cheat certain irrigators, lest he be branded a liar, exposed in front of the community as a cheat, and not provided his compensation in food and liquor contributions for his work. One slightly inebriated participant explained to me the gravity of making a mistake with water distribution, “Puedes joderme cuando jugamos cartas, pero no me jodas con el agua.” (You can fuck me when we are playing card games, but do not fuck with me about water). Needless to say, the pressure can sometimes be too much for people, and although it is seen as an act of disgrace, one can step down as distributor. It is seen as even more disgraceful to be forced out, so in comparison, it is not surprising that 3 distributors have stepped down in the past 10 years.

The Impact of Single-Source and Multi-Source Systems

The distinction between multi-source and single source water systems has important impact on the social, economic and political structure of the communities. In

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² Often translated as “ritual battle”, tinku has a variety of meanings in Andean literature. It is often described as a ritual battle between communities, moieties, or kin groups and is used a social release valve for tensions between neighbors. It happens on neutral ground or on boarders of territories (Arkush and Stanish 2005). Thus, this reference to tinku implies requesting water is like fighting your neighbor for both reasons of utility and pride.
Antabamba, the single-source community, the whole community is dependent upon the same water source. The implications of this create a different set of vulnerabilities and power dynamics than in Charcana, the multi-sourced community.

First of all, as a community, they are much more vulnerable to variation of water availability from the spring. If water quantities decrease, it is more likely to cause the entire community to have a decrease in crop yield, thus threatening the food security of the entire community. In Charcana, should one spring have decreased output of water flow, it is very likely farmers can supplement with crops produced on another canal system that may not be experiencing the same degree of water shortage. However, from a hydrologic point of view, this is common that groundwater availability would not vary much between springs located in such a close proximity to one another, as is the case in the communities of La Unión.

A more realistic cause of variation in water availability is the rupture of a tank or the degradation of a specific canal. Prior to the beginning of the planting season in Antabamba, a crack was discovered in the canal, and the community immediately came together to discuss how to fix this before the irrigation season needed to begin in September. This incident affected everyone equally, and the pressure to fix the only source of water in the community was shared by all. Given this a seismically active part of the world as well, one small tremor could destroy the canal system or tank, and cause absolute destruction of at least one year of food supply. Alternatively, Charcana is buffered by the multiple sources of irrigation, and different tanks and canals that run through the community. By have a diversification of infrastructure they are spreading their risk to catastrophic events such as earthquakes, or even more minor infrastructure
deterioration. Clearly this is not ideal, but the threats and fears are real in Antabamba, and the stakes of water access feel critical.

Secondly, the power and control of water is absolute in Antabamba. This is the most important effect of single versus multi-sourced irrigation in La Unión. In Antabamba, to control the one canal is to control the entire community. When you control water you control everyone’s economic viability. The stakes are high, the benefits greater, and the competition for control is fierce. This consolidation of power seen in Antabamba by the two dominant families is a result of this system. Since most of the ayni associated with the one canal in Antabamba is either voluntad (because of kinship obligations) or m’inka (asymmetrical exchange), there is very little opportunity for community members who are on the negative side of asymmetrical exchange. With only one canal to control, the two powerful families in Antabamba have strategically allied themselves to essentially be in positions of power in perpetuity, or at least until their numbers fall compared to the total number of residents.

In Charcana, the dynamics are completely different. Though the canal is the organizing agent for agricultural cooperation and exchange, the multitude of canals in the community allows for more people to be in control of community resources. Logistically, this requires multiple water chiefs and distributors to participate. For one faction or minority group in the community to have control at the scale of Antabamba, this would require coordinating across three different canal systems, swaying three different electorates to vote for you, and manipulating three very disperse bodies of water on a daily basis. Consolidation of power is therefore extremely difficult to achieve. Additionally, residents own land on multiple canals, and some canals are of
more importance than others to the residents, depending on the crops they are growing in the field that year. One year someone may be growing alfalfa on canal “A” and have a vested interest in more receiving more water there for that particular growing season. The following year they may be growing alfalfa on land associated with canal “B”, therefore needing to be well positioned in another social and economic dynamic that is different than that of canal “A”. This diversity in socio-economic circles provides an option should someone feel as though they are in the minority group in one canal system. This will be very important in understand the difference in the reciprocal relations of ayni discussed in Chapter 6.

**Socio-Cultural Practices of Water Management**

In the villages of La Unión, there is a ubiquitous association between water and the origins of life. Sharing water is sharing ethnic identity, and this has major implications for intra-community relations and the creation of a cohesive, united front against exogenous regimes intending to control water resources. That act of sharing water also become a trans-generational thread connecting the ancestors to the present water users, as their labor, knowledge, and accomplishments live on through the material culture of the canals and gates themselves.

As we know, culture is adaptive and relentlessly contested and negotiated while simultaneously being represented in both the individual and the collective (Kottak 2011). The “culture” of water management in the area is no different, and I argue is the foremost cultural system influencing daily in La Unión. For the purposes of this section, I will refer to the “cultural” practices of water management as those actions associated with water management that do not distinctly drive the economic or political management of water, per se, but may certainly have repercussions for the political
and/or economic components of water management. The importance of cultural practices associated with irrigation varies from community to community, though it is clear that culture is an imperative and universal pillar of irrigation in La Unión.

Peter Gose (1994) has written extensively on the rituals associated with the agricultural cycles in the highlands of central Peru. It is not my intent to recapitulate what he has already written, which consists of extremely detailed, sometimes half-hour by half-hour accounts of agricultural activities. His account is focused more on the sowing and harvesting of crops as opposed to irrigation activities. One of the major themes he focuses on in the very short section on irrigation ritual is the fear of many irrigators that they will contract malaria from standing in the cold water for too long (Gose 1994:106; Stein 1961:83). In this region there was little talk of contracting disease or illness from the cold water. I was constantly reminded to drink cane alcohol because it “warms the body to fight the cold of the water.”

Throughout the Province, normal irrigation activities are punctuated with small pagos (offerings) to pachamama (mother earth) that include the burning of q’apas (offerings that involve burning incense, cigarettes, and, in some instances, little plastic toys) and t’inkay (offering of libations—usually cane alcohol, chicha\(^3\) or homemade wine—and coca). These serve as reminders to pachamama that they are thankful and requesting a bountiful harvest.

\(^3\) Chicha which in this region of Peru is a corn-based fermented alcoholic beer made in the homes of village members and not commercially marketed. There also exists chicha morada which is a non-fermented and non-alcoholic beverage made of purple corn. During a t’inkay fermented, alcoholic chicha is almost always used.
Cultural Practices of Irrigation in Antabamba

The descriptions I was told about irrigation in Antabamba seemed void of what many other communities considered to be integral cultural practices associated with water management. The village had no official *fiesta de agua* (water party), nor was there an established date that anyone could tell for the large, annual canal cleaning ceremony apparent in other villages. Almost everyone I asked about dates for the annual canal cleaning responded with a one-month window between August 16 and September 15. The neighboring town of Alca, which actually is not associated politically with Antabamba at all, has their patron saint festival annually from August 13-15; the only real consensus in responses was that it happens sometime after the party in Alca. The date was set by the beginning of August, and in 2010 occurred on September 8 and September 9. I was told by the water president that it was contingent upon the weather, and it wasn’t up to the community, but to the rains.

Another custom that was not part of the culture of water in Antabamba was the lack of regalia that adorned the water chief or distributor when they were doing their job. In other communities, water chief and distributors wore special *llikllas*, cloth wraps, around their shoulders while they were distributing water to users. Others are noted for carrying a wooden staff adorned with charms and talismans, while others reportedly carry a staff fashioned like a snake (c.f. Gelles 2000). Save the notebook and the coca, cigarettes and bottle of alcohol that accompanied the distributors everywhere they went, there was very little in the way of overt pageantry associated with the presence of the distributor.

I came to learn that most families and irrigators did perform the *pago* before and after irrigating. Many times, this was a small offering of coca and alcohol to the earth
prior to the water reaching the fields. These customs were out of respect for 
pachamama, mother earth, and to show respect and appreciation for her past 
productivity and to ensure productivity into the future. It was made clear to me that this 
was more about the individual user's relationship to the earth, more so than the water.

When I asked specifically about the cultural activities associated with irrigation I 
was almost always given a response that reiterated the q’apas and tinakys that took 
place during the canal cleanings in August or September. Little was mentioned 
regarding the ceremonial role of the water distributor other than he sometimes comes 
by and offers coca and cane alcohol for a t’inkay during the irrigating. Most people 
greeted his appearance with skepticism and believed he was there more to check on 
certain people than he was to provide any sort of ceremonial or religious function. That, 
I was told, was the responsibility of the curanderos (healers) who have long since been 
disassociated with water activities.

**Cultural Practices of Irrigation in Charcana**

Unlike Antabamba, residents of Charcana have myriad activities and rituals 
associated with water management that highly structure not only their days of irrigation, 
but the planning of their weeks, and years.

As explained in the context of Antabamba, the rituals and ceremonies associated 
with the act of irrigating one’s fields include a pago, q’apa, and t’inkay. The difference in 
Charcana is that it is a very public offering, and occasionally neighbors will participate in 
the pago, even if they are not working the fields that day. When I first arrived in 
Charcana the official distributor was an older gentleman who would unfurl his liklla and 
remove the incense, cigarettes, cane alcohol and kernels of maize to perform a q’apa at 
the canal every morning. Once the liklla was laid out and the q’apa was ready, he
would pull out his coca pouch, which he attached to the faja (woven cloth belt) around his waist; he would open the pouch and pull out the coca. He would find the three most perfect and complete leaves, organize them in his hands in a shape resembling a fan and blow on them with each blessing he said to the mountain spirits. This is known locally as a kintu. With that, the distributor would complete the burning of the q’apa and return to the village. I was told the t’inkay was the responsibility of the individual irrigators at the site of their fields. The distributor told me this was because he was only engaged in a relationship with the water. It was the irrigator who was responsible for the relationship with the earth.

The presence of a spiritual interlocutor between farmers and water indicates a very powerful role of water in the community. Furthermore, the lack of q’apa when the water distributor role turned over to a new person precipitated an argument on Sunday (the day when water allocation for the week is decided). The distributor came under fire from irrigators that it was his fault the caudal (water quantity) was so low. Purportedly the mountain was disrespected by the lack of q’apas. His tenure as water distributor lasted only four months, not the customary six that is usually associated with this cargo.

The other cultural component of great importance in Chracana, and other communities in the Province is the fiesta de agua (water party). One migrant who now lives in Lima told me “I can make plans to come back on July 28th every year until I die knowing I will never miss a water party.” In some cases, the fiesta de agua requires people to plan years in advance to take into consideration that it may be their turn in the near future to financially sponsor the fiesta and serve in the capacity as the patrón (financial backer) of the event. Although today it is more of a community rite of
intensification than a “work party” which was its original intent, the meaning and utility endures. This three-day event associated with community-wide water management, through all the pageantry and performance, still represents a very real relationship between the village and its water while serving in the practical sense as a time to clean the canals.

Understanding the Role of Cultural Practices in Water Management

In comparing the cultural practices associated with each community, we see commonalities that are helpful in understanding the various types of relationships that communities and individual users have with water. Just as economic and political relationships within the community and between community members and resources affect or dictate someone’s ability to access water, the presence or absence of cultural components may also indicate the mores about water being a “common good” in the Andes (Ore 2005). In the socio-cultural relationships with water in Antabamba and Charcana, we see two spiritually different conceptions of relationships to water.

Both communities have in common the mediation of water. In Antabamba, the cultural components of this mediation are minimized in relation to the economic and political components influencing this mediation. In Charcana, the mediation is done through an appointed, rotating position that hypothetically will be filled by everyone in the community at some point. The consolidation of this power to mediate resources in a cross-section of time may seem stringently hierarchical, but in the long run is actually much more “egalitarian” than that in Antabamba. Why would this be?

One hypothesis for the disarticulation of rituals and rites associated with water in Antabamba is that there is much more control over water in the hands of fewer people. Another is that the prominent and strong history of the hacienda system in Antabamba
was highly effective in distancing village residents from their means of production, and thus minimizing the cultural relationship with these resources as well.

I asked a few people in Antabamba why there seems to be a lack of public culture regarding water. I was given a variety of answers. The most popular was always contextualized in the larger issue of the community of Antabamba “perdiendo la alma” (losing its soul). Whether it is the soulless trajectory of the community or an economically and politically motivated power play on the behalf of village elites, the results are a distanced and impersonal relationship with water.

Finally, I want to bring attention to the gendered dynamics of cultural and ritual associations with water. Coles and Wallace (2005) call for a more nuanced understanding of women’s subordination and exclusion from the political and economic spheres of daily life. In an attempt to better understand the role of women in the cultural practices associated with water management, I adapted the social relations analysis approach of Kabeer (1994) that is often used to understand how people gain access to certain resources (March et al. 1999). It is a conceptual framework used to understand the relationships between people, between people and resources, and people and activities. I focused primarily on the structures relating power and events.

One commonality between communities is the lack of engagement of women in the daily and weekly rituals and ceremonial activities associated with irrigation water management. Women were involved, sometimes exclusively, in the pagos in their own fields, but there has yet to be a water chief or distributor who is a woman in either of the communities. This was explained to me, by men, that this is a function of the demands of the job. It is rigorous, requires you to be out in the fields all day, and sometimes all
through the night. Stigmas abound about women that are out in the evenings, and no self-respecting husband would allow his wife to be in the fields all night with other men. The constraints of women’s reproductive tasks such as cooking, caring for the animals, cleaning the house, taking care of the children, etc. were also prominent in both men and women’s rationale for why women were never in these positions of cultural significance.

The participation of women in pagos to pachamama conforms to, and reinforces, culturally accepted notions that the earth is a woman’s domain. Women sow seeds, harvest, and even irrigate the fields. But as we have seen with the symbolism of pagos in the fields prior to irrigation, they are pertinent to the fertility of the land, not the flow of water from the mountain spring.

**Importance of Understanding Economic, Political and Socio-Cultural Institutions**

Water, whether conceptualized as a finite resource that needs to be controlled politically and economically (like in the case of Antabamba) or conceptualized as the blood in the veins of the earth (Sherbondy 1998) (like the case of Charcana) is still universally accepted as a necessity for life. Enrique Mayer said “The capacity to act collectively is the most outstanding characteristic of Andean households” (2002:35). Marisol de la Cadena (1989:85-89) argues that the main reason households collaborate is out of necessity, and that no household alone can successfully manage an agricultural operation at that level. As evidenced by the cases of Antabamba and Charcana, this relationship via the economically productive exchange system of ayni is crucial to both productive and reproductive activities. However, we see a stark difference in how ayni exchange is expressed. In Antabamba it takes the form of a cliental relationship, similar to what Fonseca (1988) described in his work distinguishing
wealth from class in rural communities. People in m‘inka exchange of ayni (which is the majority in Antabamba) are the majority of the labor force but have no power with the system to control their status in the community (Mayer 2002). In the waje-waje system that is exemplified in the Charcana economic system, we see a pattern of exchange much closer to what de la Cadena (1989) and John Earls (1992) describe in the use fictive kin as an extension within the community.

The entwined political, economic, and cultural components of water management in La Unión make it difficult to identify causality or predictability based on just one variable. Taken together, I aim to show that an attempt to understand the “culture of water” and irrigation is really a study of the endemic political, economic and cultural systems. It is a highly sensitive system predicated on the negotiated and fluid relationships between these variables. Before looking to the future of water management under the new Peruvian law, it is important understand previous political and cultural histories that have left their indelible cultural and physical imprint on the canyon landscape.
Table 4-1. Percentage of Loayza family members growing water intensive or high-valued crops in Antabamba

<table>
<thead>
<tr>
<th>Product</th>
<th>Total Farmers In Antabamba</th>
<th>Loayza Family Members Growing Product</th>
<th>Total Growers That Are Loayza Family Members (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lucuma</td>
<td>2</td>
<td>1</td>
<td>50.00</td>
</tr>
<tr>
<td>Kiwicha</td>
<td>15</td>
<td>6</td>
<td>40.00</td>
</tr>
<tr>
<td>Alfalfa</td>
<td>11</td>
<td>5</td>
<td>45.45</td>
</tr>
</tbody>
</table>

Table 4-2. Percentage of Bellido family members growing water intensive or high-valued crops in Antabamba

<table>
<thead>
<tr>
<th>Product</th>
<th>Total Farmers In Antabamba</th>
<th>Bellido Family Members Growing Product</th>
<th>Total Growers That Are Bellido Family Members (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lucuma</td>
<td>2</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Kiwicha</td>
<td>15</td>
<td>4</td>
<td>26.66</td>
</tr>
<tr>
<td>Alfalfa</td>
<td>11</td>
<td>4</td>
<td>36.36</td>
</tr>
</tbody>
</table>
CHAPTER 5
INSTITUTIONAL LANDSCAPE IN LA UNIÓN

On January 13, 2009, a full 78 days before the official publication of the New Law of Hydraulic Resources No. 29338 (*Nueva Ley de Recursos Hídricos*), the World Bank’s Sector of General Water, Sanitation and Flood Protection finished an appraisal of a project to implement the new water law in Peru. When I first started talking to non-governmental organizations in the May 2009, I was told that they had been approached by World Bank consultants and told that the new law was going into effect, prior to their government telling them. Many described this as a sign that even before the water law was approved, they were certain they were going to be spectators and not actors in these reforms to the most vital of resources concerning their country.

According to Peru’s political-administrative scale, La Unión province is considered an area of second level decentralization. What this signifies is that there is an officially recognized independent coordination between the Province and the Department, and approvals for decisions need not be elevated to the national level (USAID 2010). It has been recognized both locally and regionally that the lack of resources necessary to perform the functions of planning for and managing its natural resources are inhibiting the success of this legal obligation (Cano 2005). These deficiencies have impelled locally organized groups to become more politically active. Because of this, I have included community organizations in the analysis of provincial level institutions.

This chapter will describe the current and transforming institutional landscape in La Unión, and explain the relationships between various non-governmental organizations, civil society groups, cooperatives, and government agencies all present and somehow (either through self-reporting or nominated by another institution)
involved in water management in the Province. The objective of this chapter is to answer questions about who is collaborating at the provincial level with one another, and what the new organizational landscape looks like with the addition of the Autoridad Local de Aguas (ALA). Specifically, does the addition of a new organization facilitate the decentralization goals of the New Water Law? Based on state discourse around the inefficiency of “unregulated” water management, an effort is made evaluate the strength of local normative processes. To test the efficacy of these local-level institutions, I use cultural consensus analysis in an attempt to provide empirical evidence to the theoretical principles outlined in common-pool resource management theory over claims that in the absence of codified regulations, agreed-upon norms and sanctions are still prevalent and influence water management practices at the micro level.

Recruitment for my sample of organizations was based on a snowball sample, replicating the method of Charles Kadushin (1968) in his study of power, influence and social circles. In accordance with this method, I met with representatives from each of the organizations I had witnessed involved in water management in the Province, and asked them to name all of the other organizations in the province that they would consider to be involved with water management in some way. Additionally, I asked them to tell me if they would self-identify as an organization that is involved with water management or not in the Province. I visited every organization named and continued until the pool of respondents was saturated, and no new organizations were mentioned. In total I identified 16 organizations in the Province and they comprised my sample for the subsequent interviews and analyses. I interviewed various members of each
organization, attended meeting in Cotahuasi as well as any workshops they did in communities, and observed their participation in larger multi-organization forums.

**The Push for Institutional Reform from the Outside In**

This period of time of institutional reform in Peru is not limited to restructuring solely in the water sector. The reorganization and renaming of ministries and departments was a government-wide initiative across a three-year period beginning in 2008. One of the most pertinent changes that coincided with the change of the national water law was the dissolution of the National Institute for Natural Resources (INRENA) which was home to Ministry of Agriculture, which was the principle ministry charged with managing water resources in the country. However, many other agencies and sectors were involved in the management process and responsible for filtering information regarding water management throughout the country. Table 5-1 illustrates which sectors were responsible for certain roles in water management. As is evidenced in the table, there were previously seventeen different agencies associated with the government involved in some capacity with water management.

Through a process of consultation initiated by international bilateral (such as the United States Agency for International Development – USAID) and multilateral agencies (such as the World Bank and the Inter-American Development Bank), governmental and non-governmental organizations in Peru worked to identify and plan a series of reforms to make water management more efficient. They suggested improving upon the management and preventing underutilization by reducing water loss in transportation and allocation; a set of 11 important reforms were identified and planned (Alegria 2007). Among the most impactful, in the opinion of the government, were those pertaining to the State ownership of surface and subsurface water resources, systematic and
consistent implementation of an Integrated Water Resource Management program, and to improve end-user efficiency. Also mentioned in the eleven reforms, though not publically discussed in meetings at the basin or community levels, was the need to promote private investment to operate and maintain the water systems in the country. Haysom and Kane (2009) define state ownership as a system in which the central state, either in its own name or in the name of “the people” of the country (IMF 2005) assume ownership of the resources and are entitled to make decisions about the use of the resources. This also allows the State to decide how, when, and to what extent the resources can be leased or sold to private parties. In the case of Peru, this is accompanied by an effort to give more executive and legislative power to the local and departmental authorities, since hypothetically they are heavily involved in the management of local resources. This model of State-owned, yet decentralized management poses many logistical problems and has produced a system of hollow participation, since there is little understanding at the watershed and community level of what authority they have under the law, if the State owns the resources. The second major component of the decreed reformation is the implementation of a systematic and consistent Integrated Water Resources Management (IWRM) program. IWRM strategies were established after consideration of the Dublin Principles presented at the Rio de Janei ro World Summit in 1992. These principles state:

- fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment

- water development management should be based on a participatory approach, involving users, planners and policy-makers at all levels

- women play a central part in the provision, management and safeguarding of water
• water is a public good and has a social and economic value in all its competing uses
• Integrated Water Resources Management is based on the equitable and efficient management and sustainable use of water

On March 3rd and 4th, 2008, Lima was host to 22 Ibero-American countries for a seminar on IWRM that resulted in the Lima Declaration, a pledge to engage with IWRM principles through planning and implementation of projects, strengthening institutions and laws, and pledging to finance water-related projects. Following the seminar, the country of Peru officially established the National Water Authority (Autoridad Nacional de Aguas – ANA) and implemented the National System of Water Resources in June of the same year. I would argue that Peru, as a State, has successfully integrated the IWRM principles into their policy, and many officials at the national level respect the decentralized decision-making implicit in IWRM; however the institutional infrastructure is still lacking to some extent in the most rural of areas, like La Unión Province.

The third focus of reform was “end-user efficiency.” There have been large campaigns funded by the national government as well as the non-governmental organization Instituto de la Promocion para la Gestion de Agua – IPROGA (Institute for the Promotion of Water Management) focused on more efficient water use and less waste at the point of delivery. With very little in the way of evidence, the most prolific and well-respected newspaper in Peru, El Comercio, published an article on March 22, 2005 discussing the drastic state of water projected for the near future. A shocking headline that proclaimed that Peru’s problems with water scarcity would rival those of Northern African countries in the near future, partly blamed poor local level water management. In 2009, the World Bank released their project proposal for their $10 million water resources modernization project (World Bank 2009) and cited similar
concerns about end-user efficiency. This is a highly contested theme in the communities themselves. Interestingly enough, it has been reported that Peru is actually a net exporter of water (Chapagain and Hoekstra 2008; Lynch 1991) and that a majority of the poor end-user practices actually occur within the commercial or industrial sectors, and not at the small-scale irrigation level.

Current Organizational Landscape in La Unión Province

Bates (1988) and Ostrom ([1990] 2007) discuss at some length the impulse and actions of institutional reform in rural settings. Both agree that institutional reform should be a reflection of the changing demands on supply of resources being governed, and thus, in theory, will be beneficial to the collective, and not the just the nation-state. I now turn to present institutional reforms, and through a series of institutional analysis frameworks (Ostrom [1990] 2007, Bates 1988; Buck 1998) will discuss how the reforms and creation of new institutions in La Unión are functioning to meet the goal of the government: to implement and follow efficient and effective integrated water resource management practices (Alegria 2007).

In January 2010, at which point field work coincidently commenced, the Provincial office of the Asociación Local de Aguas (ALA) opened, and the lone employee began his job of integrating ALA into the institutional landscape of one of the most water-scarce regions in the Department of Arequipa (Cano 2005). Although La Unión is a province of only 15,662 residents (INEI 2007), irrigation and water management in general are a priority, and prior to the arrival of ALA, there were 5 organizations, institutions or government entities that self-identified as somehow being related to water management and usage. I was able to collect the names of all of the organizations in La Unión that are perceived to be involved in some aspect of irrigation water
management activities through a method of snowball sampling. I solicited names of organizations until the sample was saturated, the point at which I received no new names of organizations through various different prompts (Brewer 2002).

Sixteen institutions were identified through this method. This list included representative organizations from the government, nongovernmental sector, civil society and community organizations, associations and producer groups. Table 5-2 shows the groups and the types of organizations. These 16 institutions exclude the community and ayllu-level water management organizations (user-group organizations). The governance and communication structures are vastly different within the provincial institutional level and between the provincial and community level. For the purposes of this chapter, I will address communication and collaboration between other provincial level organizations and between these organizations and the communities.

The creation of institutions is not standard, and some institutions are created through an organic process of multiple groups coming together and deciding to become a collective, legally recognized association or organization. Many local-level organizations and producer groups are formed through this process. In the case of La Unión, many producer groups and end-user associations are examples of this model of institutional birth. One of the NGOs working in La Unión, AEDES, has association building as a core activity. AEDES works to not only help end-users organize into officially recognized groups, but also helps them learn how to manage finances and communicate professionally with local and national government organizations. In the case of water management in La Unión, these institutions include the organic producers
associations (APROPLAME and APCO) and neighborhood associations (Comunidades Campesinos).

Other institutions are created with specific goals and often with direct or indirect financial support from the national or departmental government. These institutions are centrally controlled and very often have a non-negotiable objective and limited scope of involvement in the broader role of administering and managing water distribution. Institutions representative of this type in La Unión include direct government agencies (Agricultural Agency, Municipal and Regional governments, Department of Parks, health workers) and government-funded technical assistance agencies (agricultural extension agents, technical training institutes).

What becomes a bit more difficult to classify is arguably the most important institution in the province: the province-wide water user association. The Junta de Usuarios de La Unión (JULU) is uniquely positioned in that it was founded with governmental money, though the organization is chartered, governed and operated by end-users in the Province. It is a representative body comprised of elected members filling the following positions: President, Vice-President, Secretary, Treasurer, sub-Treasurer (a person who can make payments should the Treasurer not be immediately available), and 2 at-large members (locally known as “vocales”). In addition to the elected position there is one “technician” who is the only full-time employee of JULU and receives an annual salary for his work. He keeps the books, arranges institutional collaborations, and is supposed to provide assistance to communities when they request workshops or trainings on new techniques.
Institutional Analysis Development Framework

With sixteen institutions, it is important to have a systemic way of understanding each institution’s role in water management at the Provincial level. In order to do this, I will use the Institutional Analysis and Development (IAD) framework. Much of the IAD work is based on the seminal work by Elinor Ostrom and her collaboration with many other scholars.¹

Ostrom defines institutions as the following:

The sets of working rules that are used to determine who is eligible to make decisions in some arena, what actions are allowed or constrained, what aggregation rules will be used, what procedures must be followed, what information must or must not be provided, and what payoffs will be assigned to individuals dependent on their actions ([1990] 2007:51).

The benefits of the IAD framework include providing a type of analysis that takes into account the role of institutions in influencing interactions and outcomes within the micro level governance of local resource decision-making and norm setting. The focus area on this type of analysis is what Ostrom has called the “action arena.” These arenas of socially and legislatively informed decision-making can be better understood by looking at three key variables in the process: the institutions that are present in the area; the characteristics and socio-political fabric of the community where the decisions take place; and the physical object (in this case the irrigation water) that is being governed (Ostrom 1999, 2005).

By integrating these two approaches, the ultimate objective of the IAD framework is to more clearly see how governance process between the constitutional level,

¹ Elinor Ostrom has been extremely prolific and has collaborated with many individuals such as: Arun Agrawal, Michael McGinnis, Susan J. Buck, Fikret Berkes, Ronald Oaskerson and Daniel Bromely, to name a few. They should all be recognized as contributors to this analytic framework as well.
operational level, and the collective-choice level (Kiser and Ostrom 1982; Ostrom [1990] 2007, 2005) are interrelated. These three levels can be understood as the following:

- **OPERATIONAL LEVEL**: This is considered to be the level at which daily decisions are made and effectively acted upon that relate to appropriation and provisioning of resources, as well as monitoring and sanctioning. In the case of water management in La Unión, this would be defined as the decisions made by water users in the fields or at the canal heads.

- **COLLECTIVE-CHOICE LEVEL**: This is considered to be those intermediary organizations such as the provincial-level water-use association (JULU), who are involved in the decision-making processes between end-users (operational level) and the constitutional level actors. This includes local level policy-making, management and conflict resolution. I argue that this is inclusive, at least at this point, of the central government-funded agency ALA, the Local Water Authority.

- **CONSTITUTIONAL LEVEL**: This would be an analysis at the level of the Departmental and State government that is responsible for making rules and governing the collective-choice actors, and producing both regulations and sanctions to be followed by the collective-choice actors, and in turn (according to the new law in Peru), the actors at the operational level.

Eight principles have been defined for sustainable small-scale common pool resource management, though some scholars debate that there are essentially five that are of utmost importance (Buck 1998). These five are: having clearly defined boundaries; a correspondence between local-level rules (operational level) and the local physical and social conditions; a way of monitoring resource use; implementing increasingly stiffer penalties; and *nested enterprises*, which represent local groups in the larger discussions at broader institutional levels such as departmental and/or national level dialogues (McGinnis and Ostrom 1992:58). It is important to understand, using these two frameworks, how communities and institutions in La Unión are organized and how they affect resource control and access before and after the implementation of the New Law of Hydraulic Resources.
Measuring Organizational Perceptions of Peer Institutions

The goal of this phase of the research was to understand the relationships between institutions working in the Province. As I mentioned before, through snowball sampling I compiled a saturated sample that provided me with the names of all of the organizations in La Unión that are perceived to be involved in some aspect of irrigation water management activities. I used this list of sixteen organizations and bound my network by using this group. Throughout my fieldwork I attended meetings, workshops, capacity building trainings and read publications produced by all sixteen of these groups. I was also invited to sit as an “honorary member” on the Mesa de Trabajo de Agronegocios – the provincial-wide working group on agribusiness. This allowed me the opportunity to interact with representatives of various agencies and learn about the interactions and what they expect and request of each of the other institutions. In addition to these participant observation activities, I administered a fifteen-question survey about the type of work they are doing in the province, followed by six network tie questions. Each of the six tie questions required them to report on the likelihood of collaborating with each of the other fifteen institutions in the province. At the end of the survey, each institutional representative answered a total of 105 questions (Appendix B for survey questions and Appendix C for network roster).

Organizations and Their Role in Water Distribution in Antabamba and Charcana

Communities in La Unión have displayed an amazing resiliency to changing regimes of water management, as discussed in Chapter 3 and discussed in much of the archaeological and historical data presented here and in various other venues. In this section I will discuss the ways that institutional change in accordance with the New Law of Hydraulic Resources is impacting the two research communities of Antabamba and
Charcana in different ways. Both of the communities meet the conditions outlined above for hypothetical sustainable common pool resource management, though the changes and institutional rearrangements at the national, Departmental and Provincial levels are not being applied equally in each community. For each community I discuss what changes are being implemented in the communities and what the effects are of these changes.

**Antabamba’s Institutional Reform**

Antabamba, as I have discussed earlier, is eagerly and forcefully embracing the new law, and consequently the institutional reforms that accompany these changes. Cotahuasi serves as the administrative capital of the Province, and all 16 institutions/organizations recognized as being part of the irrigation water management regime in the Province have at least one representative in the town. The relative proximity of Antabamba to Cotahuasi (one and a half hour walk to the town of Alca, which is then an hour ride to Cotahuasi with hourly runs between 6AM and 6PM) makes it relatively easy and convenient to attend meetings. With the regularity that Antabambinos go to Alca for buying food and other essential items, the extra hour to travel to the comparatively big city is worth it, since it is usually accompanied by larger shopping trips, visits with relocated Antabambinos, and in some cases, continued travel on to Arequipa.

In Antabamba, the acting President of the local water user group told me that he went to Cotahuasi about twice a week on average (more if there was a soccer tournament he needed to play in on the weekends) and always made it a point to stop in and see the technician and provincial-wide water president in the JULU office. He said this was his main way of communicating with JULU. It was in these visits that he would...
sign documents, have meetings about accessing funds for canal maintenance and improvements, as well as learn about the new laws. I asked him if he made visits to other organizations related to community water management, and he said that he had been to the ALA office once since it opened to introduce himself to the lone technician, and he makes infrequent visits to AEDES, the NGO in Cotahuasi to learn about any opportunities there may be to sell products. Otherwise, he said, it is mainly visits with JULU.

Once I ran into Señor Yohn (the President of Antabamba) as he was waiting for the last combi van of the day to take him back to Alca from Cotahuasi and we began talking about a proposal he had just discussed with the JULU technician. I asked him if he felt like it was unfair that he had to burden himself with traveling to Cotahuasi since JULU does not travel to the communities. As he was loading up the top of the combi with copious amounts of things like toilet paper, red meat, various vegetables and a rehabilitated bike tire, he responded with a smile and said, “It does not inconvenience me. It is part of my cargo (responsibility to the community). Besides, the dues we pay as a community reimburse the costs of my trip so I don’t lose all of my money doing this job.” Although Señor Yohn was clearly aware of the opportunities that traveling to Cotahuasi on “business” could bring, he was one of the most well known community presidents in the JULU office and, as I was told, was one of the most knowledgeable presidents with regards to the new water laws. Suffice it to say that Señor Yohn was concerned about maintaining a good working relationship with the institutions, which were the only way to leverage funds to improve water management infrastructure in Antabamba.
It is not surprising that the President would choose to go to JULU instead of all of the other fifteen agencies located in the town. Social network analyses from the sixteen-member water management institution network revealed that JULU is a major “hub” in the institutional network (Table 5-3, Table 5-4, Table 5-5, Table 5-6, Table 5-7, Table 5-8). A “hub” in a network is a node with a high degree and betweenness centrality. Of the six network tie questions asked of the institutions, JULU was ranked as one of the top three “hubs” of sixteen for each category four times, and more importantly, for the overarching question regarding water management in general in the province (Table 5-3). Obviously, Señor Yohn is not only interacting with JULU because of this, but rather there is an observation by water users that JULU, in its role as an organization operating at the collective-choice level (in IAD terms) keeps them connected to what is happening at the constitutional level. According to the IAD framework, everything appears to be working smoothly, except that at the operational level, it is difficult to ascertain how much of that wider information about water policy is turned into practice and widely distributed. This information and regulation “infrastructure” that I am discussing here is evidence that the minimum five (Buck 1998) of eleven elements identified by McGinnis and Ostrom (1992) are present, but it remains to be seen to what extent they reach the operational level.

The interaction of Señor Yohn is extremely influential in the operational level institutions within Antabamba. Señor Yohn, as president of the user group in Antabamba is himself a highly-influential member of the institution, and the vigor with which he has decided to impose the regulations that are part of the New Law of Hydraulic Resources in Antabamba has had an important impact on the community.
level dynamics of accessing water in Antabamba. Under his influence, the law has also restructured their local water management council. Official titles like “President” and “Vice-President” carry more weight, and as of last year, the community did away with the cultural position of “water chief.” Under pressure from the President and amidst rhetoric that threatened lack of local institutional reform might lead to lack of financial and technical assistance, the community voted to disband the position of water chief, as well as the position of repartidor, or water distributor. The current political structure at the operational level is a replication of the institutional structures at the collective-choice and constitutional levels, resembling a State-sponsored institution more than autonomously organized and administered local level institution like it used to be. I will discuss at more length the impacts of the implementation of these rules coming from the constitutional and collective-choice levels, and how their imposition on the operational level has had very poignant effects and repercussions.

Charcana’s Institutional Reform

As opposed to Antabamba, Charcana is much more apprehensive about implementing the new water management regulations and allowing the State to intervene in their tailored water management organization. Very different geography plagues Charcana as opposed to Antabamba, though the increased availability of water in Charcana provides a positive element to the community. Unlike Antabamba, from Charcana it is a much more difficult trip to Cotahuasi. There is one combi van that leaves at 6AM and arrives three or four hours later in Cotahuasi (depending on the road conditions and the “adventurousness” of the driver). The road, which was just recently completed in 2006, hugs the Cotahuasi Canyon walls at its most vertical points, and because of the road’s proneness to landslides and damage by falling rocks, it is washed
out various times throughout the rainy season. In the course of my fieldwork, the road was closed on seven different occasions, the longest of which lasted nearly three weeks. The impacts of the lack of proximity and ease with which Cotahuasi can be accessed from Charcana cannot be understated.

One of the reasons that this factor cannot be underestimated is because it was highly influential in Charcana remaining one of the few hold outs in the province to maintain a much more traditional system of water management, and makes many of the users, especially the older community members, very reluctant to change systems. When many irrigation commissions began to alter their internal organization in the 1990s after the Shining Path terrorist group was removed from the area, and many NGOs and government organizations began doing development outreach in the area, Charcana was still practicing their traditional management, unaltered. In 2004 they incorporated the positions of “President” and “Secretary” (noticeably there was no Treasurer; this was to be mixed into the President’s responsibilities) while retaining the roles of water chief and water distributor. I was told that in recent years, these two traditional positions had been slowly losing prestige, though they are still omnipresent in the water management arena within the community, unlike Antabamba.

Don Julio, the acting President of the Charcana water commission at the time of the research, communicated to me that Charcana was just too big, and that the requests for accountability on water distribution by JULU and the regional government were not being answered by water chiefs and distributors. I was told that slowly JULU and the regional government were restricting services and financial resources that Charcana had become dependent upon, and soon they needed to become more
accountable with their resource use to the state. This lack of accountability, or as James Scott (1998) has referred to it, “legibility,” is seen as a central tenet of the state and in times of resource scarcity becomes even more pervasive and strictly enforced. The idea of keeping records is nothing new in Charcana or in this region. As far back as the *khipu*\(^2\) there has been a system of record keeping at the local level. Water was measured by *rakis* (units that corresponded to the depth of a standard measuring stick in the canal – Gelles 2000; Trawick 2003) and the products from the fields that were sent to a central storage facility were measured as well. However, the idea of “legibility” is something that is fairly new to Charcana and its residents. Scott describes “legibility” as a manifesting of the increasing knowledge of the State about what is happening in areas where they were previously unaware of what was available in many parts of their country with regards to human, natural and even financial capital. Scott writes:

> How did the state gradually get a handle on its subjects and their environment? Suddenly, processes as disparate as the creation of permanent last names, the standardization of weights and measures, the establishment of cadastral surveys and populations registers, the invention of freehold tenure, the standardization of language and legal discourse, the design of cities, and the organization of transportation seemed comprehensible as attempts at legibility and simplification. In each case, officials took exceptionally complex, illegible, and local social practices, such as land tenure customs or naming customs, and created a standard grid whereby it could be centrally recorded and monitored… (1998:2).

The ideas that Scott communicates in this passage reflect what has been happening throughout La Unión, though the process is in its more nascent phases is Charcana.

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\(^2\) *Khipu* is the Quechua word for a cord with many pendants that hang from it. It was believed to have been used from the Middle Horizon period (600-1100AD) until the conquest of the Inca by the Spaniards. The pendants are the portions that are wrapped around themselves and thus hold the numeric record for anything ranging from a census to tribute payments. For a comprehensive overview of the role of *khipus* in historical Andean culture see Salomon (2004).
In reflecting on Scott’s description of legibility and the recent changes in Charcana, it appears as an interesting coincidence that at the time the State and Departmental organizations were requesting stricter reporting, the governments were engaging the community in a conversation about a potential road construction project connecting the Charcana to Cotahuasi. This type of quid pro quo policy to convince communities to reform makes the point that Scott is describing above. One of the major roles of the institutions in this area to report to the government what the status is of the precious water resources in the area, and catalog users for every watershed. With open access to the communities, this makes the government’s job much easier and more accurate.

Ultimately, the lack of coordination between the operational level management in Charcana and the collective-action level institutions in Cotahuasi has had damaging effects. Whether it is a direct retaliation for lack of participation in registries and payments related to issues of legibility, or the professed perception on behalf of JULU and other institutions in Cotahuasi that Charcana does not want assistance from outside organizations, the extension of the institutional authority on the local water management is minimal. This has resulted in an under-funded and poor maintained canal system that ends up not meeting either the community’s or government’s goals of efficient and sustainable resource management.

Organizational Collaborative Networks

For the six related collaboration questions, I was able to create a unique network of interaction and analyzed the data to produce individual scores that relate to the level of collaboration among organizations in La Unión. Tie questions related to the following areas of potential collaboration: (1) irrigation water in general, (2) legal/policy
implementation and enforcement, (3) infrastructure projects, (4) technical assistance/extension work, (5) finding financial resources, and (6) water quality.

Levels of collaboration were estimated by evaluating betweenness centrality, in-degree, out-degree, and hub centrality. Taking into account these measures, one can see the importance of a small handful of organizations in many different spheres of irrigation water management. In general, the most central organizations to the institutional network are the government entities of the Agricultural Agency, the Local Water Authority (ALA), and the Municipal governments. AEDES, the non-profit NGO working in the area, is also very central to the network. The water user association of La Unión (JULU) is also a key player in the collaborative networks. The hydroelectric plant, the micro finance institution, the government sanitary and phytosanitary agency (SENASA) and the organic producers association of La Unión (APCO) play a very minor role in comparison to the other organizations in the Province.

What resulted from these studies was the realization that there were too few actors involved in the water management process. This was communicated to me by various research participants. Even organizations that were central to networks outside of their area of expertise complained of too much reliance on too few a number of organizations. In qualitative interviews with these organizations, it became clear that there was a misunderstanding about the roles and responsibilities of each institution. Furthermore, many organizations associated with the government complained about the false notions of the capacity of their organizations to implement change. One representative from the Agricultural Agency put it this way:

The communities think we are charged with doing everything. We tell them, ‘We can help with infrastructure, helping you coordinate with other
agencies, and telling you where to go for funding. That is all we can do. We cannot send your water chief or water president to jail, increase your water supply, or immediately fix a canal because it is broken.’ They don’t understand. I sometimes feel like the other organizations that we work with seem to think that too. We cannot do everything.

The frustration from organizations was clear. There was also doubt about the efficacy of other organizations in the Province. This was an interesting parallel between the individual community member’s lack of confidence in other community members helping in faenas and engaging in ayni. The same doubt seemed to be occurring at the organizational level. It was argued that some organizations were only interested in getting their name on the projects so that they could “justify their salaries” and the time they “sit in their offices spreading gossip.”

**Importance of ALA in the Network**

The timing of my field work was particularly useful in that my during my field work, I was able to be present in the La Unión for the one year anniversary of the establishment of the local ALA office. The intended role of ALA was to be the coordinating and governing body for irrigation related issues in the province, to advise JULU on priorities and legal regulations outlined in the New Law of Hydraulic Resources, and help plan and fund canalization and large-scale infrastructure projects that require cooperation between multiple districts and various communities. They are explicitly not responsible for canalization, maintenance, or infrastructure projects at the district or community level (Republic of Peru 2009).

Of all of these responsibilities, I was told that the biggest and most important role for ALA to play was that of coordinating. ALA was intended to be the agency in the province that would act in a more directorial role, as opposed to an extension in the communities, or water-user outreach role. In order to test the impact of ALA on the
organizational structure for water management, I ran a network analysis procedure that allowed me to do an analysis of the impact on the network if ALA were suddenly removed from La Unión (Figure 5-1, Figure 5-2). This operation is called an Immediate Impact Analysis in the network analysis package called *ORA (Carley et al. 2010). Through the use of comparative statistics, the program allows you to compute the consequential changes in the overall network structure and composition of key entities the network (Carley et al. 2010).

As a result of running an impact analysis on the organizational network data, the simulations uncovered something very peculiar about the impact of the creation of ALA and their role in the decentralization process, which is the intended goal of the New Law of Hydraulic Resources. Tables 5-9 and 5-10 reveal the changes associated with the hypothetical removal of ALA. General collaboration over irrigation water projects in La Unión appears to be heavily influenced by the addition of ALA in the Province. Government organizations in the Province experience drops in ranks centralization with the removal of ALA. The Regional Government loses over 35% of it is original betweenness value. Interestingly, it is not other government entities that fill this gap. NGOs such as AEDES and community and producer associations such as the organic quinoa and amaranth exporter’s association (APCO) move up the rank by greater proportions. The only government entity that increases in betweenness with the removal of ALA is the Agricultural Agency. This indicates that perhaps the presence of another government institution in the province serves only to reinforce the presence of government in the region, and is actually detrimental to the decentralization process and extending management decisions to nongovernmental organizations.
Table 5-10 shows the impact specifically as it relates to policy decisions and collaboration among organizations. This analysis reveals a surprising change in the rank of the locally based nongovernmental organization, AEDES. It appears that AEDES’ value would increase by 78%, making them the number one ranking organization, skipping ahead of the Agricultural Agency, which occupies that rank in the actual policy-making landscape of La Unión. The Municipal Government also has a drastic jump of 68% in betweenness. This indicates that the policy-making sphere is more dominated by local institutions that are governed and administered at the local when ALA, the national government’s locally based organization, is not present. Again, this seems to suggest that the presence of ALA serves the interests of the national government agencies more than in the local populations, which it is touted as serving. It must be recognized that these are merely mathematical predictions, though it serves to validate the complaints by many residents and nongovernmental organizations in the Province that they are losing control of the decision-making process surrounding water management.

I do believe, as Scott (1998) would say, that this type of analysis demonstrates the intentions of the state to make these rural communities more legible, and exact a more precise control over resource use and allocation. Discursively referred to as a project of decentralization and increased participation (though the two do not necessarily go hand-in-hand), this indication of government consolidation through the establishment of ALA implies an effort to extend control, not retract it. Through micro-managing the economic, physical, financial and political sectors of water management in separate bureaucratic agencies, the illusion of distribution of power and control is upheld, though
the underlying consolidation of power through orchestrated coordination is ultimately advanced.

**Norm Agreement and Consensus About Rules Governing Water Access**

The New Law of Hydraulic Resources outlines very firm laws regarding water use, management, and conflict resolution. As I have discussed earlier, local communities have well established and locally derived norms based on iterative processes of consensus building. After understanding the different types of social structures between these two communities, I became interested in how these two differently structured communities viewed norms and rules associated with water management.

One of arguments made most often by water bureaucrats in Peru is that a lack of rules exists at the local level, and that without codified laws there is no logical order to water management. This is precisely what Ostrom (2007[1990]) argues against in her case for common-pool resource management. In the IAD framework, the Peruvian government is making assumptions about the “operational level”. This is the level at which daily decisions are made and effectively acted upon that relate to appropriation and provisioning of resources, as well as monitoring and sanctioning. To test the existence of local normative rules at the operational level, I used cultural consensus analysis.

Consensus theory and domain analysis provide conceptual frameworks used to determine whether something is part of a cultural domain. Borgatti (1999) defines a cultural domain as concepts, entities or objects that are recognized as related or associated by a bounded cultural group. In addition to ethnographic examples of culturally acceptable management and distribution practices I was able to add empirically informed data by using cultural consensus analysis, which makes salient
existing agreements or consensus about certain cultural domains. By asking individuals about specific rules and norms associated with water management practices, I was able estimate what type of cultural norms and knowledge is common, and which informants are most knowledgeable about the community norms (Weller and Romney 1988).

For water management to be successful, it would presumably need to be understood and followed by everyone in the community. Unequal distribution of knowledge can be expected within a cultural domain (Romney et al. 1986), and in the case of water management in this context, it could result in the amount of water access being unequal as well.

Two of the districts omitted from the analysis were Sayla and Tauria, both of which are located more than 14 hours in private vehicle from the Provincial capital of Cotahuasi and proved logistically challenging to maintain a regular presence. The third district omitted was that of Cotahuasi. One reason that Cotahuasi was omitted is due to the fact that agriculturists in Cotahuasi have unusual access to resources such as plows, seeds, fertilizers and other products due to the accessibility of the Agricultural Agency and other agricultural NGO office located in Cotahuasi. Another reason is that many of the agriculturalists in Cotahuasi district have disproportionately large plots of land across various production zones (Murra 1956) providing them a distinct advantage and incentive to produce for the market as opposed to subsistence, which is the case in the rest of the Province.

Creating the Questionnaire, Selecting Participants, and Data Analysis

In order to create the cultural consensus questionnaire, I asked water users through the Province to free list as many rules about water management as they could name. This free list allowed for the creation of a 35-item questionnaire focused on the
most common norms mentioned (Dressler et al. 1996). The questions were posed in an agree/disagree format (Appendix A), and data were aggregated at both the community and provincial levels. Consensus questionnaires were administered to 207 respondents in eight of the eleven districts of La Unión Province. These districts range in the degree to which they are adopting the water law and implementing both political and economic changes associated with the law (Table 5-11). Inclusion criteria for respondents were anyone who works in the fields during irrigation, and has personally had to request water for their family. Often this is someone other than the listed water user on the committee or commission registry. Women are often responsible for requesting water, though traditionally they are not listed as landowners and therefore are often not listed on the water user registry. By widening the inclusion criteria I was able to increase the number of women respondents, and well as have a more heterogeneous age range of respondents as well.

To analyze the data I used the cultural consensus analysis function in Anthropac 4.98 (Borgatti 1998). I compared the eigenvalues of the first factor loading to the eigenvalues of the second factor to receive the eigenvalue ratio. This computation is used to determine if there is one set of “correct” answers indicating that there is consensus on the tested domains. According to Weller and Romney (1998) a ratio of three to one is sufficient to indicate there is consensus within the group.

**Consensus Results**

Through analysis of the data from all eight Districts within the Province, it is clear that at the Provincial level there is overall consensus as to how water is managed, what is considered stealing, and who has control over water distribution. However, not all communities had internal consensus regarding how water was managed. Interestingly,
it was Antabamba that displayed the least amount of internal consensus with regard to water management norms. Table 5-13 shows the competency scores for each community, and Table 5-14 shows the analysis of variance between the communities and demonstrates that they are statistically significant at the 0.05 level. From these results we can conclude that within the communities, there are high and statistically significant levels of agreement about water management norms. However, the lack of significance for the ANOVA between groups suggests that although there is internal, community-level agreement, there is not the same level of agreement at the provincial level. Although there is a high degree of agreement across the whole province, there are some norms that are accepted in one community and not accepted in another. This indicates the challenge of implementing one standardized management practice at the provincial level when organizations disseminating and promoting the law cannot assume standard practices across communities.

The degree to which communities have formed consensus about water management is clear evidence that in lieu of formal written rules, local institutions can still organize and effectively communicate water management norms (Ostrom [1990] 2007). For the purposes of this discussion, I find it important that seven of the eight districts analyzed showed statistically significant norm agreement scores (Table 5-13, Figure 5-3). Antabamba, one of two of the comparative research sites was the major outlier (Figure 5-3). In continuing with the comparison between Antabamba and Charcana, it is important to focus on which norms were divergent in Antabamba, which represent points of contention within the community.
According to the cultural consensus analysis the following concepts were unable to be determined as having “correct” responses in the agree/disagree format in Antabamba. Although there is a recorded probability for what the correct answer is, there is no assumption with statistical confidence as to which response is correct.

- “I understand the New Law of Hydraulic Resources (No. 29338) of 2009.”
- “People should not have reduced turns with irrigation water when it is raining.”
- “Irrigation turns that will water subsistence crops should receive priority in water distribution as opposed to turns that will irrigate alfalfa or pasture grass.”
- “The distribution of water in my community is equitable.”
- “I resolve conflicts with other water users personally, and without the intervention of the irrigation commission/committee.”
- “The most powerful person in regards to water distribution in our community is not the president of the commission/committee.”
- “Our traditional system of water management is better than the New Law of Hydraulic Resources (No. 29338) of 2009.”
- “I can increase the quantity of land I use for agriculture if I want to.”

Only the final question on this list is a concept that is explicitly written in the New Water Law. The law states that there will be no expansion of the agricultural frontier (Republic of Peru 2009). I believe that this is representative of the fact that there is also disagreement about the extent to which people feel they understand the New Water Law of Hydraulic Resources. Although there were very few questions that corresponded directly to the new water law, since the cultural consensus survey was constructed from freelists, there are not many examples of community norms conflicting with the regulations outlined in the new water law. However, those that disagreed with the statement of their right to increase agriculture cited the law as the reason. Others who agreed with the statement vehemently defended this right and told me I was
mistaken. This confusion extended to many other aspects of the law such as regulations and responsibilities associated with tariffs, canal infrastructure projects, maintenance and authority. This issue of authority is indicated by the lack of consensus in the questions pertaining to authority of the water commission/committee president. In Charcana, 100% of the respondents agreed that the water commission/committee president was not the most powerful person in the community with regards to water distribution. In this case, it was the water chief who was considered the supreme authority.

In Charcana, every respondent (n=25) agreed that irrigation turns intended for subsistence crops should receive priority over alfalfa and pasture. In Antabamba, only 19 of 32 respondents, or 59% agreed to this concept. I believe this is more a reflection of the economic incentives associated with alfalfa and pasture production than with subsistence crops. The Loayza and Bellido families are responsible for 82% of the alfalfa grown in Antabamba (Table 4-1 and Table 4-2), and the precedent has been set that these crops are subject to equal irrigation turns, even though they are more water intensive and are produced for consumption by their own cattle and cuyas (guinea pigs) or for sale to other residents in the community.

Among other things, the cultural consensus analysis makes clear that in lieu of written rules with written sanctions, local norms about water management are well understood within communities. I contend that Antabamba, the community that is most far along in transition to the state model of water management, is suffering through the growing pains of trying to implement the new laws. It is impossible to know how people would have answered these questions prior to the implementation of the law; however,
the strong evidence of shared agreement in other communities not dissimilar to Antabamba suggest that they are being impacted by the law.

The unique timing of my research placed me in Antabamba the first year of efforts to fully implement the new law. This snapshot in a period of transition (which is still lingering two years later) is an extremely important time in natural resource policy development, and dismissing the processes of reformulation of local norms cannot be understated. Claiming it is a phase that is not representative of the management practices in the long run is true, but understanding why the long run has turned out the way it has is of utmost importance. In a study on the impact of new Indonesian forest governance policies on local communities, Tan (2004) noted that breakdowns in policy communication and confusion in implementing centralized plans for decentralization governance lead to a multitude of negative consequences including: increases in illegal activity, less sustainable resource use, and less care taken for the resources.

Such basic contradictions illustrate the government’s failure to reconcile the objectives of two disparate sets of political forces, one purporting to accord greater power to local government units while the other seeking to retain centralized control over sectoral resources and revenue streams. The result is a massive dysfunction in the forest management effort, with emboldened local leaders ignoring central government edicts and proceeding to issue their own concessions pursuant to regional autonomy (178).

Drawing upon the results of the social network analyses, ethnographic observations, and cultural consensus analyses, it hard not to attribute some of the lack of consensus in Antabamba with the poorly communicated sweeping changes in water management laws and policy. This lack of consensus could foretell the fate of other communities as they become increasingly involved in reform. These conclusions may also serve to assist local organizations in understanding where confusion lies, and how
to better design their communications strategies. This may also encourage some form of oversight into the reformation process, which is currently lacking.

**Conflicts of Interest and the Perils of Decentralization**

The interaction between these organizations is, inevitably, complex and in this setting, very personal. Unlike many of the communities and province capitals that are located relatively close, or are at more accessible than La Unión and Cotahuasi from the department capital of Arequipa, organization employees are basically full-time residents in Cotahuasi, and become integrated in the local community, politics, and economic systems in a very personal way. In focusing on the political ecology of a natural resource regime, these lines of user vs. governor become extremely blurred, and a process of constant rescaling of political and social authority and boundaries is required (Perreault 2005).

Although generally perceived as either innocuous (in the worst case) or effective and beneficial (in the best case), members of these sixteen organizations occupy varied social and political roles. For example, members of the Agricultural Agency are prohibited from owning land for market production in the community where they are working, however they are allowed to produce agricultural goods for their personal consumption. In a province largely dedicated to subsistence production and small-scale, noncommercial bartering activities, this prohibition is technically adhered to, though the root economic influences and temptations that justified this prohibition in the first place are still present.

An engineer and former technician in the Cotahuasi office for the Agricultural Agency, whom I will refer to as “Ercilio,” was well known and liked locally. Upon receiving his assignment in Cotahuasi from the Ministry of Agriculture office in Arequipa,
Ercilio moved his wife and two children out with him, since it was impractical and excessively expensive to travel between the two towns with any regularity. He and his family quickly integrated into the community, with his children attending the local primary school. His wife, Angelica, soon became one of the most successful avocado producers in Cotahuasi, and was heavily involved in the organic agricultural producers association and sold her “excess” avocados to local residents who would come to her house directly. Angelica was engaged in what were both cash and non-cash exchanges with agricultural products. It is important to distinguish here engagement in economic exchange as opposed to her involvement in ayni. Nobody, not even Angelica herself, considered her to be involved in the culturally bound system of ayni.

This caused an underlying tension within the community of Cotahuasi, which reverberated throughout the districts. It was not a scandalous issue at the level of the government, nor did the tension escalate to an open confrontation between community members and Ercilio and Angelica. When people in the communities did discuss the role of organizations in the Province, people often referenced Ercilio and Angelica as evidence of the corruption and misdirected benefits of their presence. Perverse incentives, whether or not they were intended, were perceived of the organizations by many of the local populations. Nongovernmental organizations, educational institutions, and community associations were not perceived negatively, but the relationships between government organizations and communities are built on skepticism, and this is an important factor in understanding the political ecology of water management.

**Summary**

The New Law of Hydraulic Resources was advertised as a sweeping reform for water management in Peru. The most obvious change has come in the creation of a
new bureaucratic structure that includes ANA, AAA, and ALA. With publicity surrounding the dedication of new offices and newly appointed officials, the government has been able to add pageantry and pomp to a process they have regarded as a move towards the decentralization of water resource management. At the provincial level, government water officials spoke of the need to codify water management practices due to the lack of regulations in practice at the local.

Social network analysis revealed that government agencies were the most involved with water management projects in the province of La Unión. When organizations were asked to qualitatively evaluate the skill sets and specialties of other organizations with whom they collaborate, there was a clear misconception about the roles of many of the organizations. Through a process of subsequent interviews and inter-organizational meetings it was clear there was a need for better communication between organizations. During the end of my fieldwork I was able to serve in the capacity of coordinator for a locally established working group on water. This working group coordinated eight organizations ranging in network centrality and sectoral representation. They have official meetings once a month to discuss the state of water management in La Unión, and have agreed to communicate about projects and policies that may be of interest to the rest of the parties represented in the province.

Using the theory of common-pool resource management (Ostrom 2007[1990]), analyses of meso (provincial) and micro (community) level organizations were used to understand relationship between organizations within each level, and between the levels of management. By analyzing institutions at the meso and micro levels through the Institutional Analysis Development Framework, we can see that there does appear
to be a very established and functional institutionalization of water management at the micro (operational) level. Where the government may think there is a lack of standardized rules, cultural consensus analysis actually demonstrated that there was consensus among users within the same communities in seven of the eight districts surveyed. These demonstrations of consensus are important in recognizing the capabilities of local groups to effectively and clearly create and administer natural resource management norms.

I have also described through an example of the ambiguous role of government employees in rural areas of Peru. Integrating into the local community where they are living and working can be problematic, and perceptions about the use of official powers for personal gain can quickly permeate the community. The perceptions of local government employees become associated with the government organizations they represent and vice-versa. In Chapter 6 I will discuss the relationships between community authorities and their communities, conclude why some relationships are stronger than others, and provide evidence for the impact these negative or positive perceptions of water leaders have on community cohesion and perceptions of equity in water distribution.
<table>
<thead>
<tr>
<th>Sector/Agency</th>
<th>Water-related Roles and Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Intendancy for Water Resources (Ministry of Agriculture)</td>
<td>Primary water authority in the country responsible for the distribution/allocation of water resources, and adjudicating water conflicts.</td>
</tr>
<tr>
<td>General Directorate for Environmental Health – DIGESA (Ministry of Health)</td>
<td>Monitoring of water quality and sanctioning and regulating emissions into water bodies</td>
</tr>
<tr>
<td>Ministry of External Commerce and Tourism</td>
<td>Deciding and allocating uses of thermal water resources for tourism activities</td>
</tr>
<tr>
<td>Ministry of Energy and Mines</td>
<td>Allocating sub-terrain water resources for mining and hydroelectric purposes</td>
</tr>
<tr>
<td>Ministry of Production</td>
<td>Creates and enforces regulations related to the use of water for industrial coastal irrigation and commercial fishing.</td>
</tr>
<tr>
<td>National Directorate for Water and Sanitation – DNS (Ministry of Housing, Construction and Water Supply and Sanitation)</td>
<td>Monitor and regulate national supply for domestic water use</td>
</tr>
<tr>
<td>Rural Water and Sanitation National Program – PRONASAR (Ministry of Housing, Construction and Water Supply and Sanitation)</td>
<td>Plan and implement water supply, sanitation and remediation programs in rural communities and small cities.</td>
</tr>
<tr>
<td>National Fund for Compensation and Social Development – FONCODES (Ministry of Women and Social Development)</td>
<td>In collaboration with PRONASAR, plan finance, and implement water supply, sanitation and remediation programs in rural communities and small cities.</td>
</tr>
<tr>
<td>National Council for the Environment - CONAM (Presidential Advisory Board for Ministries)</td>
<td>National Environmental Authority held responsible for approving policy changes, setting normative standards, setting penalties and approving studies and reports of other agencies.</td>
</tr>
<tr>
<td>National Institute for Natural Resources – INRENA (Ministry of Agriculture)</td>
<td>Monitoring and management of parks and protected areas. Responsible for studies associated with water availability and demand.</td>
</tr>
<tr>
<td>National Program for Water, Land and Watershed Management – PRONAMACHCS (Ministry of Agriculture)</td>
<td>Provides technical assistance in rural areas for small-holder farmers in the Andean region of Peru.</td>
</tr>
<tr>
<td>Sectoral Irrigation Program – PSI (Ministry of Agriculture)</td>
<td>Provides technical assistance for all irrigation activities on the Peruvian coast.</td>
</tr>
<tr>
<td>National Institute for Development – INADE (Ministry of Housing, Construction and Water supply and Sanitation)</td>
<td>Plan and provide funding for irrigation development projects</td>
</tr>
</tbody>
</table>
Table 5-1. continued

<table>
<thead>
<tr>
<th>Sector/Agency</th>
<th>Water-related Roles and Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Intendancy for Electoral Services – OSINERG (Presidential Advisory</td>
<td>Responsible for hydro-electric tariff regulation and collection</td>
</tr>
<tr>
<td>Board for Ministries)</td>
<td></td>
</tr>
<tr>
<td>National Intendancy for Water Supply and Sanitation Services – SUNASS (Presi-</td>
<td>Responsible for domestic water use tariff regulation and collection</td>
</tr>
<tr>
<td>dential Advisory Board for Ministries)</td>
<td></td>
</tr>
<tr>
<td>Meteorology and Hydrology National Service – SENAMHI (Ministry of Defense)</td>
<td>Responsible for collecting, analyzing and disseminating meteorological data upon request</td>
</tr>
<tr>
<td>National Institute for Civilian Defense – INDECI (Presidential Advisory Board</td>
<td>Prepare for and respond to natural disasters throughout the country</td>
</tr>
<tr>
<td>for Ministries)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asociación Especializada en Desarrollo Sostenible – AEDES</td>
<td>Nongovernmental Organization</td>
</tr>
<tr>
<td>(Specialized Association in Sustainable Development)</td>
<td></td>
</tr>
<tr>
<td>Agencia Agraria (Agricultural Agency)</td>
<td>Government Entity</td>
</tr>
<tr>
<td>AGRORURAL (Agricultural Technical Assistance Provider)</td>
<td>Government-funded Rural Service Provider</td>
</tr>
<tr>
<td>Administración Local de Aguas (Local Water Administration)</td>
<td>Government Entity</td>
</tr>
<tr>
<td>APCO (Organic Producer Cooperative)</td>
<td>Cooperative/Association</td>
</tr>
<tr>
<td>APROPLAME (Organic Producer Cooperative)</td>
<td>Cooperative/Association</td>
</tr>
<tr>
<td>Comunidades Campesinos (Association of Rural Communities)</td>
<td>Association with State Recognition</td>
</tr>
<tr>
<td>FONDESURCO (Micro financing Organization)</td>
<td>Nongovernmental Organization</td>
</tr>
<tr>
<td>Gobierno Regional (Department of Arequipa Regional Government)</td>
<td>Government Entity</td>
</tr>
<tr>
<td>Chococo Hidroeléctrica (Chococo Hydroelectric Plant)</td>
<td>Private Company</td>
</tr>
<tr>
<td>Instituto M.J.G. (Technical Training Center – Institute Monsignor Julio Gonzalez)</td>
<td>Government-funded Educational Center</td>
</tr>
<tr>
<td>Junta de Usuarios de La Unión - JULU (Water User Association of La Unión)</td>
<td>Association with Government Backing</td>
</tr>
<tr>
<td>Municipalidades (Municipal Governments)</td>
<td>Government Entity</td>
</tr>
<tr>
<td>SENASA (National Agricultural Health Service)</td>
<td>Government Entity</td>
</tr>
<tr>
<td>SERNANP (National Organization of State Protected Areas)</td>
<td>Government Entity</td>
</tr>
<tr>
<td>Sierra Sur (Southern Mountains Technical Assistance)</td>
<td>Nongovernmental Organization</td>
</tr>
<tr>
<td>Organization</td>
<td>Betweenness</td>
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<tr>
<td>-----------------------</td>
<td>-------------</td>
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<tr>
<td>AEDES</td>
<td>0.0554</td>
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<tr>
<td>AGENCIA AGRARIA</td>
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</tr>
<tr>
<td>AGRORURAL</td>
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<tr>
<td>ALA</td>
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<td>APCO</td>
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<td>CAMPESINOS</td>
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<td>FONDESURCO GOBIERNO</td>
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<td>HIDROELECTRICA</td>
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<td>JULU</td>
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<td>MUNICIPALIDADES</td>
<td>0.0242</td>
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<td>SENASA</td>
<td>0.0261</td>
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<tr>
<td>SERNANP</td>
<td>0.0127</td>
</tr>
<tr>
<td>SIERRA SUR</td>
<td>0.0071</td>
</tr>
</tbody>
</table>
Table 5-4. Organizational centrality measures of likelihood of communicating about policy or regulatory frameworks associated with irrigation management in La Unión

<table>
<thead>
<tr>
<th>Organization</th>
<th>Betweenness</th>
<th>Authority</th>
<th>Clique Count</th>
<th>Cognitive Expertise</th>
<th>Constraint Burt</th>
<th>Hub Centrality</th>
<th>In-Degree</th>
<th>Out-Degree</th>
<th>Potential Boundary Spanner</th>
<th>Total Degree Centrality</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEDES</td>
<td>0.0937</td>
<td>0.3892</td>
<td>4</td>
<td>0.2444</td>
<td>0.3147</td>
<td>0.4632</td>
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Table 5-7. Organizational centrality measures of likelihood of communicating about irrigation-related extension or technical assistance programs in La Unión

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<td>0.0000</td>
<td>0.0222</td>
<td>0.0000</td>
<td>0.1111</td>
</tr>
<tr>
<td>INSTITUTO MJG</td>
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<td>0.3230</td>
<td>6</td>
<td>0.2583</td>
<td>0.3208</td>
<td>0.3536</td>
<td>0.3333</td>
<td>0.3111</td>
<td>0.0531</td>
<td>0.3222</td>
</tr>
<tr>
<td>JULU</td>
<td>0.1149</td>
<td>0.1900</td>
<td>7</td>
<td>0.1000</td>
<td>0.3475</td>
<td>0.4791</td>
<td>0.1778</td>
<td>0.5111</td>
<td>0.1163</td>
<td>0.3444</td>
</tr>
<tr>
<td>MUNICIPALIDADES</td>
<td>0.0714</td>
<td>0.6619</td>
<td>7</td>
<td>0.4000</td>
<td>0.2019</td>
<td>0.2652</td>
<td>0.8000</td>
<td>0.2667</td>
<td>0.0467</td>
<td>0.5333</td>
</tr>
<tr>
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<td>1</td>
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<td>0.1333</td>
<td>0.2000</td>
<td>0.0000</td>
<td>0.1667</td>
</tr>
<tr>
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<td>0.2076</td>
<td>0.2148</td>
<td>0.6444</td>
<td>0.1556</td>
<td>0.0042</td>
<td>0.4000</td>
</tr>
<tr>
<td>SIERRA SUR</td>
<td>0.0440</td>
<td>0.2532</td>
<td>4</td>
<td>0.3111</td>
<td>0.2683</td>
<td>0.4485</td>
<td>0.2667</td>
<td>0.4889</td>
<td>0.0407</td>
<td>0.3778</td>
</tr>
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</table>
Table 5-8. Organizational centrality measures of likelihood of communicating about the quality of irrigation water in La Unión

<table>
<thead>
<tr>
<th>Organization</th>
<th>Betweenness</th>
<th>Authority</th>
<th>Clique Count</th>
<th>Cognitive Expertise</th>
<th>Constraint Burt</th>
<th>Hub Centrality</th>
<th>In-Degree</th>
<th>Out-Degree</th>
<th>Potential Boundary Spanner</th>
<th>Total Degree Centrality</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEDES</td>
<td>0.0639</td>
<td>0.3669</td>
<td>8</td>
<td>0.2000</td>
<td>0.3009</td>
<td>0.5789</td>
<td>0.4667</td>
<td>0.7111</td>
<td>0.0378</td>
<td>0.5889</td>
</tr>
<tr>
<td>AGENCIA AGRARIA</td>
<td>0.1906</td>
<td>0.6811</td>
<td>9</td>
<td>0.2667</td>
<td>0.2617</td>
<td>0.4264</td>
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<td>0.5111</td>
<td>0.0935</td>
<td>0.7111</td>
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<td>0.4704</td>
<td>0.1556</td>
<td>0.4889</td>
<td>0.0821</td>
<td>0.3222</td>
</tr>
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<td>0.2750</td>
<td>0.3300</td>
<td>0.4684</td>
<td>0.3333</td>
<td>0.4667</td>
<td>0.0148</td>
<td>0.4000</td>
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<tr>
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<td>0.3037</td>
<td>0.3125</td>
<td>0.2950</td>
<td>0.4000</td>
<td>0.3111</td>
<td>0.0243</td>
<td>0.3556</td>
</tr>
<tr>
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<td>0.0130</td>
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<td>0.3952</td>
<td>0.6607</td>
<td>0.0656</td>
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<td>0.4568</td>
<td>0.0333</td>
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<tr>
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<td>1.0000</td>
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<td>0.0111</td>
</tr>
<tr>
<td>INSTITUTO MJG</td>
<td>0.0490</td>
<td>0.3230</td>
<td>6</td>
<td>0.2583</td>
<td>0.3208</td>
<td>0.3536</td>
<td>0.3333</td>
<td>0.3111</td>
<td>0.0531</td>
<td>0.3222</td>
</tr>
<tr>
<td>JULU</td>
<td>0.1149</td>
<td>0.1900</td>
<td>7</td>
<td>0.1000</td>
<td>0.3475</td>
<td>0.4791</td>
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<tr>
<td>MUNICIPALIDADES</td>
<td>0.0714</td>
<td>0.6619</td>
<td>7</td>
<td>0.4000</td>
<td>0.2019</td>
<td>0.2652</td>
<td>0.8000</td>
<td>0.2667</td>
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<td>0.5333</td>
</tr>
<tr>
<td>SENASA</td>
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<td>0.1457</td>
<td>1</td>
<td>0.3744</td>
<td>0.2959</td>
<td>0.2821</td>
<td>0.1333</td>
<td>0.2000</td>
<td>0.0000</td>
<td>0.1667</td>
</tr>
<tr>
<td>SERNANP</td>
<td>0.0048</td>
<td>0.5811</td>
<td>4</td>
<td>0.3692</td>
<td>0.2076</td>
<td>0.2148</td>
<td>0.6444</td>
<td>0.1556</td>
<td>0.0042</td>
<td>0.4000</td>
</tr>
<tr>
<td>SIERRA SUR</td>
<td>0.0440</td>
<td>0.2532</td>
<td>4</td>
<td>0.3111</td>
<td>0.2683</td>
<td>0.4485</td>
<td>0.2667</td>
<td>0.4889</td>
<td>0.0407</td>
<td>0.3778</td>
</tr>
</tbody>
</table>
Table 5-9. Organizational relationships in general with immediate impact removal of ALA

<table>
<thead>
<tr>
<th>Name</th>
<th>Actual Rank</th>
<th>Actual Value</th>
<th>Predicted Rank</th>
<th>Predicted Value</th>
<th>Value Change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>JULU</td>
<td>1</td>
<td>0.116</td>
<td>1</td>
<td>0.119</td>
<td>2.17</td>
</tr>
<tr>
<td>Gobierno Regional</td>
<td>2</td>
<td>0.105</td>
<td>5</td>
<td>0.068</td>
<td>-35.14</td>
</tr>
<tr>
<td>Agencia Agraria</td>
<td>3</td>
<td>0.076</td>
<td>2</td>
<td>0.089</td>
<td>16.59</td>
</tr>
<tr>
<td>AgroRural</td>
<td>4</td>
<td>0.072</td>
<td>3</td>
<td>0.087</td>
<td>22.02</td>
</tr>
<tr>
<td>ALA</td>
<td>5</td>
<td>0.065</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AEDES</td>
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<td>0.055</td>
<td>4</td>
<td>0.072</td>
<td>30.34</td>
</tr>
<tr>
<td>APCO</td>
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<td>0.048</td>
<td>6</td>
<td>0.058</td>
<td>19.59</td>
</tr>
<tr>
<td>Instituto MJG</td>
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<td>7</td>
<td>0.031</td>
<td>-4.25</td>
</tr>
<tr>
<td>SENASA</td>
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<td>11</td>
<td>0.017</td>
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</tr>
<tr>
<td>Comunidades Campesinos</td>
<td>10</td>
<td>0.025</td>
<td>9</td>
<td>0.026</td>
<td>4.52</td>
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</tbody>
</table>

Note: Actual and Predicted Value columns reflect betweenness centrality measurements.

Table 5-10. Organizational relationships pertaining to policy with immediate impact removal of ALA

<table>
<thead>
<tr>
<th>Name</th>
<th>Actual Rank</th>
<th>Actual Value</th>
<th>Predicted Rank</th>
<th>Predicted Value</th>
<th>Value Change (%)</th>
</tr>
</thead>
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<tr>
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<td></td>
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<tr>
<td>AEDES</td>
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<td>0.094</td>
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<tr>
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<td>0.065</td>
<td>9.19</td>
</tr>
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<td>0.055</td>
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<td>0.032</td>
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<td>4</td>
<td>0.054</td>
<td>5.46</td>
</tr>
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<td>0.022</td>
<td>7</td>
<td>0.029</td>
<td>34.27</td>
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<td>Comunidades Campesinos</td>
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<td>8</td>
<td>0.024</td>
<td>13.64</td>
</tr>
<tr>
<td>AgroRural</td>
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<td>0.015</td>
<td>-26.15</td>
</tr>
<tr>
<td>Municipalidades</td>
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<td>0.019</td>
<td>5</td>
<td>0.032</td>
<td>68.27</td>
</tr>
</tbody>
</table>

Note: Actual and Predicted Value columns reflect betweenness centrality measurements.
Table 5-11. Stages of transition for communities in La Unión Province, Peru

<table>
<thead>
<tr>
<th>Designated Name</th>
<th>Description</th>
<th>Community Names</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete Transition</td>
<td>Adopting both political structural changes and legal/regulatory changes</td>
<td>Antabamba</td>
</tr>
<tr>
<td>Structural Transition</td>
<td>Adopting the structural changes for political organization only while keeping traditional norms</td>
<td>Huaynacotas, Alca, Tomepampa, Toro</td>
</tr>
<tr>
<td>Structural Mix</td>
<td>Adopted some structural changes but overlapped them with traditional structures while keeping traditional norms</td>
<td>Charcana, Puyca, Pampamarca</td>
</tr>
</tbody>
</table>

Table 5-12. Comparison of means for knowledge scores by village

<table>
<thead>
<tr>
<th>Village</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alca</td>
<td>0.943</td>
<td>0.055</td>
</tr>
<tr>
<td>Antabamba</td>
<td>0.571</td>
<td>0.155</td>
</tr>
<tr>
<td>Charcana</td>
<td>0.961</td>
<td>0.027</td>
</tr>
<tr>
<td>Huaynacotas</td>
<td>0.974</td>
<td>0.015</td>
</tr>
<tr>
<td>Pampamarca</td>
<td>0.931</td>
<td>0.036</td>
</tr>
<tr>
<td>Puyca</td>
<td>0.937</td>
<td>0.024</td>
</tr>
<tr>
<td>Tomepampa</td>
<td>0.857</td>
<td>0.099</td>
</tr>
<tr>
<td>Toro</td>
<td>0.964</td>
<td>0.028</td>
</tr>
<tr>
<td>Provincial Aggregate</td>
<td>0.807</td>
<td>0.261</td>
</tr>
</tbody>
</table>

Note: A score of 1 would indicate complete consensus and a score of 0 would indicate absolutely no consensus.
Table 5-13. Descriptive statistics for first factor scores by community norm agreement

<table>
<thead>
<tr>
<th>Village</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Stage of Transition</th>
<th>Hours to Cotahuasi via Public Transport</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antabamba</td>
<td>32</td>
<td>.246250</td>
<td>.1759536</td>
<td>Complete Transition</td>
<td>3.0</td>
</tr>
<tr>
<td>Charcana</td>
<td>25</td>
<td>.888000</td>
<td>.0370810</td>
<td>Structural Mix</td>
<td>4.25</td>
</tr>
<tr>
<td>Alca</td>
<td>25</td>
<td>.927600</td>
<td>.0706682</td>
<td>Structural Transition</td>
<td>1.0</td>
</tr>
<tr>
<td>Huaynacotas</td>
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<td>.962800</td>
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<td>Structural Transition</td>
<td>3.5</td>
</tr>
<tr>
<td>Pampamarca</td>
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<td>.906400</td>
<td>.0513063</td>
<td>Structural Mix</td>
<td>4.0</td>
</tr>
<tr>
<td>Puyca</td>
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<td>.901200</td>
<td>.0227889</td>
<td>Structural Mix</td>
<td>4.0</td>
</tr>
<tr>
<td>Tomepampa</td>
<td>25</td>
<td>.821600</td>
<td>.1637753</td>
<td>Structural Transition</td>
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</tr>
<tr>
<td>Toro</td>
<td>25</td>
<td>.953600</td>
<td>.0342637</td>
<td>Structural Transition</td>
<td>3.5</td>
</tr>
<tr>
<td>Total Province</td>
<td>207</td>
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</tbody>
</table>

Table 5-14. Analysis of variance between community norm agreement scores

<table>
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<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>12.208</td>
<td>7</td>
<td>1.744</td>
<td>185.584</td>
<td>.000</td>
</tr>
<tr>
<td>Within Groups</td>
<td>1.870</td>
<td>199</td>
<td>.009</td>
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<td></td>
</tr>
<tr>
<td>Total</td>
<td>14.078</td>
<td>206</td>
<td></td>
<td></td>
<td></td>
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</table>
Figure 5-1. Organizational network threshold set over 2.0 for general collaboration
Figure 5-2. Predicted organizational network threshold set over 2.0 for general collaboration after immediate impact analysis of removing ALA
Figure 5-3. Agreement on Provincial water management norms by village
Building upon the understanding gained in Chapter 5 about the institutional landscape under the New Water Law, we can now turn the focus toward the two communities where I conducted a majority of my research. Acknowledging that it would have been impossible to carry out in-depth fieldwork in every community in the Province, I selected two communities that represent the extremes of the water management strategies currently in place under the New Water Law. As I have stated earlier, Antabamba is an example of a community that is embracing these new water management systems and has committed to restructuring water distribution and land use based on the New Water Law. Charcana, on the other hand, is an example of a community that continues to observe many of their traditional water practices. Citizens there have openly contested the value of implementing the New Water Law or changing their water management strategies. They do not want to abandon what they see to be important traditional water management practices.

In this chapter, I operationalize *ayni* exchange and draw conclusions based on the correlative relationship between socio-economic relationships (Murra 1970), crop cover (Dayton-Johnson 1999), and metrics of power and authority. I use a comparative model to look at how structural and compositional variation may uncover otherwise hidden community power dynamics. Specifically, I aim to better understand: (1) the extent to which canal-level network characteristics allow us to predict successful adoption or integration of the New Water Law, and (2) the impact that adoption may have on reproducing or changing current socio-economic relationships associated with water management. I used one canal from each community to perform a quantitative social
network analysis to measure the levels of network cohesion and centralization and look at disparities in power and authority through a variety of network measures.

From these quantitative analyses of existing relationships, a series of ethnographic questions emerged, which I explored through qualitative analyses in the communities. These analyses revealed rich data about the relationships between economic and social prestige, and water access and control. As Mayer (2002:105) stated, ayni is an important resource in this setting. By using crop cover and selection as a proxy for water (Dayton-Johnson 1999) and ayni as a proxy for social capital, I was able to better understand the extent to which total power exerted to control resources within communities influences community-level economic and political parity.

Additionally, this chapter addresses the impact the New Water Law is having on gender relations at the household level. When communities begin to replace preexisting normative structures with new, state-directed policies, these new state policies may beget other regulations that need to be included in local political or judicial processes. With the New Water Law, communities have been told that they must also apply the Gender Quota Law. This piece of legislation requires that each gender be represented with at least 30% of the candidates during any political election. I describe how the administration of this law at the community level is impacting the daily lives of women who participate in these political processes.

**Social Capital and Culturally-Constructed Leveling Mechanisms**

In this section, I describe the quantitative measures derived from social networks analyses in both of the communities. Social Network Analysis (SNA) provides an effective modeling tool for uncovering micro-level interactions, and drawing conclusions about the effect of those interactions on macro-level patterns of behavior, which then
feed back into micro-level interactions (Granovetter 1973). Network analysis allows for the comparison of structural characteristics across communities, which can be used to understand variation between actors from different networks.

The criteria for inclusion in the network study were that the individual be an officially registered water user in the canal system being studied, and that they be over 18 years old. In Antabamba, this network was comprised of 42 individual users, and in Charcana, 55 users were identified as members of the network. Incidentally, no registered water users in either community were excluded due to being under the age of 18, so the rosters for each canal represent the entirety of the users with no omissions.

I chose to operationalize three preselected tie types (Burt 1983) that relate to local with the following questions in an attempt operationalize the concept ayni:

1. **Transaction Relations:** “Who in the community would you go to if you needed to borrow money?”

2. **Communication/Authority Relations:** “Who do you ask about, or hear information from, regarding irrigation turns or new rules about water access?”

4. **Instrumental Relations:**
   
   d) “Who have you asked for help with labor in agricultural work in the past 12 months?”
   
   e) “Who have you asked to borrow equipment from for agricultural work in the past 12 months?”
   
   f) “With whom have you traded seeds or products in the past 12 months?”

These questions are directly related to ayni exchanges, which has been discussed earlier to be a correlate of water management (Murra 1970). I use social network analysis of exchanges as a response to Boelens et al. (2008) call for an investigation into the local social relations embedded in Peruvian irrigation management paradigms, because they provide unique opportunities to learn about and model successful adaptive water management strategies. They contend that, “the active construction and
re-construction of ‘territory’ is inherent and key to [user’s] localization efforts but requires strategic, broad networking” (2008:62). SNA provides an effective modeling tool for uncovering micro-level interactions and helps researchers to draw conclusions about the effects of those interactions on macro-level patterns of behavior, which then feed back into micro-level interactions (Granovetter 1973). Moreover, this approach allows for comparison of structural characteristics across canals systems that can be used to understand variation between actors from different networks.

In Antabamba, it was evident that the consolidation of power between the Loayza and Bellido families is a force that is so well allied that it is difficult for other people in the community to be independent of them in terms of economically-focused relationships. Analyses of network metrics and attribute data revealed there was a statistically significant correlation between alfalfa production and effective network size in the products exchange network in Antabamba (Table 6-5). As discussed earlier, Tables 4-1 and Table 4-2 indicate that the Loayza and Bellido families combined, produce over 75% of the alfalfa in Antabamba. These results indicate that the ability to produce alfalfa is both socially and economically lucrative, thereby increasing one’s access to both financial and social capital in Antabamba. Paccha, on the other hand, does not experience this correlation between alfalfa and network size in any category (Table 6-6). Additionally, it is important to note that there were fewer numbers of isolates in the Paccha network as opposed to the Antabamba network, even though there was a higher N in the Paccha network. This shows that a higher percentage of people in the Paccha canal are embedded in socio-economic relationships in comparison to

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Antabamba. This could be an indicator of access to more resources, which can be vital in preventing or mitigating a family's vulnerability.

One of the benefits of SNA is the multiple ways to view data. One way is through the numerical statistical outputs, and the other is through the visual display of information based on these statistical outputs. For example, in the labor exchange network in Paccha (Figure 6-2), there is a clear core-periphery structure to that network. This shows that the network is centralized around a group of well-connected nodes, not just one individual. It also signals that there is peripheral group of nodes that are not well connected to the others. In the case of Paccha, many of the peripheral nodes are only connected to one or two other nodes. Contrary to what may be visually intuitive, these types of networks actually have shorter average paths between nodes, meaning they are more efficient when it comes to transmission of knowledge or material goods (Borgatti 1999). In an analysis of the core-periphery structure for labor relations in Paccha, age appears to play an important role. Figure 6-3A shows the core of the group, with the labels indicating the age of person the node represents. Figure 6-3B shows the same information, but for the periphery for the group. The average age of the core group is 45.4 years old, whereas the average age for the peripheral group is 63.3 years old. This makes sense when you take into consideration that more youthful people would be more highly connected when it comes to exchanging services that require manual labor. Therefore, the core/periphery structure of this network does not indicate centralization of power so much as it highlights the centrality of able-bodied workers in the labor exchange network.
Another interesting comparison between the structural characteristics of the networks is the amount of network closure they each have. Coleman (1988, 1990) describes network closure in relation to the risks associated with being a broker, someone who maintains connections between two otherwise disconnected parties (Burt 1992). Brokers are considered sources of unique information or resources, and can be linked with innovation (Burt 2000). Coleman (1988, 1990) contends that in certain situations, the stress that can be induced by occupying this position can be great, and the dependence of the network on a few comes with a risk. A distrust or frustration may form between those who are reliant upon the broker, and the broker him or herself.

Figure 6-1 and Figure 6-2 are visualizations of the labor exchange networks of Antabamba and Charcana, respectively. In Antabamba (Figure 6-1), we can see that there are seven individuals in the network who are dependent upon just one person with whom they can enter into labor exchanges directly. They may use that relationship to leverage other labor, but they reported only having one direct exchange relationship. Six people in Antabamba are isolates, and not part of the network. Three of these people are old and not active in agricultural production; the other three have very marginal land and were considered (for various reasons) the highly unproductive members of the community. This translates into 31% of the community either relying on one broker or not connected at all to labor exchange in Antabamba.

In Charcana on the Paccha canal (Figure 6-2), the story is different. Only three individuals have just one person with whom they can enter into labor exchange relationships, and only three of the 55 registered canal users are isolates. Thus, the percentage of users on the Paccha canal that are dependent on only a single broker or
not at all involved in labor exchanges represents only 11% of the canal. According to Coleman’s theory on network closure, this should equate to a more trusting network within the Paccha canal network in Charcana than in Antabamba. Ethnographically, I found this to be true. Although there are multiple canals in Charcana, users from Paccha and other canal systems seemed to be less suspicious of other water users than the residents in Antabamba. Through ethnographic groundtruthing, I believe that these quantitative data are reflective of community-wide perceptions. In Charcana there is little suspicion about how much water people receive, and conversations about water management and disagreements for all canals are done in public. In Antabamba, daily accusations are made about theft or bribery to get more water. Conflicts are mediated in a private setting, and decisions are never publically communicated to the larger community.

Though I believe the network characteristics to be a reflection of the trusting nature of the members of the Paccha network, causation is difficult to prove. Is the network closure responsible for the confidence and trust people have in their community members, or is the trust in one another reflected in their willingness to enter into relationships of exchange and dependence? I believe the two mutually reinforce each other.

Another factor is also influencing the relationships—the role of the historical dynamic of relationships in each of these communities cannot be understated. Antabamba is embroiled in a century-long history of power relationships dominated by the legacy of the Bellido family hacienda, and more recently, the rise of the Loayza family, whose investment in land and increasing population dominance gives them a
distinct advantage in both natural and human capital. The history of Charcana is strikingly different. The community is still physically and socially structured around the ayllu system, which considers everyone in your ayllu to be kin, to one extent or another. I do not mean to say that ayllus as a system prevent asymmetric power relations (Weismantel 2001). I do broadly agree (Podkul 2010) with Arnold and Hastorf’s (2008:226) contention that the historical narrative of the ayllu is instrumental in helping translate individual power into household power, family power, and ayllu power. I believe this is played out at the community level through reinforcing the shared control over resources and decision-making.

Part and parcel of the shared decision making in Charcana is not accepting the terms of new leadership as laid out by the government. According to the New Water Law, local water commission presidents are to serve a three-year term. In Antabamba, the new water president just began his three-year term, the same time as when the new water chiefs and distributors began their duties in Charcana. During the three-year term of the Antabamba water president, the role of water chief and distributor will have turned over at least three and more likely four or five times for each position in Charcana. Because of the onus placed on the water chief, Charcaninos expect the cargo will last anywhere from six months to one year. Although the distributors and water chiefs will have power, it will be short lived and constantly under scrutiny of the community with an associated threat of deposition.

Antabamba and the Reconstruction of Water Management

As discussed earlier, Antabamba is a relatively small community with only 43 registered water users and one irrigation canal. Four of the water users on the registry live in Cotahuasi full time and lease out the right to their fields and water every year.
Two more of these listed water users are no longer producing crops on their large fields due to their age, and are bartering their water rights in exchange for foodstuffs with other people in the community. Although Antabamba is politically an “annex” (term for a very small community that is geographically isolated) of the district of Huaynacotas, it is geographically proximate to the town of Alca, the capital of a district by the same name. Among the institutions and government agencies operating in La Unión, it is popular to associate rural, “annex” communities with later adoption of technologies and information. Yet, Antabamba is a clear example of the fallacy of this stereotype. For all of its rural and small-community characteristics, the Junta de Usuarios de La Unión (JULU) referred to Antabamba as one of the most advanced “rural” communities outside of Cotahuasi with respect to water management. With 11 districts and 48 total communities/population centers in the Province, it is important to realize that Antabamba is at the forefront of institutionalizing these changes, and therefore provides an interesting example of the effects of these changes in a rural, non-commercial agricultural setting.

**Getting Water in Antabamba**

Antabamba has a very state-like political structure to their water management, and as one Antabambino retorted, “Yeah, and like the politics in Lima, we have a corrupt politician running our organization here too.” Antabamba has a President, Vice-President, Treasurer, and Secretary. Until 2010, they had a “water chief” who was assigned the figurative role of master of ceremonies in the annual canal cleaning; he also performed rituals and pagos (payments to mother earth) for irrigators when requested. From 2005 to 2007, Antabamba experimented with re-introducing the role of water chief as distributor. The role of the distributor in water management is to let
people know who will get water in the upcoming week, and then to actual open and close the *compuertas* (gates) on the canal to redirect the water each time it needs to change direction. Each community has their own way of deciding who will be allocated water and when. Some communities, like Antabamba, irrigate by *de canto*, which is the official state model of water distribution.

*De canto* irrigation is a system in which water is distributed sequentially, moving from one field to an adjacent field. The justification for the State’s adoption of *de canto* irrigation is that it is highly efficient and equitable. As described to me by the technician from AEDES, the local NGO that has been working in the province for nearly 20 years, the alternative systems that were used previously were considered inefficient and wasteful. Of the 83% of registered water users from Antabamba that I was able to interview, everyone was in agreement that the practiced form of irrigation distribution was *de canto*. However, there was vast disagreement among people in Antabamba as to what is a more efficient mechanism for delivering water. Many people felt as though there was a waste of water because many of the fields categorized as fallow were receiving just as much water as fields growing subsistence crops, at times when subsistence crops needed to be watered more frequently than they were able to under the new system. One farmer who sharecrops on the land of a large landowner described his opinions on the efficiency of the *de canto* system to me this way:

Do we have a water crisis here in Antabamba and La Unión? Clearly. Are we suffering from a drought here? Absolutely. JULU tells us that we need to be more efficient with water distribution and that *de canto* will reduce the water we lose. I don’t think so. I’ll tell you what happens. All of those fields up there [pointing to the terraces on the side of the mountain] belong to Don Pedro, and he only uses those for pasture. How is that efficient? Why does he get as much water as I do when I need to plant maize? Do you know how often I need water when I first plant maize? Every 20 days. I
only get it every 35-40 days because the water has to pass over all of those fields every turn [irrigation cycle] before it gets here again. How is that efficient?

Within this quote, a tension emerges about what is considered inefficiency, and what is considered inequality. It may seem clear that inefficiency often refers to something being wasteful, and failing to maximize or make the best use of a resource (in this instance, water). Inequity on the other hand, often refers to something that is unfair, or unjust. These two previous words are different from a third term that is often (though mistakenly) thought of in these situations, which is “unequal”. Nothing about traditional water distribution in the Andes is “equal” (Boelens and Gelles 2005), and as I have described in Chapter 5, there is strong consensus throughout the Province that there should not be “equal” distribution of water (everyone getting the exact same amount), rather it should be equitable (proportional to size of their land).

Interestingly, in Antabamba there is an overwhelming feeling that issues of efficiency can be solved at the State level through policy. In addition to implementing changes in distribution, the state has funded various workshops over the past few years to teach techniques associated with individual water efficiency, which can be utilized in the fields of individual landholders during the planting and irrigating season. In an attempt to understand whether individual farmers were practicing these types of water conservation behavior on their own plots, I surveyed the farmers and employed spot-observation techniques (Munroe and Munroe 1971; Rogoff 1978; Flinn 1988) in the crop fields to observe actual planting and irrigating techniques. Quite often these visits ended with me being given a shovel and digging the ditches, which allowed me to fully engage in the practice, and understand the trade-offs between effort efficiency and water efficiency.
In order to understand individuals' behaviors associated with these water conservation techniques I conducted interviews about how people actually plant and irrigate their fields on an individual level. It is clear that water conservation practices do not translate to the individual even though they may be promoted at the national and provincial levels.

As early as the 1960s and 1970s, agricultural extension workers and agronomists have been funded by both the Peruvian and international governments to look specifically at the problem of food production in the Andes, where challenges of topography, land fertility, water availability, market access, and cold storage have been (and very much still are, in places like La Unión) insurmountable hurdles to efficient subsistence and market-oriented production (Brush and Guillet 1985). Since then, many recommendations have been issued to farmers and extension agents about conservation practices for farming in the Andes.¹

In 1982, a publication came out that specifically warned against the deleterious effects of the use of hatos in both livestock management and as an adapted way of irrigating (Millones 1982). Hatos is a Quechua word that is most commonly used to describe herd corrals in many Andean communities. When I heard the word used in response to my line of questioning concerned with irrigation practices, I assumed there was a miscommunication and my Quechua had been failing me. An agronomist from AEDES explained to me that they were in fact referring to planting and irrigation practices. These are called hatos as well, because the crops are strategically “corralled” in enclosed spaces. Farmers plant seeds in rows (usually, though other

¹ The reports are too numerous to cite here, but for selected bibliographies, see the country pages of any Andean country on the UN Food and Agricultural Organization, USAID, IADB or DFID websites.
configurations occur with less frequencies) and then literally make a corral around the row with earth and rock. Farmers do this in order to create an area that they can later flood when it is their turn with the water. The logic, I was told, is that they need to take advantage of every drop that is afforded to them. By flooding the fields, they can accumulate the most water on their crops with the smallest amount of loss due to run-off, which I was told is unavoidable in row cropping.

This system of planting and irrigating is considered a poor practice by agronomists and conservationists for many reasons. The first is that flooding crops, regardless of the crop and the stage in the developmental cycle of the crop, can be detrimental to plant health. It is also very important that the amount of water on the surface be monitored and distributed on a specific schedule depending on the specific crop’s needs. It can be an efficient use of water, though in the absence of an extremely level surface, it is difficult to control the depletion rates (Walker 1989), and thus there is a higher chance of water run-off and lack of a “ponding effect” on the intended area.

A survey of planting and irrigation practices in Antabamba revealed that 94.4% of those irrigators interviewed used hatos in their fields. Of that group, about 60% used hatos as their only method of irrigating, while nearly 40% of those that used hatos combined it with at least one other method of irrigating. I was told that the choice to use hatos was based on whether or not the fields were level or heavily sloped.

The alternative irrigation method in Antabamba is surcos, or row cropping. According to extension agents from the Ministry of Agriculture, row cropping is advantageous because, if done correctly, it can help diminish soil erosion, control the flow of water, and prevent over-irrigating, thus increasing water efficiency. Row
cropping comes with other advantages in this climate; it is helpful in preventing a freeze in frost-prone, high altitude parts of the Andes. Much of the technical extension work done in the area promotes the intercropping of maize and beans since this is a highly efficient combination in arid and semi-arid areas, which also helps to diversify diets and provide an increase in food security (Ofori and Stern 1987). Antabambinos told me that around 2006 and 2007 they received various workshops and technical assistance from NGOS such as AEDES and the predecessor to what is now AgroRural (which at the time was called PRONAMACH) on the benefits of row cropping.

At the time of the survey in 2010, only 36% of the farmers in Antabamba were utilizing row cropping. Of the people row cropping, only one person was exclusively using row cropping, while the rest were mixing row cropping with hatos. I asked people about their perceptions of row cropping, and received a variety of answers. Some people stated that they did not see a difference. Others maintained that they thought you used row cropping only if you were interested in producing goods for the market. A few argued that it was their right to the water, and questioned what would happen once ‘they’ (referring to other communities and the government) thought they didn’t need the water anymore. “The people in Piramarca (a community located on a cliff above Antabamba) will use that as a reason not to let any water come down to us!”

One older gentleman in the community who attended all of the workshops and practiced row cropping in his fields for two growing cycles put it bluntly:

I do not row crop because it is very exhausting. I am racing against the water as it runs into my field. I am constantly digging around each row. Digging and then damming to make sure the water doesn’t run away where it is not supposed to go. If it is just me and my wife; that is a lot of work for us. Everyone else doesn’t want to help us, they are lazy or dedicated to drinking, not hard work.
The Duopoly of Water Control in Antabamba

History’s grip on current politics of water in Antabamba cannot be understated. As discussed in Chapter 3, Antabamba’s economic, political, and social history is rooted in the (post) colonial tradition of the *hacienda* system. During the first disintegration of the *hacienda* system influenced by the Agrarian Reform of 1969, many of the haciendas in La Unión, including those in Antabamba, were divided and essentially parceled out to *hacienda* workers and community members. Many of the *hacendados* left and went to Arequipa or Lima. In Antabamba, two of the powerful *hacienda* families, the Loayzas and the Bellidos, remained in the area, working their smaller plots of land. Through a system of legal acquisition and some bartering, these two families gradually recaptured much of their land that had been redistributed during the breaking up of the *hacienda*.

One member of the Bellido family told me that the 1970s and 1980s were dedicated to reacquiring and reestablishing their agricultural property lost during the breakup.

The current patriarch of the Bellido family, Don Pedro, is an older gentleman in his mid-seventies who is considered to be the *mayorista* of the community. He singlehandedly owns a lot of land, according to the official registry of land users provided by JULU. With the wealth that he has accumulated through large-scale agricultural production, he has managed to send all of his 4 children to the city of Arequipa; three of them have completed university. In Antabamba, Don Pedro is accompanied by a caretaker who, as he puts it, has become like a member of the family. This could be because she is really the only family that Don Pedro has living in his house with him. She is in her 60s herself, and her family has since relocated to Alca and Arequipa. Don Pedro speaks about her with a special affinity and sincere tone when he describes how she is integral to his survival.
Don Pedro is an ailing man. Though only in his mid-seventies, he is suffering from nearly total hearing loss. When he does begin to move around, it is not long until you see that he too, like many of the aged population in these rural agricultural Andean communities, suffers from the pains and ailments associated with arthritis. His swollen knuckles and elbows, and edema in his feet, ankles, and legs are only the physical manifestations of the pain he is feeling. But perhaps the most painful illness from which he is suffering is rapid memory loss due to a traumatic brain injury he suffered about eight years prior to my first encounter with him. It is unclear whether he is suffering from cingulum, fornix, or hippocampal atrophy, and unfortunately it doesn't matter in Antabamba, because there is nothing that can be done about it.

As the story goes, Don Pedro was visiting a son in Arequipa and was watching a parade from the second story balcony of a house when the overloaded balcony banister gave way, allowing Don Pedro to fall 5 meters (about 15 feet) to the concrete below. Don Pedro landed headfirst on the concrete. He miraculously survived the fall, though the damage sustained to his brain was permanent. Upon his return to Antabamba, it was immediately clear that Don Pedro was not the same. Accompanied by his children, Don Pedro struggled to reassert his prowess in the community. His nephews and nieces, who still reside in Antabamba, were supportive, and for all intents and purposes assumed control of his fields.

Don Pedro has multiple households in Antabamba that are dependent upon him for access to arable land that can be used for subsistence production. It is modern day sharecropping (Goudsmit 2008), whereby residents are given permission to use his land in exchange for a certain portion of the harvest of each crop. This works to Don Pedro’s
advantage, in that he is without children, and is no longer physically capable of actually working his own land. A few of his nephews have taken on the management and day-to-day operation of the land. They own their own land, but as Don Pedro told me, they will inherit all of his land since his children have no interest in returning to Antabamba. The nephews know this, and willing obliged their “mentally ill” uncle’s requests.

The other powerful family, the Loayza family, supports Don Pedro and his nephews. They know that it is advantageous to collaborate with Don Pedro, since he is the largest individual landholder in Antabamba. Because of this, he has a wealth of crops that he can trade, as well as more regular turns with water that he “unofficially” shares with the Loayza family. Table 6-1 shows the Degree Centrality scores pertaining to the relationships between water users based on barter for seed and products. Don Pedro has the highest Out-Degree score (120.000), and the 5th smallest In-Degree score (45.000). This tells us that Don Pedro trades crops away to many different people, but does not receive crops from many different individuals. This was explained to me as a function of that fact that Don Pedro would rather have people work for him in faenas or on his fields, as opposed to get their crops that he doesn’t need.

In contrast, the Loayza families, who have the next highest six Out Degree scores, seem to engage in a much more equal pattern of trade than Don Pedro. The variety and quality of the crops produced by the Loayza family makes engaging with them extremely attractive, if not necessary, depending on your personal crop variety and production. Sr. Juan, who has the highest In-degree score in the community for trading and bartering, told me that it would be impossible for his family to afford to buy all of the crops they need. Sr. Juan and his wife have three children who all attend school in Alca
and, unlike most families, have no reserve of dehydrated potatoes, grains, or beans to rely upon. Clearly, they are a very vulnerable family when it comes to food security.

The politics and practicality of arguing with anyone from the Loayza family over water allocation and alleging inequity in access are a dangerous affairs for community members in similar positions to Juan and his family.

Though individually they do not own nearly as much land as Don Pedro, Loayza family members own many larger plots of land and represent a large voting bloc in the community, which is important in the new water system. Herein lays the true power of the Loayza family. The 11 Loayza family landholders, in conjunction with Don Pedro, own 19.89 hectares of the total 45.05 hectares of agricultural land in Antabamba. This means that just 29% of the population owns 45% of the land.

According to the New Water Law, every registered water user is allowed one vote in general elections germane to water management in their community (Republic of Peru 2009). Just in sheer numbers, the Loayza and Bellido families have a distinct advantage. Not only does at least one person in a Bellido or Loayza household appear on the water user registry, but in some cases, as with a few of the older Loayza brothers, their wives have land in their own names, and therefore appear on the water user registry. In essence, this doubles the votes for one household. Although they do not create half of the voting bloc, giving them an automatic majority, they compose a quarter of the voting population (26.2%) of the registered users. In addition, there is the Bellido family, which comprises another 14.3% of the voting population. These two families therefore comprise just over 40% of the total water user voting population in Antabamba. When you consider the additional influence these families wield with
respect to land they allocate to others through sharecropping, and the dependence that people like Juan and his family have on these bartering relationships, their influence and control over community politics and dynamics increases dramatically.

It is no secret that traditionally, the powerful roles of water chief were alternated between people from the Bellido and Loayza families. Everyone acknowledged that it was part of their cargo (community obligation) to serve this role since they were the mayoristas in the community. This creates a history of two family rule; a duopoly of water management that has unintentionally positioned the two families to continue with their consolidated control of water in Antabamba even under the new, “equitable” and “democratic” system. With a large number of voters, the majority of arable land in their ownership, the majority of agricultural equipment in their ownership (Table 4-2) and a stronghold on the local bartering system (Table 6-1), there is little reason to believe that the implementation of the new law will wrest control from the Loayza and Bellido families. In fact, qualitative evidence from the first year of implementation indicates that the new law is being co-opted by the Loayza family to control resource use in Antabamba.

Perceptions of the New Water Management Law in Antabamba

To understand community perceptions and reactions to the new water, I held three focus groups with community members where I asked them to express their hopes, concerns and predicted long-term prognosis for the impacts of the new water law in Antabamba.

Although it is clear there are two distinct groups in Antabamba – the Bellido and Loayza families, and then everyone else – there is a more diverse perception of the new water law that does not follow these simple divisions. The most visible split in
Antabamba is that between the younger and older populations. It seems as though the enactment of the new law has breathed a sense of change and “progress” into the younger population, and the changes they hope for under the new law are palpable.

The demographics of registered water users in Antabamba are skewed in such a way that nearly two-thirds of the users are over 50 years old. When I refer to a “younger” population, I am speaking about the five registered water users under 40 years old, and various other residents in their twenties and thirties who one day will also appear on the water user registry by way of inheritance of land. Their hope is that in light of the increasing droughts, this perceived increased efficiency and management of water would help reduce the felt impact of such climatic events. Another important aspiration was to more easily resolve conflicts with neighboring communities, namely Piramarca, with whom there are on-going arguments over water access. Prior to the New Law of Hydraulic Resources in 2009, conflicts between water users in Antabamba and Piramarca were handled at the individual, community, and then eventually the provincial level.

If a user in Antabamba thought that (s)he was not receiving water they should be during their irrigation turn because there was an insufficient amount coming from Piramarca, the cheated user would file a complaint to the water chief, who was supposed to take up the issue with the water chief of Piramarca on that person’s behalf. Quite often the water user was responsible for hiking the steep two and one-half hours climb up to Piramarca, and then spend the time to find the person who was responsible for irrigating the same day that the particular user in Antabamba was irrigating. This was a daunting task, and unless you were extremely well liked and the person who was
irrigating that day in Piramarca was extremely disliked, very few residents of the small village of Piramarca were inclined to divulge the name of a water user. I was told by residents in Piramarca that revealing a name and “playing along” communicated that: a) there was an acknowledgement that misuse of water may have occurred in Piramarca, and b) they should base their water usage off the demands of users in Antabamba.

Clearly, the personal approach was neither worth the time or the effort for residents in Antabamba. The water chief was often met with similar resistance, though he was usually shuffled off to his counterpart in Piramarca. Many previous water chiefs in Antabamba told me that often the two would discuss their agreed-upon norms for water management, and how they thought the agreements were being violated, and ask for compensation (which apparently was never paid by either party). Eventually the community, including the water chief, would file a joint complaint to JULU about the violations of Piramarca to their signed and binding agreement regarding the rules of water allocation. The two water chiefs were brought together and one specific issue would be discussed. If the president of JULU thought an act was in violation, then the offending water group had to pay a fine. If the president of JULU did not find the action to be in violation of the agreement, or worthy of a fine, the parties were encouraged to discuss how they could prevent future conflicts.

Conflict resolution seemed to be the most important and apparent concern on the minds of water users in Antabamba, and the one universal hope the new law would address, regardless of the age of the community member. Through utilization of the IAD framework (Chapter 5) it is possible to look at what happens in these conflict negotiation settings at the local level. Ostrom ([1990] 2007) in her California water
management example shows how dialogue is extremely important in the conflict resolution process, and that the lack of institutional space for dialogue can have damaging effects on the conflict resolution process. The reduction of what Adams et al. (2003) call a 'cognitive conflict' into a specific, judicable issue defies the very essence of the grievance being brought to the conflict resolvers. Adams et al. (2003) explain how the empirical knowledge and understanding of an issue (in this case, the specific incident being argued in front of the JULU president) is operating in an often misunderstood realm that fails to take into consideration the larger cultural, legal and informal knowledge influences on how each side is cognizing their problem. In the case of these conflicts pertinent to Antabamba, each community is operating under their own community rules for water management, which in Antabamba are very different than in the rest of the communities in La Unión Province. I would agree with Adams et al. in that the underlying issues precipitating these regularly occurring conflicts are disagreements at the cognitive level, and the old institutional framework did not include space for this level of "conflict" to be resolved.

It is no wonder then that the whole community is hoping and believing that by codifying the rules of water management, as well as the penalties for breaking the rules, there will be fewer occurrences of water shortages in Antabamba. It is difficult to predict how successful the new law will be in meeting this expectation, and as of yet the government still has not installed the local ALA official who will be responsible for resolving conflicts pertaining to the new law. The implementation of the law may change water practices in Piramarca and positively impact the overall water availability in Antabamba. This might divert the blame for lack of water away from Piramarca and
reduce conflict between the two groups. Consequently it may cause Antabambinos to become more cognizant of the disparities between water distributions within their own community, and exacerbate the divide among water users in Antabamba. Empirically based models show that when this happens, endogenously created rules systems once again take precedence (Carpenter 2000), leaving the Loayzas and the Bellidos in control once again, regardless of what Peruvian Government’s Law No. 29338 states.

The Resistance to Changing Water Management Practices in Charcana

The written and recorded colonial history of Charcana states was politically and economically part of the Department of Ayacucho, not Arequipa. During the revolt in 1834-1835, Charcana separated from Ayacucho and became part of the Province of La Unión and Department of Arequipa. What is arguably even more important in respect to water management is the pre-colonial history of Charcana.

The history of water management in Charcana is one less beset with hacendados and exclusive families as it is with conflict at the neighborhood level. Very little archaeology has been conducted in the Charcana district, leaving the estimates of the time of human settlement in the region up for debate. Through the minimal material culture available and trade routes identified by satellite imagery, it is clear that populations were settled in Charcana at least as early as the Huari period (Jennings 2003).

Myths and the Power of Water

The folk history of the area describes a story of water conflict, and the settling of the district inclusive of present day community settlement is a result of these water conflicts. The legend states that on the two points that extend out eastward and westward to the canyon’s edge were the apus (mountain spirits) of Umaccacha and
Aemaraes. These *apus* became embroiled in a fierce battle over water. The scars of this battle can supposedly still be seen on the landscape today in the contours of the *quebradas* (ravines) that run from the mountain springs down to the *ayllus* of what is present-day Charcana. In the end, the Eastern *apu* Umaccacha was victorious, and with this victory was able to reroute the river that now runs directly below the archaeological site of the former village of Umaccacha. Not only did the victor win rights to the water, but also Aemaraes was expelled from Charcana and sent across the ridge to another mountain. The final stop for Aemaraes was the present-day annex of Andamarca. To this day there is a stigma about the residents of Andamarca and their unbridled penchant for violence. On one trip to Charcana from Cotahuasi we made an extended stop in Andamarca because the festival for their patron saint was blocking the road that passes through town. During our unplanned detour I witnessed a tradition that is rare in this part of the Andes. Four men and four women were selected to ride horses around the central plaza swinging chickens by their necks. On the ground were people running between the horses serving *chicha* to the participants. When I arrived to Charcana I explained to my hosts what I had just seen and was met with laughs.

You have to be careful down there! You did not get off of the combi, did you? They are savages! Today is their patron saint party and they ride around on horses swinging the chickens to remind everyone how vicious they are. The people from Andamarca express the anger and hatred still present in the land that Aemaraes was sent to. They are the warriors and we are the pacifists. We are descendants of those who won the water; they are the descendants of the losers. Take much care when dealing with people from Andamarca.

This reminder of the preciousness of water is omnipresent in Charcana. Though not nearly as desiccated as other communities, such as Antabamba, the restricted
access to outside goods, relative isolation, and much larger population dependent upon these resources requires that water be managed carefully.

**Getting Water in Charcana**

As discussed earlier, the physical distance of Charcana to the provincial capital of Cotahuasi has always rendered Charcana more independent from the State control system. Charcana is structured differently than Antabamba in that there are multiple irrigation groups defined by geographic sectors as opposed to one irrigation association for the entire community. Although it is officially recognized by JULU as the Charcana Irrigation Commission (*Comisión de regantes de Charcana*), there are four water committees divided and grouped by canal and water source. This is a very important distinction. Conclusions drawn in Antabamba can be extrapolated to the community level, since there is only one canal in the community. The four (canals of Charcana do not divide the community equally. Rather it is common for people to own land on multiple canals. The choice to investigate only one of the canals was based on the realistic ability to conduct interviews with users. As social network analysis and ethnographic interviews require large commitments of time from the interviewee. It became clear that requesting multiple hour-long network interviews and conducting multiple field visits and open-ended interviews with the same person would create respondent fatigue. Logistically, the geographic expanse of these canal locations makes it impossible to work with all of the irrigation committees. For these reasons, one canal was the focus in Charcana. The Paccha canal represents the largest canal system in the community, and requires the most labor for maintenance and functionality. Some of the other canal systems, such as Concha, have as few as 12 users, which is hardly enough to understand the social structure associated with sharing a canal.
Paccha is a 55 member water committee with fields located just above the village and includes users from both urinsaya and aransaya ayllus: Humara and Supalta. The committee of Paccha has one elected repartidor – water distributor. The role of the repartidor is to receive requests from users, make decisions about who will receive water, and resolve any disputes that arise between Paccha users only. There is no specific water chief for Paccha, but there are two water chiefs in Charcana: one for the ayllu of Humara, and one for the ayllu of Supalta. The Paccha network has the Supalta water chief as an irrigator, and this has caused some controversy, which I will discuss later in the chapter. As for political organization, that is the extent to which Paccha canal is bureaucratically organized.

As every water user will tell you, being the repartidor is not the most enjoyable position to be in for six months or a year, but it is a cargo, a community responsibility, that every land owner with more than three topos (the standard in Charcana) in any given canal system must fulfill. It is often the case that there are a limited number of people with three topos or more in each canal system. Therefore there is often a request for volunteers. Rarely is someone immediately willing to volunteer. The job is demanding. You must be present every Sunday (with the exception of the rainy season) to handle requests for water. Many who have served in this role before reported that the amount of effort this cargo requires is taxing. You need to make yourself available to users who may have problems while irrigating, and you have to settle conflicts within the canal group. Keeping a detailed record of everyone’s assigned water right is very important should a conflict arise - which one inevitably does on a weekly basis.
Probably the most grueling of all of the responsibilities is that of maintaining the canal and reservoir. The reservoir for the Paccha canal is located at 4600 meters above sea level, and about 1150 meters above the village of Charcana. The contour of the land is steep, rocky, and covered with spiny cacti. The reservoir sits on the relatively flat puna (high altitude montane grassland and shrubland biome) above the fields pertaining to Paccha. The alpine spring that fills this reservoir every evening is located another 3 kilometers to the east. Every morning and every evening, the repartidor is supposed to walk up to the tank and make sure it is properly filled at the beginning of the morning and properly plugged in the evening (Figure 6-2, Figure 6-3, Figure 6-4). Any farmer that failed to properly close the reservoir in the evening had to pay a fine. Additionally the repartidor was supposed to be responsible for going to each chacra and telling the farmer when their irrigation turn was beginning and ending. These types of visits were few and far between, with the repartidor telling me that his hikes up to the reservoir twice a day sufficed for fulfilling his duties.

The current repartidor for Paccha canal often complained of his inability to travel to Cotahuasi and Arequipa on the weekends and holidays. He cited having to be available every Sunday morning as the main reason. Because he was also a teacher at the local primary school, he was obligated to be in Charcana throughout the week, and therefore the weekends were his only chance to travel outside of Charcana. He also confessed that some days he was unable to go up to the reservoir to check on the water. He did compliment the committee for their generous donation to his family’s food supply. In Charcana, it is considered polite to provide some of your harvest to the repartidor in recognition of the sacrifice they made from tending to their own fields to support the
production of everyone else on the committee. He also commented that from holding this position he had learned about the people in the community better than he had before.

When you are distributor you see the best sides of the people of Charcana and you see the worst sides of the people. You see them when they are honest and gracious, and then you see them when they are lying and trying to cheat their neighbor out of water. I did not realize how much I would learn about everyone. My friends argue with me and sometimes they get mad at me and don’t want to talk to me anymore. I know I have to do this job, but I don’t like it.

Upon my return to Charcana after being away for six months, I learned that Don Juan, the repartidor during my prior visit to Charcana, had been asked to step down from his position. This dishonorable discharge from service was described to me as a punishment for not fulfilling his cargo to the community. Unlike in Antabamba, Charcaninos have no problem dislodging someone from a powerful position if they feel there is an injustice or a person is incapable of dutifully fulfilling their role. There is a famous saying in Quechua that dates back to Incan times and is still used today to describe the core values associated with rural Andean ideals. “Ama sua, ama llulla, ama quella” (Don’t steal, don’t lie, don’t be lazy). I was told that Don Juan violated all three of those codes and needed to be removed. This was told to me tongue in cheek, but the sentiment that Don Juan was not working hard enough for others was clear.

Perceptions of Water Law in Charcana

Charcaninos are nothing if not proud. Until 5 years ago, they was no option other than walking a grueling eight to ten hours just to get to the Provincial capital of Cotahuasi for basic supplies such as vegetables, gas, batteries, tools and clothing. Even when the road was built, it was primary funded through former residents of Charcana who now live in other places such as Arequipa or Lima, and as far away as
the United States and France. Though most of the labor and planning was completed by non-Charcaninos, local residents pride themselves on having provided labor where they could, hosting the workers, and providing them with food and *chicha*.

Upon returning from Cotahuasi with the law, Don Julio (the president and coordinator of all of the minor canal organizations in the community) held a meeting where he, much like Sr. Yohn in Antabamba, read aloud the new law, from front to back. The differences in discourse, and reactions to the new law between Charcana and Antabamba, were striking. Whereas in Antabamba there seemed to be a silent acceptance of the new law, with the only arguments predicated on the interpretation of certain passages of the law, Charcana voiced outright objection.

As in Antabamba, I held three focus groups with irrigators in Charcana. I was able to parse out what some of these objections were based upon, and some of the residents even provided solutions as to how they might best be able to incorporate some of the *de jure* principles with *de facto* practices currently embedded in the water management practices. There were many objections that certain individuals had to specific aspects of the law, but four common demurrals emerged.

The first was with regard to the general idea of the government intruding on local politics and natural resource management. Specifically, concern was voiced over how conflicts were to be resolved. I was told that although it is always difficult to resolve conflicts locally about rights to undeveloped springs (those that have not gone through a process of canalization), there was doubt that the government could create better solutions than the community members themselves. Conflicts are handled locally, and the term “logical” was used in describing how decisions are made. The government, I
was told to a roar of laughter, was incapable of making logical decisions. The reasoning behind this statement is that the government doesn’t know the local dynamics, who already has access to other sources, and who, by virtue of their kin networks, has rights to these resources. Furthermore, there is a fear that any conflicts between the community and an outside entity such as a mining company would be decided in favor of the mining company, and leave the local populations with little recourse. Many people cited the case of a mining company operating in the high plateau above the community of Huaynacotas. Although the case was elevated to attention of the Provincial government and the regional director for the Cotahuasi ANP, the communities were told that the mining company had the rights to the water and the community legally needed to respect those rights. The report of the environmental impact assessment was officially still in process, but the communities believed that it would never be published. Charcaninos looked to this case as the precedent for how conflicts at this level are managed.

Another concern is the adoption of what is known as the *de canto* irrigation style. As described in Chapter 3, this is a type of water distribution organization that is based on a physical geography model, and reduces the amount of decision-making as to who is entitled to water, and when. Charcana has a weekend “ritual” of meeting every Sunday morning at 8:00 am in the plaza to decide publically who will receive water the upcoming week. The water chiefs and distributors have notebooks, and the district water president oversees all of the distributions and assists in any conflicts. It is dramatic, cutthroat and fierce. Depending on how far into the growing cycle a crop is, the irrigator may or may not need water that week. These are decisions made
collectively by both irrigators and authorities. Within the distributor’s notebook is a registry of who is growing what crops, and when they last received water. Decisions are then made for the upcoming week based on consultation with irrigation records in the notebook and the strength of oral arguments. There is only one steadfast rule: If you or, a proxy, does not attend the meeting, you will not be able to ask for it later. The *de canto* system, by contrast, basically eliminates decision making from the equation.

One of the eight “design principles” that Ostrom lays out in her Common Pool Resource Institutions work is collective-choice arrangements that allow most resource appropriators to participate in the decision-making process” (Ostrom [1990] 2007:93). The shift to a *de canto* system gives control to a nameless, faceless, and unaccountable entity that cannot be negotiated with. Many irrigators told me that if they did adopt some of the government’s changes, this would not be one of them. In the focus group Don Abelino discussed the role of user’s knowledge of water demands.

*We know what products need water and when they need it. I need more water for alfalfa and maize when I have just planted it. The users of the canal decide who can begin to plant their crops. Depending on their crops, we decide who gets the water. We cannot all plant maize at the same time, so the timing of water turns is based on the crop cycle.*

This is what the *de canto* system cannot take into consideration. These decisions are also based on individual need. Some people have higher altitude fields, which require them to plant seeds later in the rotation than people located at or below the village center. I was told that flexibility was key to agricultural success and the rigidity of the *de canto* system is not a logical way to distribute water.

Finally, the ideological opposition to paying the national government to use water angered users in Charcana much more so than users in Antabamba. Residents of Antabamba, though not happy about increases in tariffs for water use, did eventually
pay the tariffs. In Charcana, there was outrage at the increase in the tariffs and the apparent lack of services offered by the State. Article 105 of the New Law states that private companies involved in infrastructure projects must allow local and indigenous communities some of the benefits of the projects (Republic of Peru 2009:11). As far as who will be responsible for the labor and equipment at the local level, there is no mention of State or private involvement. This omission from the law has been explained by ALA representatives in the Province to mean that local maintenance projects will need to be financed and operated using local funds and local labor. In protest to what the irrigators of Charcana see as a tax being paid for nothing in return, the water commission of Charcana, at the time of writing had not paid its water tariffs. Charcaninos continue to wait in suspense as to what repercussions they will face for their failure to comply. Many in the community speculate that nothing will result and they will be left alone. Authorities in Cotahuasi, however, are preparing residents to spend a year with blocked canals and municipal funding shortages, in areas such as funds to run the school, and reductions in welfare programs such as “Vaso de Leche” (food program for children and the elderly) and payments to non-laboring elders in the community.

**The Unintended Consequences of Gender Redistribution Policies**

Law 00268/2011-JNE, known as the Gender Quota Law, has been ratified by the Peruvian Congress, making gender representation mandatory in all electoral events at all levels of government (Diario Correo 2011). Ostensibly, this seems like a great idea. With a minimum requirement of 30% representation for each gender, the law is “therefore closely linked to respect for political rights of women, which seeks to ensure their political participation and representation without discrimination” (00268/2011-JNE).
The application of this law in Peru has been met with general approval by international organizations and scholars (Schmidt 2003). The thorough implementation of this law has successfully reached even some of the most rural communities in the Province, thanks in part to work of the Jurado Nacional de Elecciones (JNE – National Election Jury) and local NGOs like AEDES. This quota system has been implemented on such a micro level that even water commissions and community user groups are incorporating this principle.

What is different about being on a local water committee versus being in the national or departmental level congresses is that it is not remunerated, and not held in high esteem. Though the water chief is seen as a position of prestige, being a member of the recently formed water committees and commissions is not. It is a bureaucratic position that entails a commitment of time and effort with little reward. Furthermore, there are decisions being made that affect the entire community, and making a wrong decision can turn the community against you.

In Antabamba the process was fairly easy in recruiting women to run in the water board elections. Two women from the Loayza family were nominated, and one was elected to serve. When I asked about other women that have run for positions in the past, I was told that it was always women from the Loayza family that are nominated. This is consistent with the family’s political dominance. In Charcana however, the willingness to even be nominated for these positions is minimal.

In March of 2010, at the request of the central water commission, Charcana finally held its mandated water commission elections. At this meeting, the principles of the Gender Quota Law were applied and although it was hard enough to get males to
volunteer, it was even more difficult to get women to volunteer. Men were cajoled into participating through arguments of based on duty and responsibility to the community. In order to persuade women to participate, to ensure legal validation of the election men, were telling them that this too was a cargo, and that it was their responsibility to the community as well. One woman eventually volunteered. With a total of six positions that needed to be filled, the elections required at least one more female candidate to meet the minimum quota of 30% of the candidates.

In what seemed like a playful gesture at the time, a man finally grabbed a woman in the front who had apparently been known for being vocal in meetings and literally dragged her up to the table. Everyone was laughing, some women nervously, but clearly relieved that this process could be completed. The elections were held, and the only contested position was that of Treasurer. This meant that everyone else was elected to their position, including the two women who now comprised one third of the commission council.

Upon returning to Charcana a year and a half later, I spoke to Don Julio, the president of the water commission and asked him how everything was going. Don Julio was not a native Charcanino. Again, these were not the positions of water chief or distributor. The position of president was viewed as a chore, and the not-so-popular Charcana transplant that married into a sizable amount of land was coerced to be President. His relationship with the community was tenuous, and though he liked to think he was in a position of honor, he was realizing that he might have been set up for disaster in this tenure that includes the implementation of the new water law.
Don Julio mentioned that the new system was slow to be adopted and the commission was not functioning well. He cited community resistance to many of the new rules, including the payment of tariffs as one of the reasons the new system was not being implemented. He then started into how the commission council was dysfunctional and unable to make any decisions. When I asked what happened, he explained that the council members were lazy, and dedicated to other things. He specific mentioned the women, and stated that they simply stopped coming to meetings, and that they did not take their responsibility to the council seriously. It turns out that Don Julio was correct about the women not attending meetings anymore, but he was incorrect about why.

In a conversation with a female key informant in Charcana, I was told the real reason why the woman stopped attending the meetings. It turns out the influential factor in their decision to no longer attend the meeting was “la mano dura.” La mano dura (“the heavy hand”) is a euphemism used in the village for domestic violence. From what I was told, the husbands were discouraging the women from participating in the councils. This, I was told, was a consequence of the defined roles of woman and men. The public sphere (politics, social gatherings) is the male domain, and the private sphere (the home) is the woman’s domain.

Much of the literature on Andean concepts of gender complementarity (Harris 1978, 1980; Spedding 1997), suggests there was a balance of power, though to use the term “complementarity” seems incorrect. In an adapted fashion, I utilized Kabeer’s social relations framework regarding access and control to resources (1994). This seemed most suitable in that social relations clearly determine people’s roles, rights,
responsibilities and claims over others. Furthermore, the council (read ‘institution’) and the new requirements were actually working to reproduce and maintain social inequalities. Although women were participating, they were not actively engaged in rule making or resource allocation decisions. The gender-redistributive policies of the Gender Quota Law were aimed at incorporating and empowering women in the political arena. They may have been effective in meeting that goal. On the other hand the consequences of this policy seem to have disempowering and negative effects on the lives of woman, and their well-being.

Not only are women victims of violence due to their political participation, they are publicly ridiculed and blamed for any dysfunction of the water council. In Charcana, it is customary not to make any decisions without at least 50% of the group members present. Although this is not clearly stated in the New Law of Hydraulic Resources, it is a community policy, and therefore applied to the new water council as well. Due to the fact that women represented 33% of the council, and their absence was almost guaranteed, making decisions that could be official would require every other member to be physically present. It is not uncommon for people in Charcana to have obligations in their fields, be traveling to Cotahuasi, or, unfortunately, be in such a state of inebriation that they cannot attend meetings. More often than not, only 50% (three members) or less of the council would be present. This lack of ability to officially make decisions was the dysfunction to which Don Julio referred. The council’s belief was that it was the fault of the women, who had the poorest cumulative attendance at these meetings.
The blame placed upon these women makes them the target of public ridicule, and an outcry for their resignation is voiced at every meeting. Now women are suffering in both the public and private domains of their lives. At the macro level, the Gender Quota Law appears to be a success, and the fact that it is even discussed and implemented at the local level is a testament to the work on behalf of the government and NGOs. However, complacency with successful dissemination of policy is an injustice to the true spirit behind the law.

**Summary**

Charcana and Antabamba are two very different communities, with two very different sets of physical, political and economic histories and characteristics. Charcana is a multi-sourced irrigation community, while Antabamba is single-sourced community. *Ayni* in Antabamba is much more predicated on *voluntad* and *m’inka* (asymmetrical) exchange compared to Charcana where most of the exchanges are *waje-waje* (symmetrical). However, these two communities share the fact that they are in a process of change.

Through an analysis of canal-based *ayni* exchanges, results indicate that there is dominance in Antabamba by two major families, which is not the case in the canal system analyzed in Charcana. The centralization exhibited in the canal analysis in Antabamba indicates a power vacuum; where-as the canal in Charcana does not appear to exhibit these characteristics. It is important here to reflect on the influence of various water sources in Charcana as opposed to Antabamba. This may be affecting the network centralization measures, however community-wide ethnographic follow-up indicated that sentiments of resentment and resource dominance were pervasive against central family members in Antabamba. In Charcana, there was less concern
about the central network figures controlling resources or dominating the community. Although a direct comparison between the network structures of both communities in their entirety cannot be made, the benefits of uncovering these social and economic hierarchies directly me to key individuals and themes to focus on in the ethnographic follow-up.

The uncovering of the dominance of two families in Antabamba is pivotal for understanding how the new law is being communicated and implemented differently than in Charcana. The state believes that the message is being communicated the same throughout the communities of La Unión, however evidence indicates that this is not the case. Where there are multiple canals, more people are directly involved in information dissemination and policy implementation. This functions as a check and balances on the information that is being provided to other community members. In Antabamba, the information is funneled through one person, the president of the water commission, whom we can presume is a member of one of the two dominant families. As the sole mouthpiece for the new law, and literally the only owner of a hard copy version of the law in the community, this person can control what parts of the law are communicated and incorporated, and how exactly they will be implemented.

Additionally, the communities have very different political structures. Antabamba, which has structured their political water authorities around the state model, have a highly centralized internal organization with only four people from the whole community active in water management. In Charcana, due to the use of water chiefs, distributors, in addition to the new political structure they have 12 people involved in water
management decisions, thereby incorporating more people, shifting from a top-down decision making process to a lateral and more democratic decision making process.

This chapter also demonstrates one of the most disturbing and underpublicized unintended consequences in the application of the new law. Women have found themselves in particularly difficult positions with regard to the new water law. The Law of Inclusion, meant to promote and increase participation of women in all democratic election processes, is having a negative effect on women in some of the rural communities just beginning to implement the new law. By placing women in a position of public authority, many of their husbands are dismayed at this newly acquired power and act violently towards their wives. Aside from the obvious disadvantages to the women involved in these predicaments, it is having a negative effect on the efficacy of the new law in rural communities. With women refusing to participate in the meetings, many issues are unresolved, and thus the new law is seen as ineffective.

I suggest that rigorous evaluations of the impacts of these gender-redistributive policies be more closely investigated at the household level. These situations are not direct results of the New Law of Hydraulic Resources, but rather the convergence of many policies handed down from the national level that forego taking into consideration the realities on the ground. Furthermore, the lack of gender sensitization programs that accompany these directives are essentially an unexplained shock to the local sociocultural system, and if Charcana has made one thing clear, they are not interested in blindly adopting new state policies that are not consistent with the internal logic of the community.
Table 6-1. Antabamba freeman degree centrality for product and seed exchange

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Table 6.5. Correlation between attributes of irrigator and Burt’s effective network size in Antabamba

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Notes: **Correlation is significant at the 0.01 level (2-tailed)  *Correlation is significant at the 0.05 level (2-tailed).
Table 6-6. Correlation between attributes of irrigator and Burt’s effective network size in Charcana (Paccha canal)

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<td>.289*</td>
<td>.203</td>
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<td>Sig. (2-tailed)</td>
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<td>Sig. (2-tailed)</td>
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Notes: ** Correlation is significant at the 0.01 level (2-tailed)  *Correlation is significant at the 0.05 level (2-tailed)
Figure 6-1. Antabamba network for labor reciprocity

Notes: Nodes scaled by degree centrality; Triangles = Men, Circles = women; Blue = landowners, Red = land renters, Black = rent and own, Gray = undefined, ○ = member of Loayza or Bellido family; line thickness is relative to strength of relationship (thicker = stronger tie)
Figure 6-2. Paccha canal (Charcana) network for labor reciprocity

Notes: Nodes sized by degree centrality; Triangles = Men, Circles = women; Blue = landowners, Red = land renters, Gray = undefined; line thickness is relative to strength of relationship (thicker = stronger tie)
Figure 6-3. Visualizations of core and periphery networks from Paccha canal (Charcana) labor exchange network. A) Core network members, and B) Periphery network members (Note: labels = age; sex: triangles = men, circles = women; property rights: blue = owns land, red = rents land, gray = unknown)
Figure 6-4. Antabamba network for equipment exchange

Notes: Nodes scaled by degree centrality; Triangles = Men, Circles = women; Blue = landowners, Red = land renters, Black = rent and own, Gray = undefined, ○ = member of Loayza or Bellido family; line thickness is relative to strength of relationship (thicker = stronger tie)
Figure 6-5. Paccha canal (Charcana) network for equipment exchange

Notes: Nodes sized by degree centrality; Triangles = Men, Circles = women; Blue = landowners, Red = land renters, Gray = undefined; line thickness is relative to strength of relationship (thicker = stronger tie)
Figure 6-6. Antabamba network for product and seed exchange

Notes: Nodes scaled by degree centrality; Triangles = Men, Circles = women; Blue = landowners, Red = land renters, Black = rent and own, Gray = undefined, ● = member of Loayza or Bellido family; line thickness is relative to strength of relationship (thicker = stronger tie)
Figure 6-7. Paccha canal (Charcana) network for product and seed exchange

Notes: Nodes sized by degree centrality; Triangles = Men, Circles = women; Blue = landowners, Red = land renters, Gray = undefined; line thickness is relative to strength of relationship (thicker = stronger tie)
Figure 6-8. Paccha canal system reservoir tank with source stream (Photo: Timothy Podkul)
Figure 6-9. Long wooden pole with an old pair of pants wrapped around it used as a stopper for the Paccha tank (Photo: Timothy Podkul)
Figure 6-10. Demonstration of stopper utilization in the Paccha canal to prevent water exiting tank and entering canal (Photo: Timothy Podkul)
CHAPTER 7
FIESTA DE AGUA AND THE ROLE OF RITUAL IN WATER MANAGEMENT

Ritual has often been considered to be one of the most universalizing aspects of human existence, and a cornerstone for anthropological inquiry since the 1800s (Lévi-Strauss 1963; Turner 1969; Alexander et al. 2006). Roger Rasnake (1988:220) wrote about ritual in the Andes, concluding, “communication of deeply held values and of ideas about the order of things is accomplished by preference in ritual acts – that is, in symbolic action and not verbally.” The preeminent Andean anthropologist Billie Jean Isbell stated that ritual in the Andes a “process of ‘reminding’ or of reinforcing certain values, concepts, and beliefs is often accomplished through the use of dominant symbols that reappear in different ritual contexts” (Isbell 1985:137-138). Generally speaking, water rituals in the Andes can take many shapes. In some communities they can be incorporated into daily rituals; in others they may be punctuated activities throughout the year (Gelles 2010).

By focusing this chapter on rituals associated with water management, I intend to demonstrate that there are growing tensions associated with changing resources management practices. Water is deeply engrained in the culture of residents of La Unión. The rituals described below are intended to show that they are acts intended to have lasting and objectified impacts on the outside forces exacting their influence on family and community life. Specific attention is paid to the role of family in the three different rituals, as well as the role of the state and local political authorities in these rituals. If irrigation ritual is part of a larger constellation of belief linked to productive domains, as Gelles (2000) suggests, then these rituals around water should all be related to the larger economic activity and transitions occurring in the communities.
Analysis of ritual in this chapter supports this claim through evidence of conflict during ritual that is specifically focused on the economic responsibility of ex-residents who have entered economies with conflicting cultural and social values associated with their production. This chapter concludes with a discussion about the role of water in ritual and its contributions to the cultural and extra-economic spheres of community life.

**The Types of Ritual Associated with Water Management in Charcana**

In the case of Charcana, rituals are performed in accordance with three distinct aspects of irrigation. The first are the rituals associated with each irrigation turn, in which every irrigator is engaged every 20-30 days, depending on the canal. The second is an annual gathering of family just prior to the beginning of the water fiesta based on making offerings on behalf of the family for good fortune in the upcoming year. The third is an annual ritual during the final week of July that is known as the *yarq′ Aspiy* in Quechua, *fiesta de agua* in Spanish, “water party” in English. In this chapter I will discuss the three ritual processes in detail and reflect on the importance of each type of ritual in the context of community identity, relationship building, and the symbolic representations that indicate the various loci of control associated with water management. As stated earlier, it is important to understand that not all communities in the Andes, even in La Unión Province, practice the same rituals associated with irrigation. I will use Antabamba as a reference community and point of comparison for rituals in Charcana because they do not share the large majority of rituals practiced in Charcana.

**Irrigation-Day Rituals and the Arrival of Water**

Evenings prior to irrigation are filled with preparations for the ensuing labor party the next day. People described these preparations as a mix of mundane activities and a
The mundane activities include buying alcohol, coca, and cigarettes, preparing *cancha* (toasted corn) or other foods to bring to the fields, and laying out their tools such as shovels and *chaki takllas* (foot plows). The more difficult and “game-like” part of the preparation is the task of hunting down everyone who will be assisting with the irrigation activities. In the instances where I accompanied upcoming irrigators tracking down their laborers, it always seemed to be a stressful event. Although engagement in *ayni* may require the participation of certain community members, the onus is on the primary irrigator to remind others about the exact time and meeting point.

The morning of the irrigation begins with the water user heading up to the reservoir to unplug the tank and begin the flow of water. In the process of beginning the flow of water, the irrigator performs a *t’inkay*, blessing and offering, to *pachamama* in appreciation for the water and in hopes of receiving a generous and fruitful quantity of water. This is usually an offering of alcohol, cigarettes, and coca leaves. In rare instances parts of ears or tails of animals will be offered as well, and buried in the ground at the beginning of the canal. In a race against time and flowing water, the water user sprints down the mountain to join the rest of the group working in the field. Along the way (s)he shores up the canal walls and looks for any points that may divert his water to someone else’s field, resulting in a shortage of water. It is also common to burn bushes on the mountainside during the descent. I was told this serves a dual purpose of both clearing the brush around the canals and signaling to the rest of the workers that the water is now flowing and will be arriving to the fields shortly.

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1 A *viscacha* (*Lagidium peruanum*) is a rodent in the chinchillidae family with physical features similar to those of a rabbit. It is known to be very elusive and hide between rocks in the Andes. To “play viscacha” is to play hide and seek.
Meanwhile, the group of community members assisting with the irrigation is usually gathered at the water-user’s house eating a heavy breakfast, awaiting the signal that they should head to the fields and await the water. The workers then perform a t’inkay upon their arrival to the field and begin to clear the overgrown remnants of the earthen canals dug from the last irrigation and begin to clear weeds from between the crops. Customarily the water chief passes by the field. Some water chiefs still carry a symbolic staff of command, though in many communities other than Charcana, and among the younger water chiefs in Charcana, it is considered an outdated custom. Upon his arrival another offering to pachamama is made, and the water chief is offered some food. He will usually ask about the quantity of water, if the tank was properly plugged and adequately filled, if there were any major problems in the canal, and then tells the irrigator when they should be finished irrigating.

More than a courtesy visit, the water chief is supposed to make sure that there has been no bartering of water rights and that the person who is supposed to be irrigating is the one who is receiving the water. The ritualization of the arrival of the water chief is something I found to be unique among the communities that still use the water chief and distributor positions. In Antabamba for example, when the water president arrives, there is no offering, and the irrigators perceive the visit as an act of policing. He makes a cursory pass by the field, if at all, and is usually only present when someone has complained about not receiving water they are supposed to.

Many people in Antabamba associated the commission president with a government bureaucratic. Interestingly, the current water president in Antabamba was centrally located in all of the ayni relationship networks (Figure 6-1, Figure 6-3, and
Figure 6-5). As discussed in Chapter 5 the network characteristics also indicate that there is a centralization of control in the Antabamba networks, given the disparity between network metrics. When I asked people in Antabamba why there was no pago at the arrival of the water president, my question was answered with a question: “Do you do a pago when the police come to your house?” This consolidated control, coinciding with the view of the water president as an extension of bureaucracy casts the previously esteemed position in a negative light.

In Charcana, where the network metrics reveal a more even distribution of degree centrality and betweenness measures, the role of the water chief (ostensibly the parallel position in Charcana to the water president in Antabamba) is one of prestige and honor. The arrival of the water chief is welcomed, and his presence is that of an ally, not an adversary. I was told that although he has the temporary power to administer water, he has very little “control” over the community. Should he perform poorly, the water users will remove him, and he will be replaced with a new water chief. Furthermore, he is not seen to be directly identified with the state. Conversely, the water chief – both as idea and person, has recently become a source of pride and a symbol of passive resistance: a meme for the traditional ways and the resoluteness of community management over state control. The dichotomy of the resilient relationship between the community and the water chief as a position on the one hand, and the fragility of the relationship between the community and the water chief as a person on the other, serves to show that the locus of control is squarely fixed within the community as a whole.

Yarqa Aspiy and the Reification of Community

In Peru, the entire country celebrates July 28. For proud Peruvians everywhere, it marks the day in 1821 that General José de San Martin proclaimed independence of
Peru from Spain. However, July 28 has an even more important meaning for the residents of Charcana. Officially beginning on July 28 and ending on July 31, the village of Charcana is transformed into a venue of family reunions, nearly bursting at the seams. All quiet disappears as the salvos of music mark the progression of time in an otherwise timeless chimera. This is yarqa aspiy, the water party.

Although officially a four-day ceremony, it begins well in advance of July 28, as preparations, travel and cooking all require a minimum one-week’s time to complete. With every van overloaded with crates of beer and liquor, boxes of vegetables, gifts from afar and even live animals, transportation can require weeks of advanced planning. On the particular van I rode to the fiesta, five young men were seated on the roof of the van for the four hours of the 3000m sheer drop cliffhanging (literally) ride.

**Performing Ritual as Family**

The week leading up to the fiesta is overloaded with events coordinated with both real and fictive kin. In Charcana, it is customary to hold naming and branding ceremonies for newly acquired cattle and llamas in the days leading up to yarqa aspiy. This t’inka chu (ceremonial blessing) involves branding the cows with the family’s brand, clipping the ears and tails of the animals, and for llamas, piercing their ears and affixing the woven tassels indicating their owner. Women and men alike are present in the corral even though this is considered to be one of the most dangerous ceremonies to hold.

The cattle are corralled in a corner of the pen made of stone and cacti. Men and women sing and dance to the rhythm provided by group of women playing hand drums. Another group of women moves about the crowd, passing chicha and puro (a very potent, clear, grain alcohol), encouraging everyone to “gain courage.” Meanwhile, a
group of men is gathered around a fire that has been built exclusively for the purposes of heating the metal poker used for branding the cattle. When everyone has enough “courage,” they begin with branding the cattle.

The men in the family take turns lassoing the calves, and then wrestling them to the ground. Once the calf has been taken to the ground, all of the other men jump on it and pin it down. The space over the rear rump is cleared and another man comes over with the poker. The poker is then pushed down into the hide of the calf, and the stench of burning hair and skin rises with the smoke it produces. If it has not already, the calf usually defecates uncontrollably at this point. Another man is then responsible for picking up the feces and rubbing it on the spot of the branding, supposedly to hasten the healing process. At that point, the tail is also cut and the ears are clipped. Finally, a blessing is made and a small amount of puro is poured on the calf while words of praise and requests for fertility and health are made to both pachamama and the calf.

The process of dealing with the llamas is much easier, and usually occurs after the cattle. No branding is involved, though a piece of the ear is clipped after the llama has been pinned down. Women then come over and pierce the ear with a long needle and place woven tassels into each ear. These tassels function to indicate ownership, similar to the branding on a cow. Again, a blessing is made for each llama, and this portion of the ceremony is concluded.

The ceremony is then moved to a location that is of special significance for the immediate family of those who own the cattle and llamas. These sacred spaces are usually identifiable by some large landmark. In the case of the particular ceremony I attended, the landmark was a large boulder that created a cave-like shelter on one side.
Everyone huddled under the awning of the boulder, and people began declaring this was the spot and we needed to dig. With a shovel pick, men dug about a third of a meter into the ground until they decided they needed to start digging with their hands. A clay jar, known in Quechua as a q’ero, was uncovered along with three little glass bottles (Figure 7-2). They were placed to the side, and llikllas (large cloth squares used for carrying materials on one’s back) were placed on the ground. Cigarettes, alcohol, coca leaves, incense and the tails and ears from the cattle and llamas were spread cross the lliklla with great care (Figure 7-3).

One by one, beginning with blood relatives of the host family, people made offerings to pachamama. With the three best coca leaves in their pouch, everyone created a kintu with the leaves, blew on them after making their offering, and then laid the leaves down in a pile on the lliklla. When everyone was done, we gathered around the q’ero and waited for the unveiling. Before opening the q’ero, the women once again began to play the drums, and more dancing and singing ensued.

Finally the bottles and q’ero were opened. They were filled with puro from the last time the family held a t’inkachu. When I asked earlier in the day where we were going, everyone said to the family’s place, but nobody said why. Everyone took a very little sip of the puro from these bottles. When they were empty, we refilled them with the puro from this year’s celebration, and they were returned to the box, along with two cigarettes and a box of matches. The box was closed, and placed next to all of the offerings on the lliklla. Before the box was returned to the ground, the ears and tails were placed in the hole, followed by the box, and then the coca leaves and burning incense. The soil

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2 Kintu is a Quechua word for the formation of three coca leaves united at the base of the leaf and then fanned out. The kintu is formed with the fines leaves of the bunch and is used during ceremonies.
was replaced and the bottles, q’ero, ears and tails, coca leaves and incense were buried. One final drop of alcohol was placed on top of the freshly turned soiled, and with that the t’inkay concluded. As we were walking back to the house to continue the festivities, my hosts remarked to me, “We made our offerings to pachamama and asked her for fertile cows and llamas. We maintained a family tradition and honored our ancestors. Today was for the family. Tomorrow is for Charcana.”

The events associated with the whole day were really about maintaining relationships. Returning year after year to the same place on the landscape is a mini-pilgrimage, allowing family members to retrace the steps of their ancestors. In effect, this is their spot, their place to commune with their ancestors. They symbolically drink the same drink and smoke the same cigarettes every year. It would be an overstatement to say that everything remains the same through the years, but the sentiment and relationship with ancestors is the same. It was explained to me not so much as ancestor worship in the classical sense of the phrase (Scheffler 1966), but more of a homage to those who laid the groundwork for everything the families have today. There are other points through yarqa aspiy that contain similar sentiments, though the reproduction of physical space and unearthing of symbolically unchanged material items is not as clearly displayed.

The rituals were associated with fertility, but nothing they did during the day physically enhanced the fertility of the soil, or biologically stimulated growth in the cows or llamas. The symbolic interactions between the family and pachamama were made through the medium of flesh. The symbolism of mankind’s domination over nature in those moments where the calf is being branded or the llama having its ear pierced is
ephemeral. It is not a boastful display of dominance, rather the way a gift is received from mother earth. The act of burying the parts of the ear and tail, in conjunction with an offering of coca and alcohol is an act of replenishment and recognition that these resources are being made available to them and it is not taken for granted. They return to pachamama what she gave to them, so that she may keep giving. In essence, these rituals and t'inkachus prior to the yarqa aspiy signal that the family has fulfilled their obligations in ongoing ayni with pachamama. Now it is the community’s turn to fulfill this role.

**Performing Ritual as Community**

Just before dawn light breaks, the music begins. The streets are still dark, but the music of the bands begins. The customary three bands, all sponsored by a different patrón (party organizer and financier), rival the other bands for audiences. Annually there is at least one band in Supalta, and one band in Humara. The third band can be from either ayllu and is dependent upon where the third patrón resides. As the adults bounce from party to party, the children run through the streets with new toys brought to them by relatives from the city. At this time of morning it is mainly men who are in the streets. Most of the women are in their houses preparing the meals that will be eaten later in the day. As the sun peeks over the eastern mountains and illuminates both the village and glacier Solimani across the canyon, people start gathering in the plaza to begin the trek to the spring.

The current and most previous water chiefs along with the three patrones of the celebration lead the community up the path to begin the two-hour procession to the spring. The bands play that whole time, and people bounce from group to group, though mainly stay close to their ayllu. Men carry their shovels, while the women
proceed with food and drink. There are designated individuals who are tasked with making sure that anyone who needs a drink is supplied with one. As we enter a large forest of transplanted eucalyptus trees, the procession grinds to a halt.

This is as far as the women are allowed to proceed. It was explained to me that the mountain spirits do not like to have women accompany the men to the spring because the men become “distracted.” This is seen as disrespectful to the spirits, who command full attention. I was also told that it is too dangerous for women. Reflecting on what I had just been told, and what I had seen previously, there was little that was considered too dangerous for a woman. With the exception of lassoing the calves, women were equally as active, and put themselves at equal or greater risk than men on a daily basis. I have also seen women progress on the path past this point, though never completely to the spring. Infirm or elderly people also stopped off at this point. As they climbed the side of the hill, they waved frantically good-bye, as though this might be the last time we would see each other for a while (Figure 7-4). The feeling was overwhelming, like we were all about to do something spectacular together.

As we walk down the path in a sea of men in wide-brimmed hats, I realize there is a woman accompanying the governor of the district. It is the Director of the ANP of Cotahuasi. When people realize this, they grumble under their breath about how this is just another example of the government lacking respect for their traditions. One person even comments that she is here to see how much water they have so she can give it to the mines. One person approaches the governor and asks if she is actually going up to the spring, and he replies that she is going to stand from afar, but not be near the water.
Around noon the group arrives to the spring, and immediately someone starts a fire. The bands are fiercely playing dueling tunes, and everyone vies for a spot close to the fire and the water. The rushing of the water seems to drown out the band. Similar to the t’inka the previous day, offerings of coca, alcohol, cigarettes, and good are made at the mouth of the spring. Most of the offerings happen where the fire is, which is just in front of where the water appears and falls from the mountain (Figure 7-5). As people are hurried to finish their pagos, one of the water chiefs begins a pago at the point where the water enters the canal (foreground of Figure 7-5).

Not many things have changed over years with water fiesta protocol, but the actual work of cleaning the canal is one of the major exceptions. This canal, known locally as canal matriz, has been reinforced with cement. It is the only canal that has been reinforced with cement for the entirety of the route from the boca toma (“mouth” of the canal) to the beginning of the fields it is used to irrigate. There is very little need to clean the canal anymore, though along the way everyone gives token gesture with their shovel to remove sediment that has accumulated on the cement walls. The water chief told me that his pago at the beginning of the canal is the customary tribute. Since caring for and maintaining the canal is less labor intensive than it was before, it is important that everyone still show their respect for the water and the canal.

As everyone finishes their pagos and gives hugs to other attendees, it is time to start the one-hour trek back to the eucalyptus forest, where the women are waiting to begin eating. Along the way many breaks are had to sit, have a toast, dance to the band, and if necessary, clean the canal. Many toasts are made in honor of the water chiefs and the patróns (Figure 7-6). For the water chiefs, this is the day they are
recognized for their hard work and sacrifice. They are showered with gifts of beautiful likllas, food, drink, and even small amounts of cash (in Figure 7-6 the gentleman in the middle has 10 nuevo soles pinned to his liklla). For the patróns this day is about their contribution to Charcana. Most patróns spend the equivalent of anywhere from USD $8,000 – $10,000 on this event. They usually have an open house for three days, and people will be eating and drinking in their courtyard, whether or not they are present. This is expected. Once they have completed this cargo of supporting the water fiesta, they will never be expected to do it again, and very few favors will be asked of someone who has provided all of this to the community.

When we arrive to the eucalyptus forest, the women are waiting there and much as they did when we left them, greet the returning group with cheers. The men wave and dance, some run up and kiss their wives and start dancing with them. The tone is festive, and after an address by the governor of the district and other dignitaries who are participating, it is time to eat. Overflowing plates are passed around, and people sheepishly accept plates of food from strangers, knowing there is no possible way to eat it all. Bottles of brand name spirits brought from Charcaninos who live as far away as the United States or France are passed around without regard, both the origin and destination of these treats unknown. When everyone has eaten, it is time to select the next year’s water chiefs and patróns. This practice is the only fair way to do it, since many of the viable candidates for patróns are Charcaninos who reside most of the year in the cities and have the means to provide so lavishly for the community.

The water council president acts as the master of ceremonies, and declares that the patrón for the ayllu of Humara will be selected first. At first there are no volunteers.
I find this odd since just the day before I was speaking to a woman named Gloria who resides in France most of the year, and she indicated that she was going to be the *patrón* for next year’s fiesta. Just as things began to look desperate, Gloria leapt up on the stage with a Peruvian flag waving in her hand and declared that she will be the next *patrón* for Humara. Selecting a participant from the other *ayllu*, Supalta, did not prove to be as easy.

After five minutes of people shouting out other people’s names, and those people providing every excuse for why they would not be able to take on that responsibility this upcoming year, there was a dramatic change in tone. A swell of animosity against Charcaninos who no longer live in the community began to build. They were accused of only returning for the fiesta, and eating and drinking for free, but never contributing anything else to the community. People defended themselves with claims that they helped finance the construction of the road and canal maintenance projects. This argument escalated to a point where community members were shoving each other. The governor stepped in and proposed that this be settled in the days to come, and that Supalta meet on their own time to sort this out.

Without instruction, everyone soon lined up along the path overlooking the canyon and a procession line began to form. First the governor and other dignitaries walked by as bystanders cheered and clapped. Next it was the water chiefs who paraded down the path. Then, one by one, the *patróns* came out flanked by their families and close friends, with the bands they hired close behind. Finally, a large group in formation came marching down the path. This first group was a group of men from Supalta. The men were carrying their shovels over their shoulders like soldiers carry their rifles. Their
march was a high, straight-legged kick like those of the military as well (Figure 7-7). Men from Humara followed them in a similar fashion. When they finished, everyone in attendance began dancing their way back down the path to the village.

There was one group of people who went down to the canal and were actually cleaning the canal that parallels the path back to the village. I was told that these men and women who were cleaning the canal were groups of newlyweds who had been married sometime within the past year. To the sounds of the bands they worked, while the rest of the village walked 15 meters above them. I was told that this is initiation. They are beginning their own families, and they need to learn how to maintain a canal and keep it clean. This public display of aptitude (or lack thereof) signals to the rest of the community that they are now equals. It also signals that they are ready to engage in ayni, though in reality they have already been engaged in exchanges with kin, if no one else.

**Ritual Symbolism and Mimesis of the State**

The two different ritual spaces described here actually represent three different events and scales entailing ritual practice and symbolism. The first event is the irrigation day event. In these practices we see interfamily rituals performed. The act of providing food is often associated with an inherent power dynamic that indicates the superiority of the patrón over the worker (Fonseca, 1974). In ayni, this dynamic is invalidated (Gose 1994:79), and the symbolism associated with “normal” interactions changes. This is an indication that this time in space is unique, and will be treated differently than more standard interactions.

Small communities can have deep histories that are laden with various positive and negative experiences. Many times these negative experiences between people
can manifest themselves in interactions totally unrelated to the negative experience. This is one reason why the role of water chief is respected. In these ritual spaces, people need to set aside personal disputes and understand the gravity of petulance and abuse of power. A water chief that can successfully fulfill this role is admired, but it does not make them more powerful, as we saw in Chapter 6. Tinku, or ritualized fighting, is considered to be a social mechanism that acts as a release valve for intra and inter community conflict. I argue that these rituals associated with visits from the water chief serve as a trust-building social mechanism. In these instances, it is not what the water chief does with his power that makes him honorable, it is what he does not do with his power that is the true indicator.

During the water fiesta, there are really two separate events that take place at different scales. The first is the event that is exclusive to real and fictive kin. In the case I described, the event was a t‘inka for newly acquired cows and llamas. Every family will have different events. Some families described to me the rituals they performed as a family to t’inkay the new thatch on the roof; another described the festivities associated with a child of theirs getting married. Although these life events do not necessarily coincide with the water fiesta, this is the time when families come together. These acts reinforce bonds between people that may be strained by distance and/or poor communication infrastructure.

Not only are the relationships between living family-members reinforced, connections with ancestors are strengthened as well. The family has a relationship with the earth, pachamama, and it is the responsibility of living family members to follow through on this responsibility. While they are engaging with neighbors through ayni in
their fields, they are engaging with *pachamama* in a similar fashion. Paganism and idolatry were two words used during the conquest of the Spaniards to describe the religious behaviors of locals. This is not a one-way system of respect. These *pagos* and *t’inkas* are responsibilities in the exchange families have with the earth. In this respect, there are many more similarities between these rituals and the irrigation day rituals than with other rituals associated with the water fiesta.

The water fiesta rituals at the community level are fascinating, and resonate of this transformation from what Scott refers to as “hidden transcript” (1990) to the “public transcript.” I will admit that the *t’inka* at the spring is a beautiful ceremony. Watching from afar as hundreds of people snake their way down a dirt path, dancing to the music of bands and hand drums, you cannot help be struck by the beauty of it all. When you are in the middle of it, other elements become exposed, and subtle hints of pretension and individualism shine though. Right from the beginning there is a sense of competition between *patróns* as to who can hire the best band, have the best food, and be the most hospitable host. It feels like this sentiment is extended to the *ayllus* as well, which is a unique feeling that is absent other times of the year. Furthermore, as was witnessed during the *patrón* selection ceremony, the creation of factions became apparent on the grandest stage of the year.

The hidden transcripts of resistance in Charcana reshape and recode the usual symbols associated with the community fiestas. By taking these hidden transcripts and making them public, the challenge to changes in power dynamics become an open debate. It has long been held that people migrate away from Charcana in order to be able to come back and provide the community with more and better services. This was,
to a certain degree, how the road from Charcana to Cotahuasi was built in 2005. Road signs thanking families and individuals for the contributions they made to the construction of the road serve to remind travelers of obligations to give back to the community, while also reminding everyone of the minor role the state played in the construction.

This move from hidden to public transcripts is what Greenhouse (2008:365) describes as transforming “ambivalent resentment to political capital.” By making a spectacle of difference and dissatisfaction with current political, economic and social changes that are all related to water management, local politics consume the fiesta, and debate on the topic becomes general and public. In addition to the individuals from the different ayllus, the state as a whole becomes embroiled in this conflict, and local political leaders assumed to be allied with state authority are involved as representatives of that power in this process of ethnogenesis and community decision making.

Another interesting element is the mimicry of state military order and movement. The strong men of the community leave the women, children and infirm behind while they venture off into situations that are “too dangerous for women.” Upon returning they are greeted like heroes, symbolically saving the community from drought and resulting food shortages. As a final act of authority, each individual ayllu displays their power one last time as they march as a unit on the trail before retreating to the village. They march with their weapons on their shoulders, ever ready to defend the veins of their community against the invading bureaucratic armies of the state. This procession is
always followed by judgments as to which ayllu looked better, maintaining the element of competition between ayllus.

There are many rituals associated with water in Charcana. The degree to which water is the focus of the rituals, or the medium for the rituals is debatable. In my estimation, water is the medium. The true beauty in these rituals and symbolic interactions is the way in which they were constructed to fortify the community, without making it feel forced or contrived. Water is a principal resource that can draw anyone in Charcana into a conversation. There is no better focal point for ritual or community building than water. Other communities have planting festivals and some even have bullfighting. I believe these pale in comparison to the success of the water fiesta in building community. Even with some of recent unanticipated tense moments, these rituals and fiestas will ultimately result in Charcaninos being the craftsmen of their own fate, determining how the future will look in the community, and allowing them to maintain a bit of power in the resource management and community development process.
Figure 7-1. Branding ceremony in Charcana (Photo: Timothy Podkul)
Figure 7-2. Family blessing location under rock shelter (Photo: Timothy Podkul)

Figure 7-3. Bottles of puro buried last year (Photo: Timothy Podkul)
Figure 7-4. Waving goodbye from the farthest point women can go (Photo: Timothy Podkul)

Figure 7-5. Pago at the spring source in Charcana (Photo: Timothy Podkul)
Figure 7-6. Water chiefs together at water fiesta (Photo: Timothy Podkul)

Figure 7-7. Men marching with shovels at water fiesta (Photo: Timothy Podkul)
CHAPTER 8
CONCLUSIONS AND RECOMMENDATIONS

In this chapter, I discuss the overall research findings from the various analyses and ethnographic interviews. I then synthesize these findings and draw conclusions as to how I think these compiled findings explain the impacts of water management changes in La Unión province. A review of how these findings contribute to the larger theoretical foundations underlying this research will also be addressed. The chapter concludes with recommendations to improve the implementation of the law and how consideration of micro level governance can be applied to policy-making processes.

Summary of Research Findings

Control of water has been the fulcrum of power in rural Andean communities since time immemorial. It has been responsible for the bloodshed between brothers as well as some of the most highly complex social organization and common property management regimes in the world (Boelens and Doornbos 2002). Whether provoking conflict or cooperation, there is an agreed-upon system of norms in rural Andean water management that has constantly been undergoing a process of transformation and renegotiation. These norms include guiding principles related but not limited to the domains of rights to access, rules of distribution, and maintenance. The norms are not just reflective of the current values, mores, and hydrological realities of today, but rather also represent, and are interwoven with, the history of the communities and the land.

The original design for this research aimed to compare two seemingly similar communities that only varied in the degree to which they were adopting the New Water Law passed by the government in 2010. After visiting both of the communities and beginning my research, it became clear that the issue of water management in rural
Andean communities is far more complex—and interesting—than I had originally anticipated. This dissertation is an attempt to untangle, analyze, and reassemble the complex social, cultural, economic, political, and environmental components that are interwoven into water management in the Andes.

**Archaeological and Historical Element**

Archaeological evidence in the region indicates that infrastructure associated with irrigation can be traced back to at least the Middle Horizon (600CE – 1000CE), with some scholars debating whether it cannot be extended to the Early Horizon (900BCE – 200 CE) (Jennings 2003). Although there may be some dispute as to the exact dates that sedentary agriculture began in the canyon, this does tell us that the trajectory of agricultural economic activity in the canyon has a very long history. Due to the material evidence of agricultural activity and canalization in the infertile and most arid parts of the canyon, it can be surmised that there was some socio-political structure that organized the movement of water, and the decision making process regarding where the water would need go, and when it would be channeled there.

Behind all of this organization was power. It is unclear who had this power during the Huari period, though during the Inca period it has been concluded that the central Inca State based in Cusco had the power. What is interesting about the control of water during the Inca period was that although the power was centrally located in Cusco, the representatives of the centralized powers had the freedom to make decisions based on local weather and physical conditions, availability, and demand between agriculture and salt mining activities (Hyslop 1984; Poole 1987; Trawick 2003). The semi-autonomy in this political organization was highly effective. Local practices and technical expertise were complemented with support and direction from the centralized authority. Local
ayllus that were formed during this time were able to maintain their relationships with the environment, and their daily interactions were not mediated by an external power (Sherbondy 1998).

The Spaniards systematically dismantled this system that successfully maintained itself for hundreds of years. Through policies of force, communities were compelled to participate in forced labor, and were abruptly dislocated from the resources vital to their survival. Water, the most prized resource in the canyon, fell into the control of viceroyalties and owners who were operating encomiendas in a sharecropping system. This created a system of dependence and the production of surplus. The cities of Arequipa and Cusco were dependent on agriculture from the Andes, and thus, the first prototypical forms of capitalism were introduced to the Province.

Independence in 1821 catalyzed a new type of water management in the region. It borrowed from the econmienda system, though the landowners were no longer responsible to the Spanish crown. The rise of the hacienda continued this legacy of rural marginalization, with water gracing the fields of non-hacienda landowners with such infrequency that hacendados were successfully creating their local power both political and economically. The great hopes of agrarian reform in 1968 were ultimately unsuccessful, and the 1969 General Law of Water (No. 17752) in Peru served to push a further separation between water users and their ability to govern the resource. For the first time, owning property did not equate to automatic rights to resources. The bureaucratic governance of water was officially written, and the creation of false boundaries and districts commenced. The impact on micro level water did not change
very much. Neither did the unequal relationships to power that many indebted *peones* in rural areas had hoped to change.

**Roles of Economic Exchange and Social Capital**

Reciprocity as a concept in this context implies the exchange of goods and services between individuals. In the Andes, this exchange and the associated obligations that go with it are known as *ayni*. As discussed, the role of *ayni* in rural Andean communities falls on a spectrum, as cash economies become more pervasive. It is the root of support for the community, and the system by which everyone is able to mobilize enough labor to productively use their agricultural land. Every stage of the agricultural cycle is dependent upon extra household labor to accomplish the tasks. Building and maintaining terraces, preparing the fields of planting, planting the seeds, irrigating, and harvesting are all dependent upon the leveraging of additional labor.

In rural Andean economies where cash is scarce, the system of *ayni* has successfully created non-cash based systems of exchange that people trust. This was evidenced by the reactions to my fourth relationship question on my social network interviews. When I asked individuals if they would go to X person for a loan, they laughed and responded that if they needed money, they would go to the bank. It became apparent that cash was a rare thing. It wasn’t until the third or fourth time going to the “store” with my host siblings in Antabamba that I realized they never paid. Their names were written in a ledger and it was later explained to me that when the “debt” has reached an uncomfortable limit for the owner, they would decide how to settle the debt. In the case of my family, it was usually with fresh milk from their cow, or cheeses from the same source. Just as everyone in Western countries takes faith that the
numbers on the bills in their wallet will be accepted in exchange for goods and service, rural Andeans take faith in the word of their neighbor.

In the eyes of the National Water Authority this is seen as the most important cultural component of the economic and resource management systems of rural Andean communities. During a cultural domain analysis elicitation activity with an official from ALA I was stopped in the middle of the interview and told: “Ayni es la única cosa que no podemos darnos el lujo de romper en estas comunidades. Sin su sistema de ayni, la producción se detendría, y el agua no importa.” Translated, this means: “Ayni is the one thing that we cannot afford to disrupt in these communities. Without their system of ayni, production would cease, and the water won't matter anymore.”

The purported respect for pre-existing cultural systems of labor exchange was welcomed by community members, however to them, this was not the only system considered vulnerable under the new water management laws. To them, the impacts these management changes have on the communal work practices, faenas, is also detrimental. In most urban contexts, faenas are voluntary. However, in the rural communities of La Unión, faenas are considered mandatory, and lack of participation results in penalization which could be administered through fines or, in the case of lack of participation in water projects such as canal cleanings or tank maintenance, the penalization is to miss one turn of water. A penalty such as this can have effects as grave as the perpetrator going nearly two months without access to irrigation water.

This type of penalization is highly effective, though under the new law, anyone who pays for water cannot be denied access to water. To further complicate the issue, the law clearly communicates that the state owns the water that passes through the
canals; however the maintenance or infrastructure to carry the water from the springs to the fields is the sole responsibility of the communities. So while you have the government dictating the requirements for water access, which in this case is solely based on paying one’s fees, you have the local community, which is responsible for infrastructure management, experiencing a dearth in labor for maintenance projects.

Those who missed at least two or more faenas in the past year explained to me that one of the main reasons they did not attend anymore is because they would rather use their time to travel to the provincial capital to engage in market-oriented activities, or take opportunities to work on the road construction project which pays people an “incredible” salary of 35 soles a day (equivalent to roughly 11 dollars a day). The justification for this makes total sense. If it is hypothetically illegal for the water chiefs to not distribute water to paying customers, then your interest would be in continuing to pay, which requires a cash labor job. In many districts, the water chiefs or distributors still withhold water from those who fail to participate in canal maintenance activities. Users have no established channels as yet to denounce these actions, since the government hasn’t fully staffed local ALA offices in the Province. What residents are left with are a new set of unenforceable rules by which they have to operate, creating selective conformity to the new laws, while slowly eroding the principles and practices that are at the core of the intertwined social and economic relationships of the community.

What the community as a whole is left with is dwindling sources of previously accessible social capital. I agree with Mayer that the cooperation of households in the Andes is one of its most remarkable characteristics (Mayer 2002:35). From what is
evidenced in Charcana and Antabamba, the system by which the cooperation between households is governed is fraught with contradiction. *Ayni* is still occurring, though if it is still beneficial for both, or even one of the parties involved in the exchange is a different issue entirely.

**Organizational Change and Institutional Reform**

The New Law of Hydraulic Resources created the national water authority known colloquially as ANA, which was conceptualized under the direction of the Ministry of Agriculture. In an intensive process of decentralization, the national level authorities created regional sub committees in each Department and then eventually down to regional and provincial levels where these organizations then become called ALA, the *Autoridad Local de Aguas*. This was clearly a strategic and concerted effort to decentralize management of water. In development circles, decentralization of power is touted as a sign of participatory governance, though to the majority of people in the province of La Unión, it is seen as an extension of control from the State.

What is at the heart of the reforms for rural populations is the changing mechanism for how water is obtained. Boelens and Doornbos (2001) have categorized a variety of ways rural communities around the world access water. The major transition happening in La Unión is the change from a *user-invested* system to a *concession* system. A “user-invested system” is one in which users are the owners of the resource, and have the responsibility of building and maintaining infrastructure associated with the resources, which in this case refers to irrigation canals and tanks. This responsibility includes labor, capital, goods, time, intellectual and ritual contributions that ensure system operation. A “concession” system refers to a system whereby the State administers rights (usually through a fee-based system) to a user or
groups of users. This concession system is the model the State is currently attempting to implement, with varying degrees of success, and with varying degrees of adoption at the community level.

Peru is not trying to accomplish this by completely restructuring water management in the communities. Instead, they are using and adding to existing organizational and infrastructural apparatuses already in place, creating a pluralism of sorts in systems that can be followed to getting water. This is an example of people operating in what Moore (1973) calls a “semi-autonomous” system. This refers to a system whereby local people are affected by exogenous (in this case national) norms and policies, while also retaining a bit of power to manipulate the system to serve their own needs. This can happen at both a community and individual level, with the community refusing to acknowledge the national or regional authorities, or individual users failing to acknowledge their community leader’s power or the rights of their neighbors to water.

This change not only affects local organizations, but also inter-organizational relationships. Qualitatively, this research revealed that the organizations themselves were not aware of what other organizations’ capacities and activities were in the Province. There were efforts being duplicated and large gaps in services that every organization thought was being covered by someone else. Finally, the role of the newly established Autoridad Local de Agua (ALA) office was unclear to nearly every organization in the Province.

Analyses of collaboration on projects pertaining to various aspects of water management were completed through network analyses. The results revealed that the
government is still the primary organization involved in water management, and the most likely to be asked to collaborate on various projects. After running an immediate impact analysis on what the organizational landscape would look like without the new ALA presence, results revealed more participation by the non-profit and civil society organizations, and a reduced involvement of government agencies. What this indicates is that this initiative to decentralize authority may actually be creating a consolidation of power in the government. These analyses are purely speculation; however, as the organizations settle into their new roles and dynamic with the addition of ALA, it is important to watch what happens to stakeholder participation.

Communities in Varying Stages of Reform

The results of the social network analyses in the two communities uncovered interesting characteristics of the social structure that provoked many ethnographic and qualitative research questions. The network closure and core-periphery structure on the Paccha canal in Charcana may indicate that there is more trust in the irrigation network. The network analyses in Antabamba revealed that there is a centralization of power in the communities, and members of the two most powerful families dominated all three exchange networks (labor, equipment and products). It is difficult to assign causality for these structural characteristics, but it does require more investigation.

I believe the structural characteristics and changes in political organization mutually reinforce each other in Antabamba. In Charcana however, I think the representative network structure is more resistant to change. Burt (1992) has considered network closure to be a negative attribute when networks are seeking innovation or change. In this case, I believe Burt’s observations to be true. Charcana is abstaining from adopting the new laws and policies. People are hesitant to accept the
new policies, and cultural consensus analysis revealed there is currently high agreement about norms within the community. Furthermore, network analysis on the Paccha canal revealed a highly embedded network structure indicating that penetration of new ideas or systems into this network of irrigators will be difficult to achieve.

The dominance of the two families in Antabamba was another very important factor in understanding how the new law is being implemented. The new political organizations and policies are clearly in favor of capitalist, market-based economic activity. The policy about tenure with regard to how long people can occupy positions of power also works to reinforce the establishment of multiyear dominance by one or two political elites. In Charcana however, the tenure of the water chief and distributors are limited to six months to a year. This means that no one will have power over the allocation and management of water for more than one or two irrigation cycles. Though this may originally be intended to limit the burden of this onerous position, this norm also serves as an extremely useful mechanism to ensure that elite capture of resources is avoided in the community.

Finally, the cultural consensus analyses showed the disparate levels of agreement about water management within Antabamba and between Antabamba and Charcana at the community level. There is very little agreement in Antabamba about water management rules, and specifically, about who has authority over water distribution. Unlike Antabamba, in Charcana there seems to be a very clear consensus as to what the cultural norms are that dictate the water management process. Furthermore, there is agreement among the majority of communities in the Province as to what are normal water management practices. Antabamba, again, is an outlier in this group. Antabamba
is the most progressive community in regards to implementing the new law. This would lead one to assume that as one proceeds in the conversion to the new laws and organizational structures, discordance will ensue. I do not believe there is enough evidence to make this correlation. This research was conducted at a very particular time in the process, and this may only be a reflection of the period of transition. A longitudinal study would be appropriate to measure the actual impact this conversion has on communities in the long run.

**The Role of Ritual**

Measuring the role of ritual in water management is a difficult task, whether qualitatively or quantitatively. Many of rituals carried out are intended to reinforce community relationships. These relationships may be between two individuals, may be between an individual and the community (as is the case with the *patrón*), or an individual and their resources, as is the case with *pagos* during irrigation turns. Without focusing too much on the conclusions of each type of relationship, I will focus on the water fiesta, which is considered the unique and culturally important ritual associated with community building in Charcana.

I think there are very interesting tensions that are manifest in these rituals associated with the water fiesta. The first is the contradiction between independence from, and mimicry of, the central government. The water fiesta is something that foreign anthropologists and Peruvians alike tout as a symbol of cultural individuality and tradition: a culturally bound set of rituals and symbols that shows the community's unique relationship with the earth while simultaneously demonstrating their control over the resources. These actions associated with these ideals are based upon a very militaristic set of rituals. This begs the questions, is it intended to be mimick the state,
or show opposition and strength against the state? I believe it to be in opposition to the state, though this puts a different spin on the ceremony. In comparison to the idealized image of the fiesta being a display of peace and harmony between the community and natural resources, it projects a more hostile and defensive tone. This falls in line with my next conclusion.

The strain between fulltime Charcana residents and those that have relocated is an issue that has worsened in recent years. I believe the display of distrust and animosity that broke out during the most symbolically unifying event of the year is larger than just sponsorship of the fiesta. Figure 6-2 is the visualization of the Paccha canal labor exchange network. Based on Coleman’s (1988, 1990) discussion of network closure, I surmise that this core-periphery structure is related to a much stronger sense of community and trust within the Paccha network of Charcana than in Antabamba, which has a less dense, and more individually dominated social structure. Following Coleman’s line of thinking, Burt (2000, 2005) takes this a step further to point out that this structure may reaction poorly to innovation and be less apt to absorb ideas or people from outside of the structure. At the risk of sounding deterministic, I wonder if what we are seeing in Charcana is a reflection of the changes in social structure and the negative effects of network closure.

Prior to the construction of the road in 2005, residents that emigrated from Charcana most often made it permanent, and rarely returned for visits. Now, with a higher percentage of people leaving Charcana both because of the relative ease of egress, and the lack of economic opportunity in Charcana, there are more people living transient lifestyles. As was stated, no real work is accomplished during the water fiesta
anymore. There are however still very functional canal-specific *escarbo de acequia* (canal cleaning) festivals that are very productive and demand a high input of labor. However, the transient part of the population will not be present for the majority of those events, thus missing the opportunity to integrate into the social structure on the terms required locally. *Faenas* and *ayni*, for better or for worse, are still a very large part of Charcana, and the inflexibility of these systems to incorporate part-time or seasonal residents may be problematic in the future. Alternatively, the socio-political structure in Antabamba may be suppler, and provide the right conditions to handle the changing economic conditions and residential patterns that are beginning to be seen in the Province.

**Discussion and Recommendations**

Peru is embarking on their country’s first major water law reform in 40 years. What sets this reform apart from the 1969 reform is that the 1969 reform was propelled into law by an outraged citizenry with the backing of a leftist-leaning military leader, Juan Velasco Alvarado. This time, an Alan Garcia-led government, in conjunction with multilateral financiers and bankers willing to loan over USD$10 million to get the project off the ground, propelled the reform. This dissertation does not pretend to be an evaluation of the program or predict the success of the new law. Peru is a county that is currently looking at a very frightening scenario for the future when it comes to fresh water availability (Bradley et al. 2006). It is clear from reading the law, the World Bank project appraisal, and interviews with lawyers and policy analysts in Peru that this new law is geared to favor the large coastal commercial agriculture industry, which makes up 7.5% of the GDP, and the commercial mining industries, responsible for 5.2% of the GDP (US Dept. of State 2010).
Organizational Recommendations

The most visible impact this law is having in La Unión Province is on the organizations working with water management. During the course of this research, it became clear to the organizations operating in the Province that they knew very little about the actual role and responsibilities of other organizations. At the request of various directors of local organizations, I helped them to establish the first *Mesa de Trabajo del Aguas* (Working Group on Water). Using the information from the collaborative networks portion of the research, we were able to identify key organizations that are central to the network. It has been almost a year since they officially began the Working Group, and with a representative from the newly established ALA office in the Province, it is gaining traction both locally and regionally.

One of the concerns that many of organizations and I had was regarding their communications strategy with the communities pertaining to the new law. Two particular concerns were: (1) communication strategies targeted only to members of community water councils; and (2) the impacts of the Gender Quota Law on women in the communities adopting the law. While returning preliminary research results eight months after my fieldwork was complete, I suggested to the Working Group on Water that gender sensitization needs to be included in workshops conducted at the community level. There are at least two NGOs in the Province with the capability to conduct the trainings. This is an example of the direction the Working Group is trying to move.

I believe the most successful long-term strategy will be gender interventions aimed at youth. The education sector is (relatively speaking) very well supported, and has a strong presence in all of the communities in the province, much more so than JULU or
the Agricultural Agency. Programs in the local schools that begin to encourage joint decision-making both inside and outside of the classroom may be a very effective way to integrate the principals of gender parity in decision-making. The inclusion of men/boys in this process cannot be understated.

Another concern at the organizational level is the dwindling participation of civil society and community-based organizations in inter-organizational discussions and project collaboration. Community organizations and the citizenry in general are reluctant to approach governments in this part of Peru. Unlike Andeans in Bolivia or indigenous groups in lowland Peru, southern Andeans avoid conflict, and have a profound respect for the office and the process of government. In addition, I believe there are lingering concerns about protest given the bloody history of the Shining Path in this region. For these reasons, it is imperative that established organizations take the initiative and reach out to the communities and open lines of communication about the details of the law, as well as some of the unknown benefits of the law like access to conflict resolution and mediation services by a neutral party. Communities expressed concerns about collusion among institutions and organizations, and feeling like the new law was a way to legitimate more government corruption. Unfortunately for the organizations, the burden of proof is now on them to disprove these sentiments, and including community organizations in the planning process could make a big difference in the long run.

Finally, the attempt on behalf of institutions to leverage roles such as the water chief and distributor for carrying forward mandates from the new law is not productive.
Co-opting local socio-political organizations is a dangerous endeavor, and some of the negative effects are being felt by water chiefs in other districts in the Province.

This interpersonal confusion in roles, jurisdiction and power is translated to conflict writ large between the community and the leaders. In most communities, depending on their size, there will be at least one of the two positions of water chief and distributor. As the once principled managers of water distribution, the water chiefs and distributors were tasked with ensuring the distribution of water according to order, crop selection needs, and “turns” of priority. Once a position of power and prestige, many in the communities where this tactic has been employed have begun to disregard and, in some instances, distrust the information regarding the amount of water and timing of that week’s irrigation allocations. The reactions to water chiefs and distributors are mixed, though with certainty I can say that the old view of these individuals as moral and honorable public servants is now the minority view.

Water chiefs and distributors run the risk of being seen locally as accomplices in what is perceived to be the state’s scheme to dismantle and disempower the rural sector of Peru. They are criticized publicly as impotent in communicating their needs to the new directors of the ALA. This lack of power to have the community’s needs heard results in another allegation that these previously moral individuals have fallen into the trap of the coima, or the bribe, and have taken this position simply to enhance their financial wealth at the expense of the community.

Community Recommendations

Although not the intended target of the law, rural farmers are finding themselves in a position where they are now trying to figure out whether or not to accept the de jure management that has been handed to them in a bound folder, or continue their de facto
management practices which have been formulated through an iterative and participatory process. The results from the cultural consensus analysis clearly show that the absence of written law does not equate to unclear management practices. Furthermore, the results from Antabamba suggest that the more communities become involved in implementing the reforms, the more confusion there is over authority, rights, and conflict resolution.

In my opinion, one of the major underlying tensions is an economic issue. It is an extremely complicated and fragile issue because as I have shown, ayni is more than economic exchange. It is both personal relationships and economic relationships, and the results of deterioration between exchange partners can have a ripple effect on the overall strength of community relations.

To put it simply, ayni, as it is practiced today, is not very compatible with market-based economic activity. The degree to which Antabamba is still predominantly engaged in ayni is difficult to say, and it would be interesting to see where they are, now that it has been two years since the implementation of the new management system. It is clear that market-based activity is on the rise, and more and more young people are leaving Antabamba for the city of Arequipa to look for work. Being a sharecropper with little or no land of your own in Antabamba is not compatible with the economic realities that are slowly but effectively pushing their way into these rural communities.

In Charcana, where the majority of agriculturalists owns their own land and are engaged in reciprocal economic exchange, the impact of the market on their daily lives is more subtle, though seems more severe when it does. For example, I believe the tensions between fulltime residents in Charcana and emigrants who return for the water
fiesta are a prime example of the incompatibility. What I believe it will eventually come down to is whether or not small-scale agriculture can survive in a cash-based economy. Resentment towards those who had left Charcana to enter a cash economy by those who are still working is a sign that cash is no substitute for social relationships. There is an intangible aspect of *comunitas* (Turner 1969) associated with act of communing with one another, that I think is reflected in the network structure of the village.

In the final chapter of *Friction*, Anna Tsing states, “Utopian critiques are critical perspectives we cannot do without—even if they will not be realized” (2005:268). I agree with this statement, and believe that it does apply to the case of water management in La Unión. As everyone kept telling me in anticipation of the water fiesta, there is something beautiful about the system. Unfortunately for those who would like to preserve the system as it is, the completion of the road to Charcana brought with it the economic realities of Peru today.

In the same vein of discouraging organizations to usurp local authorities to carry the state’s mandate, I would discourage communities from trying to map the new political system on top of their existing one. Starting new, but with an understanding of how and where to reincorporate the most important and missed elements of the old system may be the best approach to ensuring sustainability of the community and the precious water upon which the community is so dependent.
Sexo ____________________
Edad ____________________
Contesta con “si/acuerdo” o “no/deacuerdo”

1. Cuando quiero agua, pido agua del presidente del Comité/Comisión de Regantes.
2. Una persona debe recibir agua cuando la pide.
3. Cuando alguien se roba agua durante el turno de otra persona que está regando, la persona que robó paga directamente a la persona de quien ha robado el agua.
4. La Autoridad Local de Aguas (ALA) no está involucrada en riego en nuestra comunidad.
5. El robo de agua no es un problema en nuestra comunidad.
6. Nuestra comunidad siempre empieza a regar de canto, empezando de abajo y regando hacia arriba.
7. Necesito pagar al presidente/repartidor cada vez que yo quiero agua.
8. El gobierno nos ayuda mucho con nuestros problemas de riego.
9. Conductores necesitan pedir agua del propietario de la tierra que están cultivando.
10. Apuntalar una compuerta para permitir el paso de un poco de agua no es robo de agua.
11. Estamos acatando La Nueva Ley de Recursos Hídricos (No. 29338) del 2009 en nuestra comunidad.
12. Yo recibo compensación financiera cuando no recibo el agua que debo recibir.
13. Me voy a la Junta de Usuarios en Cotahuasi cuando tengo problemas con riego.
14. Solamente yo pago tarifas de agua para la tierra que estoy regando este año.
15. Normalmente no recibo la cantidad de agua que creo que necesito.
17. Yo recibo agua con la frecuencia que necesito.
18. Una de las razones por las que tenemos problemas con el riego es porque hay personas que no pagan sus multas cuando no asisten a las faenas.
19. Las personas no deben tener turnos reducidos de riego cuando hay lluvia.
20. Agua es la propiedad de la comunidad, y podemos decidir que queremos hacer con el agua.
21. En nuestra comunidad, nunca empezamos a regar en un punto que no es la cola o cabeza del canal.
22. Turnos que riegan pan de llevar deben recibir prioridad en la distribución de agua en comparación a los que riegan alfalfa o pasto.
23. Si yo veo una compuerta que tiene una piedra, palito u hojas que hacen que la compuerta quede un poco abierta de modo que el agua esté escapándose, soy responsable de repararla para que el agua no se escape más.
24. La tarifa del agua que pago una vez al año es la única que necesito pagar para tener acceso al agua.
25. Conductores no pagan tarifas de agua, solo los propietarios.
26. La distribución del agua en mi comunidad es equitativa.
27. No entiendo cómo me afecta la Nueva Ley de Recursos Hídricos (No. 29338) del 2009.
28. No me compensan con más agua cuando mi turno de riego está cortado y yo sé que tengo derecho a más tiempo.
29. Yo resuelvo conflictos con otros usuarios personalmente y sin la intervención del Comité/Comisión.
30. Cuando tengo una opinión sobre la gestión del agua en mi comunidad, me dan la oportunidad para expresarla.

31. La persona más poderosa en la distribución del agua dentro de nuestra comunidad no es el presidente del Comité/Comisión.

32. Nuestro sistema tradicional de la gestión de agua es mejor que la Nueva Ley de Recursos Hídricos (No. 29338) del 2009.

33. Si yo quiero, puedo aumentar la cantidad de terreno que yo uso para la agricultura.

34. El gobierno nacional no entiende los problemas que tenemos con riego en nuestra comunidad.

35. Las reuniones del Comité/Comisión mejoran la gestión de agua en nuestra comunidad.
APPENDIX B
NETWORK QUESTIONNAIRE FOR INSTITUTIONAL NETWORKS

Preguntas demográficas:
1) Por cuántos años ha trabajado su institución/organización en algún tema de irrigación en la Provincia de La Unión?
2) Cuántas personas trabajan para su organización/institución?
3) En un mes, cuantas veces su organización/institución sale a la comunidades fuera de Cotahuasi para trabajar con la gente en algún tema relacionado a irrigación?
4) De 0-5 (0 significa que no trabajamos en el tema, y 5 significa que es nuestra misión y primer enfoque el tema de agua y de riego) por favor, evalúe la participación y compromiso de su institución u organización en los siguientes objetivos relacionado al manejo de agua de irrigación en La Unión?
   a. Creando/implementando políticas
   b. Mejorando la infraestructura del sistemas de irrigación
   c. Dando Asistencia técnica directamente en las comunidades y chacras
   d. Construcción de Asociaciones o grupos de usuarios
   e. Representación y relaciones comunitarias
   f. Financiamiento de proyectos de irrigación
   g. Monitoreo de la cantidad y/o calidad de agua
5) Como piensa usted que la Nueva Ley de Recursos Hídricos ha afectado su organización y su trabajo:
   a. Nunca escuchamos de la Nueva Ley de Recursos Hídricos
   b. Conocemos la ley pero no aplica a nuestra institución/organización y trabajo
   c. Conocemos la ley y es aplicable a nosotros pero todavía no hemos hecho cambios pero intentaremos hacer cambios
   d. Conocimos la ley e hicimos algunos cambios en nuestro trabajo
   e. La nueva ley ha cambiado la mayoría de nuestras actividades o hemos cambiado nuestro misión completamente
6) Cuántos aspectos de la Nueva Ley de Recursos Hídricos, incorpora Ud. en su trabajo con las comunidades?
   a. Nada
   b. Algunas partes
   c. Todo
   d. Nuestra organización no trabaja en las comunidades
7) Como usted clasifica su organización? (Asociación, ONG, entidad gubernamental, etc.)
Encuesta de Redes de la Organizaciones/Instituciones

0 – Nunca
1 – Rara vez
2 – A veces
3 – Frecuentemente

Preguntas de Relación:
  1) Cuál es la probabilidad que trabaje en colaboración con ______________________ en algún tema/proyecto o en algún tipo de capacidad relacionada a agua de irrigación?

  2) Cuál es la probabilidad que solicite a ______________________ información o una propuesta de colaboración relacionada a POLITICA y/o ADMINISTRACION del manejo de agua de riego en La Unión?

  3) Cuál es la probabilidad que solicite a ______________________ información o una propuesta de colaboración relacionada a FINANCIAMIENTO DE PROYECTOS relacionado al manejo de agua de riego en La Unión?

  4) Que es la probabilidad que comunicara con ______________________ sobre información o una propuesta de colaboración relacionada a IMPLEMENTACION DE PROYECTOS DE INFRAESTRUCTURA relacionado al manejo de agua de riego en La Unión?

  5) Que es la probabilidad que comunicara con ______________________ sobre información o una propuesta de colaboración relacionada a CAPACITACIONES O TALLERES SOBRE NEUVAS TECNICAS A POPLACIONES EN SUS COMUNIDADES relacionado al manejo de agua de riego en La Unión?

  6) Que es la probabilidad que comunicara con ______________________ sobre información o una propuesta de colaboración relacionada a CALIDAD O CANTIDAD DE AGUA DE RIEGO relacionado al manejo de agua de riego en La Unión?
Organizational Network Survey

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APPENDIX D
NETWORK QUESTIONNAIRE FOR COMMUNITY NETWORKS

PARTE 1: Elige Una Opción

0- No hablo/conozco con esta persona
1- Imposible
2- Es posible
3- Probable
4- Muy probable
5- Definitivamente

1) Es probable que Ud. iría a solicitar a ................por asistencia con esfuerzo humano en algún tema relacionado a su chacra (incluyendo limpieza de canales de su chacra, irrigación, sembrado, cosecha, preparación del terreno)?

2) Es probable que Ud. iría a prestarle equipo de ...............para usarlo durante la irrigación, sembrado, cosecha o preparación de la tierra (yuntas, tractores, chakitanqya, etc.)?

3) Es probable que Ud. acuda a................para obtener información acerca de la distribución del agua?

4) Es probable que Ud. le pida un préstamo de dinero a ........?

5) Es probable que Ud. intercambie semillas u otros productos con ............?
APPENDIX E
GLOSSARY OF COMMONLY USED QUECHUA AND SPANISH PHRASES

Antabamba: community making the most rapid transition to management practices outlined in the New Law of Hydraulic Resources; located in the northeastern portion of La Unión Province.

Aransaya: “upper-half” in reference to the dual organization of moieties in the Andes, see saya.

Ayllu: a kinship or social unit most commonly compared to moieties (though the division of descendant groups is not always as clear in aylus).

Ayni: a social contract of reciprocal relations with three varying levels of exchange.

Boca toma: location on a mountain where water exits; source of a natural spring.

Chacra: agricultural fields in the mountains located outside of the community center

Charcana: more traditional community of the two research sites; located in the western portion of La Unión Province.

Chaupi: center

Compadrazgo: godparent.

Cotahuasi: capital of La Unión province, and headquarters for many regional organizations involved with irrigation water management.

Encomienda: a grant of land and “Indian” laborers given to Spanish colonists by the King of Spain.

Faena: communal work service; labor tax levied by the community on its residents for projects that benefit the whole community.

Hacendado: landlord, owner of large parcels of land that involve sharecropping practices.

Hacienda: large land estate usually for agricultural production.

Humara: upper moiety of Charcana (aransaya).

La Unión: name of province where Antabamba and Charcana are located.

Mayorista: a person in the community with large land holdings (usually over three topos) and/or abundant cattle stocks.
Mink’a: reciprocal exchange whereby a quantity of goods and/or a meal is exchanged for work or services. Sometimes referred to as asymmetrical reciprocity.

Paccha: name of the canal system in Charcana.

Pachamama: “earth mother.”

Pagos: payments made to pachamama or other spirits.

Patrón: financial and logistical sponsor of a community party.

Peon(es): indigenous or rural workers on a hacienda.

Q’apas: burnt offerings made pachamama and other mountain spirits.

Repartidor(es): person or persons who assigne and distribute the irrigation water in communities

Saya: division of land or resources into two halves; associated with moiety divisions between aransaya and urinsaya; also refers to altitude of fields in the community of Charcana.

Supalta: lower moiety in Charcana (urinsaya).

Tinkay: ceremonial blessing made to spirits; often associated with ritual prayer regarding requests of Mother Earth.

Tinku: literally translated means “encounter”; also known as a ritual fight between two moieties or communities.

Topo: a unit of measurement used in rural Andean communities. It is more or less equivalent to one-third of one hectare. In acres, one topo is equivalent to about 0.83 acres.

Urinsaya: “lower half” in reference to the dual organization of moieties in the Andes, see saya.

Voluntad: symmetrical exchange takes place and no accounts are kept (usually within kin groups).

Waje-waje: symmetrical exchange between people or families.

Yarqa Aspiy: also known as the fiesta de agua, or the “water fiesta.”
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BIOGRAPHICAL SKETCH

Timothy Podkul was born and raised in Buffalo, NY. He attended Connecticut College in New London, CT where he received his B.A. with Honors in anthropology and a certificate from the Toor-Cummings Center for International Studies in the Liberal Arts (CISLA). For three years, he worked for Development Alternatives, Inc. (DAI), an international development firm based in Washington, D.C. While there, he worked on agricultural and natural resource management projects in Ethiopia, Zambia, Croatia, Haiti, South Africa, Bolivia, Colombia, El Salvador and Nicaragua. He conducted field-based workshops and assisted with project development, management, and monitoring and evaluation. In 2006 he began his M.A. degree in cultural anthropology at the University of Florida. His research focused on the impact of mining contamination on human and environmental health in rural Andean mining towns in the Oruro Department of southwestern Bolivia. In 2008 he began his doctoral studies at the University of Florida. He has been the recipient of both a Fulbright IIE Fellowship and a National Science Foundation Doctoral Dissertation Improvement Grant. He is fluent in Spanish and has a working knowledge of the Quechua language.