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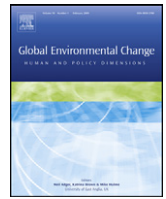
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Contents lists available at SciVerse ScienceDirect

Global Environmental Change

journal homepage: www.elsevier.com/locate/gloenvcha

Vulnerabilities, competition and rights in a context of climate change toward equitable water governance in Peru's Rio Santa Valley

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ARTICLE INFO

Article history:

Received 7 January 2011

Received in revised form 9 February 2012

Accepted 11 February 2012

Available online 5 April 2012

Keywords:

Water governance

Vulnerability

Water competition

Equity

Climate change

Water rights

Natural resource conflict

Andes

Peru

ABSTRACT

As glacial retreat changes the hydrology of Peru's Rio Santa, water demand is growing, pollution is worsening, and competition for water among economic sectors, political jurisdictions and upstream and downstream water users is intensifying. The vulnerability of highland communities, food producers, and poor urban neighborhoods in the Santa watershed in the face of these changes is magnified by inequities in water governance, giving rise to water conflict. Peru's new water regime defines water as an economic good and seeks to centralize control over water. This article analyzes implications of this regime for ensuring equity and managing conflict. It concludes that Peru's water regime is more likely to address equity issues when faced with concerted citizen action.

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1. Introduction

Competition for water in Peru's Río Santa watershed is increasing, pitting economic sectors, jurisdictions, and upstream and downstream users against one another. This competition is heightening the vulnerability of urban and highland rural water users and provoking local and regional conflict. The vulnerability of water users faced with climate change can be exacerbated or reduced by water governance institutions. My central research question is whether Peru's water regime—defined as a complex of laws, institutions, programs and policies—will be sufficiently equitable to afford protections to vulnerable water users in a context of climate change. Over the past 25 years, the mountain glaciers that feed the river have shrunk by some 15 percent (Spang, 2006; Zambrano-Barragan, 2007, p. 9). Seasonal variation in flow is more pronounced, and glacial melt is forming new mountain lakes and overflowing others. In the near term, glacial retreat increases the risk of avalanches and mudslides, but the long run, demand will probably exceed the dry-season volume of the river (Chevallier et al., 2004). Climate change scientists and hydrologists have focused on potential disasters, but have paid less attention to more insidious long-term risks faced by poor urban households, rural

communities, and the ecosystems themselves as water demand for export agriculture, power, and urban use increases (Painter, 2007; Leavell, 2008; Perez et al., 2010).

Those at risk of losing of access to the water essential for their basic domestic and livelihood needs are considered vulnerable, but vulnerable to what? Suarez et al. (2009), argue that people are vulnerable to outcomes rather than hazards: the root causes of vulnerability have more to do with social structure than with natural processes or events (see also Ribot, 2009; Mearns and Norton, 2010). Building on this perspective, I argue that for Andean water users vulnerability in the face of climate change is not a simple function of water scarcity, poverty or a lack of entitlements. It can be produced by a water regime that favors some users and uses over others or heightens competition by encouraging new demands. Vulnerability reduction and conflict management will ultimately depend on how the international, national and regional governance institutions that comprise this regime address equity concerns, including pollution control, fair allocation of water, representation of all competing user groups and recognition of the diverse ways in which water is valued and understood.

Using the Río Santa watershed as a case study, I ask whether Peru's water regime can foster equitable water allocation in the face of hydrologic change and whether this is likely in the absence of direct action by vulnerable water users. The following section outlines research methods. Section 3 explores the relationship between poverty, governance, vulnerability and inequity in Peru. It

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argues for a definition of vulnerability that foregrounds exclusion from and inequities in water governance. Section 4 presents findings on competition for Río Santa water and water conflict. Section 5 assesses the equity implications of Peru's water regime. I conclude by asking whether and how equitable water governance can be achieved.

2. Research methods

The focus of my research is the Peruvian water regime and its implications for equitable governance of the Río Santa watershed and the vulnerability of its water users. The study is necessarily multi-scalar and draws on Newell (2008, p. 525) who argues that analysis of environmental governance “has to operate across a number of sites”. While vulnerabilities resulting from loss of water rights or access to water are experienced in place, the interrelated impacts of upstream and downstream water uses suggests the need to address the watershed as a whole. Policies at the national, regional and watershed levels define the terms of water competition, deepen or reduce vulnerabilities, and reflect both regional and national political and economic imperatives. In this case, the Peruvian government, with InterAmerican Development Bank (IADB) and World Bank guidance, has committed to developing watershed-level institutions as a linchpin in the larger architecture of regional/watershed governance institutions—an architecture resulting from a complex interplay between various Peruvian government bodies and international institutions. With this in mind, I used interviews with key informants engaged in water governance at the national, regional and local levels to identify the imperatives that lie behind policy production and to analyze how and if the contemporary water regime promotes equity or contributes to vulnerability among water users. My intent was to learn about the nature of watershed governance and challenges to water governance posed by the threat of climate change from the perspectives of those who were actively engaged in the governance process.

Field research for this paper was conducted in 2008, 2009 and 2011, with assistance from graduate students Ana Maria Rueda, Nancy Galewski, and sociologist Tito Cuevas. Interviews were open-ended in order to capture a broad range of issues and perspectives on watershed governance practices and their impacts on different user groups. While our interviewees were restricted to those who interacted with the water regime in a professional or official capacity, the sample included small cultivators and livestock producers and representatives of poor urban water users as well as national officials and water management specialists. We interviewed approximately 50 irrigation association officials, mayors, campesino community leaders, NGO staff, and environmental committee members in the middle and upper watershed. In Lima, I interviewed officials from the National Water Authority (ANA), the Ministry of the Environment, and the InterAmerican Development Bank. Interview data were supplemented by attendance at local and regional meetings on environmental and watershed governance and by analysis of documentary materials, including project documents, the water law and implementing documents, local blogs and Peruvian press articles. We also visited sites of water competition in the upper reaches of the watershed from the Santa's headwaters at Lake Conococha down to Caraz and Huallanca. Rueda also conducted informal interviews in Chimbote. The Peruvian natural resource and water governance policy environment has changed rapidly since the election of President Ollanta Humala in June 2011. Field research took place before the election, and my analysis is confined to this period.

3. Vulnerability and equity in Peru

This research begins from the theoretical premise that the causes of vulnerability in the face of climate change are social (see e.g. Ribot, 2009; Mearns and Norton, 2010). This section first explores the problematic relationship between water scarcity and vulnerability in Peru. It then questions the assumption that vulnerability is mainly attributable to poverty or a lack of capabilities. I conclude that it may be more helpful to look to the policy environment for root causes of vulnerability and ask whether vulnerability may be better thought of as a symptom of inequitable water governance.

3.1. Water scarcity and vulnerability

Peru has more fresh water per capita than any other South American country (Olson, 2006), but it is unequally distributed. Limited access to water is often a product of power distribution and a lack of political representation rather than water scarcity per se. Swyngedouw (2006, p. 52), for example, argues that “particular social groups lack access to water not because of real or alleged water scarcities, but because of differential entitlements associated with differential power relations”, and that scarcity may be produced when fear of a “hydro-socio-ecological disaster” is used to justify investment in big water projects and water commodification.

Scarcity is more likely to be produced where water rights are simple and transferrable. Water commodification manufactures scarcity by exclusion and/or pumping demand (just as real estate markets exclude the poor from housing while creating new demands for real property). In Peru, where water is not fully commodified, water scarcity and vulnerability may be also manufactured by policies emphasizing interbasin water transfers for mining, export agriculture, and power generation.

In a context of perceived world scarcity, Peru becomes an attractive candidate for real and virtual water exports in the form of water-intensive crops, despite the severity of water stress in places where population and economic activities are concentrated (Hoekstra and Hung, 2005). The country already exports virtual water in the form of asparagus and other crops (Chapagain and Hoekstra, 2008; Hepworth et al., 2010). In an unfettered water market, “excess” real water would move from the rain forest and the Andes, where it is integral to the maintenance of natural and agroecosystems, to the fertile, but arid coast where export agriculture predominates. Water transfers to mining and export agriculture, the foreign-exchange generating industries favored by the Peruvian government, can generate revenues for production of valuable social goods. However, we can assume that within the watershed the health and livelihoods of the poorest and most vulnerable water users would be placed at greater risk as a result. As the 2006 Human Development Report puts it, “Water scarcity is “manufactured through political processes and institutions that disadvantage the poor” (UNDP, 2006, p. 2).

3.2. Vulnerability, poverty, and water governance

Vulnerability in the face of climate change has often been linked to poverty or to a lack of assets or capabilities (Sen, 1999). In the Río Santa watershed, many of those vulnerable in the face of climate change are neither destitute nor lacking in capabilities; rather their livelihoods and lifeways are intimately tied to environments threatened by natural phenomena, economic activities that produce hydrologic change, and governance structures that fail to promote equitable distribution of water resources.

Individuals and households are at risk, as are communities, ecosystems and the precarious sets of agroecological and social

relationships that define Andean societies (Boelens and Zwarteveen, 2005; Boelens, 2009). Threats to this interrelated set of economic, agroecological and social activities often go unnoticed by policymakers, largely because those dependent upon them live in remote areas and may lack the social and economic resources needed to participate fully in water governance activities at the national or even the watershed level.

Mearns and Norton (2010) correctly point to the role of structural factors in producing vulnerabilities, but define certain groups as particularly vulnerable—the poor, women, young, children and the elderly. In Peru, it may be more productive to look at the vulnerability or, conversely, resilience of these and other groups not in terms of their intrinsic characteristics, but in terms of their access to what Ribot and Peluso (2003) term “a bundle of powers” or the degree to which they can influence the distribution of resources or decision making.

In the absence of equitable water governance, water pollution and diversion of water from one place to another can deepen the vulnerability of neighborhoods, communities and ecosystems in the face of climate change and give rise to conflict. Vulnerability may be understood then not as a direct result of scarcity or as a function of poverty and/or a lack of adaptive capabilities, but as the product of a water regime that excludes some water users or denies them the power to shape water allocation decisions.

Alternatives to exclusionary water regimes are present in some Andean communities where water rights are tied to community membership, place, water supply, the agricultural cycle and labor contributions to system operation and maintenance (see e.g., Lynch, 1988; Gelles, 2000; Gentes, 2001; Trawick, 2003; Boelens, 2009). These regimes are at least normatively responsive to vulnerabilities produced by drought. In some cases they require return of water to the river or to the irrigation system in usable condition. In my study of irrigation in northern Peru, I found complementarities between water use for milling, cloth processing, micro hydro, and irrigation as well as between upstream and downstream agricultural uses (Lynch, 1988). Hypothetically, similar types of complementarity could play out at the river-basin level. If this were the case, upstream water users would be obliged to maintain the capacity of the landscape to store water and to use it in ways that permit urban and agricultural reuse at lower elevations. Indeed several informants argued for this type of obligation.

The research suggests that poverty is not the driving factor in the production of vulnerabilities associated with lack of access to water. Rather, in a competitive environment, exclusionary water governance structures cause and exacerbate vulnerabilities and continue to exacerbate them by stimulating water demand and encouraging polluting land uses. Alternative modes of water governance are present in many Andean communities, but do not appear at higher levels.

3.3. Equity and the reduction of vulnerability

As the above discussion suggests, water equity could help to reduce vulnerability. As Ingram et al. (2008) argue, water equity has multiple and at times competing meanings. Attention to equity, they conclude, entails attention to value differences and treating them even handedly. In meetings with community leaders and accounts of protests in the Santa watershed, the phrase “Water is life” was often repeated. This phrase resonates with the idea of the social minimum, defined in the 2006 Human Development Report as “access to resources sufficient to meet basic needs and live a dignified life.” This view was articulated in the 1969 Peruvian Water Law. It was challenged in the 1990s by national policies favoring water marketization and natural resource development, but reappears in preamble to the 2009 law.

Equity has economic and political dimensions. Wilder (2008) defines economic equity in terms of access, affordability, and productivity; political equity has to do with transparency and user participation in the design and implementation of water policies.

It is fundamentally about voice in decision-making. A policy environment that silences particular water user groups is likely to deepen their vulnerability. In Peru, political equity is also about respect for indigenous and community water rights. In these rights-based regimes, equity refers to (1) fair assignment of water rights, (2) timely provision of clean water to those with rights, (3) prioritization of domestic and subsistence needs during droughts, and (4) fair division of responsibility for infrastructure construction and maintenance.

Many scholars have criticized Peruvian water governance practices as inequitable due to (1) a durable bias favoring coastal development at the expense of the sierra; (2) devolution of water management responsibilities to national and regional institutions lacking the capacity, resources, power or will to control inappropriate water uses; (3) assignment of regulatory authority to government agencies whose mandate is development and not environmental protection; (4) disregard for Andean water management practices and institutions; and (5) an economic framing of water security.¹ If inequitable water governance is the primary cause of vulnerability for users of the Santa's waters, their ability to adapt to climate change will depend upon the capacity of Peru's new water regime to assign water rights equitably, to control pollution, to monitor water access throughout the year and revise allocation rules during dry periods, and, more broadly, to represent the interests of potentially vulnerable rural communities and urban neighborhoods, and those of the ecosystems upon which they rely.

Conversely, the research revealed that inadequate attention to equity in the face of growing water demand and changes in water availability has intensified competition for water in the Río Santa watershed. The nature and intensity of competition has been influenced by local and regional factors and by the national water regime and its expressions within the watershed.

4. Competition in the Río Santa Watershed

Our research in the watershed indicates that the nature of water competition shifts as one moves from the Río Santa's headwaters to its outlet on Peru's north coast (Fig. 1, Table 1). The sets of social actors with interests in the resource are quite diverse, and this summary does not pretend to capture the interests of all those whose lives and livelihoods are affected by watershed governance practices. That said, we found that competition for the waters of the Río Santa and its tributaries occurs along three main axes. First, a number of disputes pitted one jurisdiction against another. Conflicts among neighboring communities are common, and, at the watershed level, the regions of Ancash and La Libertad are at odds over allocation of the river's waters. Second, an even larger number of conflicts involved competition for water resources by different economic sectors or subsectors. The principal economic activities competing for Río Santa water are agriculture (the major consumer), mining, hydropower, and urban use. Third, many conflicts have an upstream–downstream dimension. Competition along all three axes is likely to intensify with climate change.

This section opens with a review of the major axes of water conflict in the upper reaches of the watershed. It then details a multisectoral conflict in the mid-basin, the Callejón de Huaylas,

¹ Renique (2010) and Mayer (2001, 2009) offer useful overviews of the broader social tensions that underlay past inequities in water governance. For critiques of the economic framing of water security see Ingram et al. (2008), Finger and Allouche (2002), Boelens and Zwarteveen (2005), and Budds (2004).

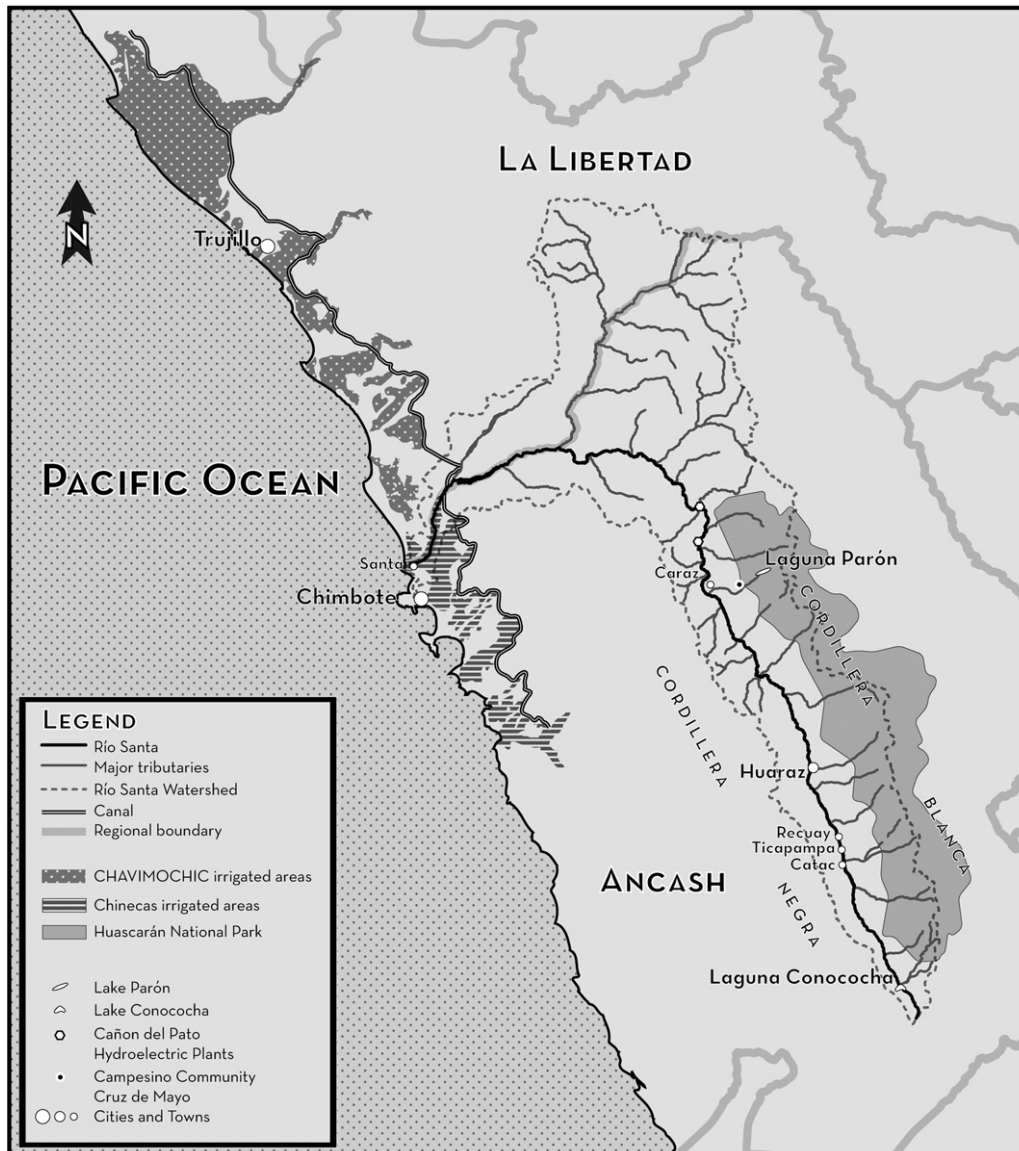


Fig. 1. The Río Santa Watershed including irrigated areas (CHAVIMOCHIC and Chincas) served by water transfers from the Río Santa, and the boundaries of the Huascarán National Park. (Map prepared by Jason Vargo.)

and offers a brief summary of conflicts in the lower reaches of the basin. Lastly, it addresses an emerging area of contention that would pit upstream against downstream users. In each case, I try to show the implications of water governance practices as they contribute to or alleviate vulnerability.

4.1. Mining, pollution and water conflict in the upper basin

Near the Santa's headwaters in the high Andes (above 3300 m), most disputes center on mine pollution. The mining sector mushroomed in the 1990s with abatement of civil strife and neoliberal development policies. In 2010, minerals accounted for 61 percent of export earnings (Peruvian Times, 2011). A portion of royalties from transnational enterprises returns to regional and local governments (Damonte, 2007; Glave and Kuramoto, 2007; Szablowski, 2007). Mine royalties are narrowly targeted; the environmental impacts of mining and ore processing are diffuse. This has provoked disputes throughout the upper basin (Galewski, 2010).

Mineral exploration, extraction and road building also bring arsenic and heavy metals to the surface and into the Río Santa, and leaching from mine tailings continues unabated. Mining is blamed for stream acidification and reduction of vegetative cover in Huascarán National Park, a reserve encompassing much of the Cordillera Blanca and surrounding *puna* lands (Silverio, 2008). Ministry of Energy and Mines (MEM) officials charged with monitoring pollution have been reluctant to impose sanctions that could affect the financial performance of the sector (Poveda et al., 2005). This in turn has increased the vulnerability of campesino communities dependent upon shared waters for domestic use, livestock, and crops.

A December 2010 MEM decision to grant a permit for mineral exploration on the shores of Laguna Conococha, the headwaters of the Santa, led to a massive protest by livestock-producing and farming communities, urban water users, and defenders of the park. Fearing contamination of the river's headwaters, protesters blocked the highway from Lima to Huaraz and marched in the streets of the region's cities calling for cancellation of the license. Huaraz' mayor, supporting the protest, warned of the potential

Table 1
Water uses in the Santa Valley.

Population Center	Elevation	Distance from headwaters (km)	Water uses
Conococha	4050 m	Headwaters	Grazing, fishing, tourism, Huascarán National Park
Recuay	3400 m	62	Livestock, mining, agroforestry, high-altitude agriculture
Huaraz	3090 m	88	Mining, urban use, tourism, high-altitude agriculture, grazing
Carhuaz	2650 m	126	Mid- to high-altitude agriculture, small-scale mining, urban
Yungay	2500 m	153 km	Mid- to high-altitude cultivation, livestock, urban
Caraz	2290 m	163 km	Agribusiness citrus and cut flower production, food production, mining, tourism
Huallanca	1820 m	205 km	Hydroelectric plant, little or no agriculture
Yuramarca	1430 m	215 km	Export-oriented agriculture, biofuels
Santa, Chimbote	0	343 km	Export-oriented agriculture, fish meal production (Chimbote), urban use, fishing

impacts of mine contamination on the agricultural economy of the entire watershed (El Comercio, 2010). The strike, accompanied by police violence and vandalism, stranded tourists and stalled trucking for several days. The MEM, responding to appeals from protesters and the Mountain Institute (2010), grudgingly agreed to a dialog (MEM, 2010), but the conflict abated only when the government suspended the exploration permit. The Conococha conflict reveals that while government actions initially increased the vulnerability of people whose livelihoods and ecosystems depended on relatively clean water, when faced with concerted and sustained protest the water regime eventually proved responsive to water user concerns.

4.2. Sectoral water competition in the middle basin

The Callejón de Huaylas, the middle basin of the Río Santa, extending roughly from the town of Recuay (3430 m) to the Cañon del Pato hydroelectric plant (1280 m), is home to Andean farming systems, commercial agriculture, small-scale mining, and numerous small urban settlements. Despite urbanization, outmigration, and land abandonment, the Callejón remains a reservoir of agrobiodiversity and its small farmers play a key role in regional food security. Rural and urban Callejón residents face the greatest risk of landslides triggered by glacial melt. Also, reduced dry-season flows concentrate pollutants, and deterioration of potable water and irrigation infrastructure built in the 1960s and '70s is reducing water accessibility for small farmers and domestic water users.

Competition between irrigators, domestic water users and the energy sector resulted in open conflict over rights to Laguna Parón, a lake high in the Andes fed by five glaciers and impounded behind a morainal dam. In 2008, the Cruz de Mayo campesino community blocked access to the lake to protest water withdrawals for power generation made by the Egenor Company, a Duke Energy subsidiary authorized by the Peruvian government to manage the Cañon del Pato hydroelectric plant. The run-of-the-river plant, built in 1948, provides power to the region's cities and industries and to the national grid.

To offset variations in Río Santa flow, Egenor drew water from glacial lakes, including Laguna Parón (Leavell, 2008). By controlling the lake's outlet, Egenor could time water releases to meet peak power demand. The company claimed the right to control releases partly on its purported, if disputed, property rights to the lake and partly on the claim that its technical expertise could prevent disaster in case of a snowslide into the lake (Fraser, 2010; Carey, 2008). But Egenor's releases were incompatible with the irrigation needs of communities that held long-standing rights to lake water (Aiello, 2009). Water was frequently made available at the wrong time of day, and its flow, too rapid for irrigation, eroded hill lands. The municipality of Caraz (population 23,580) also depended upon the lake for its domestic water supply, but during dry periods Egenor's releases left insufficient water to meet the town's needs. For this reason, Caraz supported Cruz de Mayo's blockade, which continued through 2009.

The conflict was about rights claims based on two fundamentally different views of how and by whom water should be governed. Rights claims based on the belief that only management by experts could prevent climate-related disasters were pitted against claims based on "traditional" rights based in local knowledge and underlain by a sense of place-based equity. As one local activist put it, "We must make clear that the water could disappear and with it the life support for many communities and the town of Caraz. The right to life and to manage one's own resources is in play" (Salvemos Parón, 2009). This latter discourse proved to be a resource that sustained local protest over an extended period.

In an effort to resolve the conflict, officials from Caraz and surrounding communities formed a Commission for the Recuperation of Laguna Parón, which petitioned the government for redress. It fell to Peru's newly created National Water Authority (ANA) to resolve the dispute.² Compromise on the timing and volume of releases could have reduced the risk of disaster and address agricultural and domestic needs. But conflict resolution was impeded by Commission members' distrust of plant managers and national government representatives. When government officials invited Commission members to Lima to discuss a compromise, they refused and insisted on meeting in Caraz, where community members and urban residents could provide support.

In February 2010, following lengthy negotiations, the government announced that Egenor was relinquishing its claim to property rights in the lake and its shores, and that Laguna Parón would become part of Huascarán National Park and "the property of all Peruvians" (Fraser, 2010). The resulting accord gave campesino communities control over releases from the lake for agriculture, drinking water and hydropower, but stipulated that communities must let Egenor lower the lake level if it becomes dangerously high. In April 2010, ANA affirmed its respect for local water rights, and Adolfo de Córdova, Minister of Agriculture stated, "Community members have first access to water. They will decide how much to use for agriculture and domestic use. This is the way it must be" (Peralta, 2010). Resolution of the Laguna Parón conflict, even if temporary, indicates that Peru's new water regime can guide water governance in a more equitable direction, but that the spaces for meaningful participation in water management decisions remained restricted.

4.3. Jurisdictional and sectoral competition in the lower basin

In the lower basin, river water is used for export agriculture, hydropower, and urban consumption. Two huge irrigation schemes, CHAVIMOCCHIC, in the region of La Libertad, and Chincas, in the region of Ancash, compete for the Santa's waters. CHAVIMOCCHIC, still under construction, diverts the river to four

² This account draws largely on the meticulous reporting of Peru's Defensoría del Pueblo, or Ombudsman's Office, which identifies and monitors conflicts that involve government agencies and makes recommendations for conflict resolution (See Defensoría del Pueblo (2009)).

smaller river basins in the region of La Libertad for irrigation and hydropower and to the city of Trujillo for urban and industrial use (Oré et al., 2009; Kus, 1987). Our interviews revealed that contestation between the two regions has undermined plans to create a Council for the Management of Hydraulic Resources (CRHC) for the Río Santa watershed, as mandated by the 2009 water law. Creation of this CRHC is seen as a key component of Peru's water modernization project financed by the World Bank and the InterAmerican Development Bank (IDB).

The Santa is also the main water source for Chimbote, Peru's third largest city. About 70 percent of Chimbote's inhabitants live in informal settlements; 30 percent lack access to potable water (Foronda, 1998). Chimbote participants in a 2008 workshop noted that residents of low-income neighborhoods not only had problems with access to water, but complained about pollution from fishmeal plants, most of which are located in what are now residential neighborhoods.

4.4. Upstream–downstream competition

While water competition in the Santa Valley is largely local, upstream–downstream imbalances may become serious as water flow diminishes. The upper reaches of the Santa watershed account for 40 percent of the watershed's irrigated area and 70 percent of its irrigators, while the lower basin accounts for some 70 percent of irrigated area (about 135,000 ha) and 30 percent of irrigators (Hendricks, 2008). As noted above, large agribusiness enterprises predominate on the coast, and small farms in the higher reaches of the watershed. The two groups of irrigators operate according to different water allocation rules. Landowners in the CHAVIMOCHIC irrigation system are entitled to a fixed yearly allocation of 10,000 m³/ha (Chanduví, 2006). In contrast, the water rights of highland irrigators are defined as a share of available volume. This means that while coastal irrigators expect a fixed amount of water during the growing season no matter what the weather, highland cultivators get less water if it is scarce. In 2008, Peru's Association of Exporters, which represents coastal agribusiness enterprises, demanded that the government guarantee their access to sufficient water to prevent anticipated losses. If these demands are to be met in times of drought, water would have to be diverted from the highlands, deepening the vulnerability of highland food producers and urban water users.

4.5. Competition, vulnerability and governance

The actual and potential conflicts described above suggest that absent equitable, flexible, and inclusive water governance institutions and policies, competition for water will intensify, exacerbating existing inequalities in access to relatively clean water and increasing the vulnerability of already disadvantaged populations in the watershed—highland campesino communities and poor urban neighborhoods. Also at risk are the ecosystems on which the communities depend. This in turn will make it harder to respond to new threats posed by climate change. While equity is difficult to achieve given the Peruvian government's continuing emphasis on mining and export agriculture as engines of economic growth, resolution of the Laguna Conococha and Laguna Parón conflicts suggests that it is possible.³ The ambivalent role of Peru's

³ President Alan García Pérez aggressively asserted the government's right to reallocate natural resources. In two essays entitled "El perro del hortelano," García Pérez (2007, 2008) argued that communities should not be allowed to sit on resources that could be developed for the national good. Indications are that campaign rhetoric notwithstanding, his successor Ollanta Humala will support similar policies, although he has paid greater attention to social inclusion and is requiring that indigenous peoples be consulted before extractive projects move forward (Economist, 2011a, 2011b).

water regime with regard to equity and vulnerability in the Río Santa watershed stems from (1) its history and composition, and (2) the interplay between international and national objectives pertaining to water rights, governance, and citizen participation. These are discussed in the following section.

5. Peru's water regime and its equity implications

The institutions that comprise Peru's water regime are varied; their agendas reflect competing water demands and the contradictory goals of generating revenue through natural resource extraction and enhancing social stability by attending to the needs of indigenous, *campesino* and urban water users. This makes for a fluid policy environment. Three regime characteristics are likely to have significant implications for equity and vulnerability: (1) the degree to which it privileges powerful economic actors; (2) its stance with regard to water marketization; and (3) the extent to which devolution of responsibility for water management is coupled with opportunities for broad participation in water allocation decisions.

The regime's responsiveness to climate change impacts may also vary. It could continue to prioritize economic growth over adaptation to climate change. It could use adaptation instrumentally to achieve other policy goals, reinforce existing power relationships, or further centralize control over water by overriding local rights regimes. Alternatively, it could respond to climate change with rules for sharing water equitably and flexibly among places and ecosystems and across jurisdictional and sectoral lines with full participation of water users. At present, non-adaptation, instrumental adaptation, centralizing adaptation and equitable adaptation policies appear to coexist.

International institutions, notably the World Bank and the InterAmerican Development Bank, have had a significant, but not necessarily a defining influence on the architecture of Peru's water regime. This section opens with a discussion, based largely on a review of primary documents, of how these institutions have sought to apply international water governance principles to the Peruvian case. It then reviews Peruvian modifications to international prescriptions, and concludes with a discussion of the implications of national policy and programs for governance of the Río Santa watershed.

5.1. International influences

Much of the impetus for reforming Peru's water regime has come from international institutions, bilateral assistance providers, the World Water Council, and the private sector, which have sought to influence Peruvian water policy by offering grants and loans, providing consultants, generating and legitimating environmental knowledge, and lobbying. World Bank documents addressing Peruvian water governance reflect the broader perspectives of this epistemic community.⁴ They express a concern about the impacts of climate change on water supply, but favor water marketization and show ambivalence with regard to devolution and participation.

5.1.1. The push for marketization

International institutions generally favor water pricing and transferable property rights. They draw for legitimation on the

⁴ The World Bank (2006) Country Environmental Analysis, De la Torre et al. (2009) book on Latin American Responses to Climate Change, and project documentation for the Bank's Water Resources Modernization Project for Peru (2009), and at the World Development Report on Climate Change (2010), offer a good overview of the goals, norms and institutions that the Bank would favor in a water regime.

fourth Dublin Principle, which—in a shift away from the earlier conceptualization of water as a fundamental, if implicit human right—defines water as an economic good (Conca, 2006). The 2006 World Bank Country Environmental Analysis for Peru calls for water pricing, and a preparatory document for the 2010 World Development Report (WDR), De la Torre et al. (2008) offer marketization as a tool for adaptation to climate change. Marketization, they argue, would facilitate the inter-basin water transfers to alleviate regional scarcities while dam building and hydropower development would counterbalance reductions in year-round water flows. The 2010 World Development Report, building on De la Torre et al. (2008), calls for transferrable water rights, full-value pricing, and well-regulated markets.

5.1.2. Devolution with centralization

International policy recommendations on decentralization are based in the second Dublin Principle, which calls for devolution of decision making to “the lowest appropriate level, with full public consultation and involvement of users.” User involvement is not defined, nor is it clear which powers would be devolved, or to what levels. World Bank documents are similarly ambiguous. Its Country Environmental Analysis for Peru (World Bank, 2006, p. 217) recommends creation of a coordinating agency to “insulate the government from short-term demands of water users” and devolution of responsibility for river basin and irrigation district management to local councils and committees “with the involvement of a wide range of stakeholders.” The agency would produce and disseminate information about water, monitor and enforce the water law, and “raise awareness about water challenges.” Citizens and civil society organizations, consciousness duly raised, would participate in “demand side management.” A 2009 Water Resources Management Modernization Project document calls for bottom-up water management and building the capacity of participatory, integrated, river basin-level institutions, but recommends that management authority reside in a central government agency that would develop a national expert-managed water information system and inculcate a “new water culture” in policy makers and the public.

In 2011, the InterAmerican Development Bank and the World Bank authorized loans of \$10 million and \$9 million respectively for development of a central information system that would provide real-time data on Peru’s watersheds. A condition of the loans was that the National Water Authority would supervise formation of six model watershed councils (Consejos de Recursos Hídricos de Cuenca or CRHCs) authorized by regional governments and comprised of representatives of diverse water user groups. While decentralization of responsibility to the regional level is encouraged, there is little evidence of interest in working with existing community water management institutions. Justification for this disinterest appears in the 2010 World Development Report, which argues that the impacts of climate change

... may be so rapid and unpredictable that traditional agricultural and water management practices may no longer be useful. This is already the case for the indigenous communities in the Cordillera Blanca in Peru, where farmers are facing such rapid changes that their traditional practices are failing (World Bank, 2010, p. 137).

This framing of the climate threat rhetorically delegitimizes the knowledge of local cultivators and portrays campesino communities as incapable of responding to climate change without ceding management authority to a central agency. While stresses on community-managed irrigation and domestic water systems are substantial and climate change will likely exacerbate these stresses, there is little evidence to suggest that the power shift

implied by the Bank’s recommendations would result in more precise or equitable water allocation (see, e.g., Zegarra and Tuesta, 2009). It would however increase the vulnerability of highland food producers and their agroecosystems.

5.2. Peruvian variations on the theme

The water regime envisioned in these documents is being adopted in Peru, but with substantial modification. Their economic orientation and ambivalent position on subsidiarity are reflected in Peruvian water institutions, but the latter are also shaped by past practices, political priorities, the interests of powerful water users, and a history of conflict with Sierra irrigators and communities often expressed as legislative opposition to presidential initiatives.

5.2.1. Sectoral privilege

Peru’s recent water priorities have been partly driven by the administration’s enthusiasm for international trade agreements and for extraction and export agriculture. As president, Alan García asserted the government’s right to reallocate land and natural resources by enacting legislative decrees intended to support the Free Trade Agreement with the U.S. One (Leg. Decree 994), designed to encourage investment in desert irrigation, facilitated sale of community lands.⁵ Others (Leg. Decrees 1081,1083; Law 29338) authorized the creation of ANA and privatization of water used in mining (Monge and Stavenhagen, 2009). Not all these measures were implemented, but those that were helped transfer of water from food production to the mining and agro-export sectors.

Sectoral privilege has been reinforced by dispersion of authority for water governance among competing government agencies. In the 1990s, seeking to encourage international investment in mining and energy, President Alberto Fujimori encouraged sector-based water policies. By 2004, authority for water governance was divided among seven ministries: Agriculture; Defense; Economy and Finance; Energy and Mines; Housing, Construction and Sanitation; Health; and Production. Those with most clout were the Ministries of Agriculture and Energy and Mines. In addition, Special Projects like the CHAVIMOCHIC and Chincas irrigation systems enjoyed considerable autonomy.

5.2.2. Resisting water marketization

The 2009 water law replaced a 1969 water law (DL17552) that defined water as property of the state. In highland communities, associations established by law operated alongside local irrigator organizations (Lynch, 1988; Gelles, 2000; Trawick, 2003), but communities accepting state aid for irrigation improvements were expected to bring their water institutions into conformity with the code.⁶ The 1969 water law also allowed for adjustments to changing patterns of demand, particularly during periods of drought. The law should have made water allocation more equitable and reduced vulnerability to drought, but enforcement was erratic and private interests often prevailed (Trawick, 2003).

Legislation drafted by the Fujimori government would have privatized water and created tradable water rights, but irrigators opposed the bill; it was scrapped in 2000 (Slaughter-Holben, 1999). Retreat from a strong neoliberal position is reflected in the

⁵ Many of these decrees, which went well beyond the expectations of the TLC, violate the Peruvian constitution and binding commitments to ILO Convention 169 and/or the UN Declaration on the Rights of Indigenous Peoples (Monge and Stavenhagen, 2009).

⁶ In San Marcos (Cajamarca), Lynch (1988) found that reassignment of rights helped legitimate the state’s role in irrigation management: irrigators often preferred to rely on the state to allocate water rather than bear responsibility for changes that would inevitably upset some community members.

2009 water law which defines water as national property and recognizes the water rights of indigenous and campesino communities. Callejón de Huaylas irrigators, community members, and NGO representatives worried that the new law would be used to justify privatization (Galewski, 2010), but to date, outright privatization and water market creation have not happened (Zegarra, 2004). Simplification of water rights is more likely. A unified legal framework encompassing all water uses, it would, as Boelens (2009) argues, reduce the array of water sharing arrangements that could be implemented under changing conditions and undermine the ability of water user groups to collectively manage water.

5.2.3. Decentralization of responsibility; centralization of power

Peruvian water policies echo the second Dublin Principle's call for subsidiarity, but this implies neither devolution of authority nor representation of all water users in decision-making. Two recent laws (1) gave the central government authority to design water policies, (2) assigned responsibility for natural resource management and improving environmental quality to the regions, and (3) charged regional governments with participating in sustainable watershed management and with promoting and implementing projects for irrigation, irrigation improvement and water and soil conservation (Oré et al., 2009 p. 54).

Responsibility for water governance lay with regional offices of national ministries except in coastal valleys, where irrigation oversight rested with autonomous watershed authorities (AACHs) created in the 1990s. The AACH had authority over irrigation in coastal reaches of the Santa Valley.

Our interviews with regional officials in 2009 and 2011 indicated that subsidiarity was limited and did not mean greater transparency, democracy or even decentralization in the Santa watershed. We also learned that regional responsibilities came with few resources for data gathering or enforcement. Local irrigator associations exist, as do committees for oversight of domestic water provision, but there is no institutional channel that allowing them to interact with other water users on a routine basis. Moreover, it has proved difficult for communities and irrigation groups with varying water rights regimes to coalesce to protect their common interests.

In 2008 the National Water Authority (ANA) was established to integrate water resource management. It is staffed by irrigation engineers lacking experience in the agronomic, public health and ecosystemic dimensions of water management. ANA's organizational structure is designed to centralize authority. The authority's presence in the Santa watershed is growing as it opens offices (AAAs) in Peru's hydrographic regions and at the river basin level (ALAs).

Under the terms of 2009 water law stakeholder participation would be channeled through CRHCs, whose membership would in principle reflect water uses in the Santa valley. Regional governments with support from the CRHCs would be responsible for creating management plans and developing methods to monitor and control water that will guarantee a sustainable supply. Their implementation is proving problematic. The process of Council formation in the Santa watershed had begun when I conducted interviews in May 2011, but none of my informants in local government positions had any information about the process. Second, those who were aware of the guidelines for constituting the council were astonished that the hundreds of small irrigator associations throughout the watershed, many in isolated locations, would have only one representative. The same would be true of the widely scattered campesino communities.

It is not clear whether the creation of new regional and watershed level institutions would afford the Santa Valley's most vulnerable water users opportunities to participate actively in

making water management decisions. The CRHC experience gives little reason for optimism. Vulnerable water users will probably continue to depend upon external organizations like the Confederación Campesina del Peru (CCP), CONACAMI (the national organization of mine-affected communities), REMURPE (the network of rural municipal governments), irrigator associations, communities and on the church and NGOs to exert external pressure on water governance institutions and legislators (Oré et al., 2009).

6. Conclusion

Rural communities at high elevations and poor urban neighborhoods in the Santa watershed face an increasing threat of loss of access to a supply of clean water adequate to meet their basic domestic and livelihood needs. They are particularly vulnerable in an environment where water availability is more likely to fluctuate due to climate change and where competition for water is intensifying. However, as noted in Section 3.3, vulnerability is also a function of inequitable water governance. Conversely, equitable water governance in the form of inclusive institutions that allow for voice in decision-making and respect for indigenous and community water rights can help to reduce vulnerabilities in the face of climate change.

A new water regime is under construction in Peru. The question that informed my research is whether this regime will protect these vulnerable water user groups. This, I have argued, will depend on the degree to which it enhances political and economic equity. To do this, it would need to address questions of how to support vulnerable water users as they adapt to changes in water availability and, more importantly, how to ensure that these populations play an active role in shaping water allocation and management decisions.

I have argued in this paper that Peru's water regime, which is somewhat, but not entirely consistent with the global regime, has not prioritized the need to protect vulnerable water users in a context of climate change. Adaptation to climate change has generally been subordinated to the economic interests of the state. Natural resource development has been promoted at the expense of water quality and food security. Water management is addressed as a technical question to be controlled by a central authority. Subsidiarity has largely consisted of devolution of responsibility for water management to regional and watershed-level authorities, but it has not been accompanied by deconcentration of power to the local level. As is indicated by the composition of the new regional water user councils, little has been done to ensure adequate participation in water governance on the part of the watershed's most vulnerable groups—highland rural communities or poor urban neighborhoods.

Equity concerns are addressed by the water regime. The 2009 water law prioritizes basic domestic use over other water uses and contains provisions that guarantee the customary water rights of indigenous and campesino communities. The question is whether the spaces for equitable governance and user participation created by the new regime are adequate to guarantee that the concerns of vulnerable water users will be fully addressed. Highland irrigators and campesino community officials worry that the often ambiguous wording of the water law may act to their disadvantage. Institutional arrangements continue to favor coastal irrigation, hydropower, and mining often at the expense of other water uses.

As indicated in the discussion of water competition in the Santa valley, constriction of opportunities for meaningful participation in watershed governance has exacerbated water competition among economic sectors and across jurisdictional lines. As water supplies become less predictable, upstream–downstream competition is also likely to increase. Competition has led to open conflict as in the

case of the Laguna Parón and Laguna Conococha conflicts discussed in Section 4. Resolution of the two conflicts, however, demonstrates that when pressed, Peru's water regime is capable of arriving at equitable solutions to allocation and potential pollution problems that address the concerns of a broad range of water users. But it also indicates that without external pressure from campesino communities and urban populations water is unlikely to be governed in ways that reflect its multiple values and that water rights will be simplified in ways that may reduce the capacity of the watershed and its residents to respond to climate change.

In conclusion, Peru's water regime is being contested, raising the possibility of greater equity and protection for vulnerable water users in the face of glacial retreat. Ideally, the regime that emerges out of these conflicts would be more complex and allow for more variation than that envisioned by the international development community, and it would foster complementarity in water use. The outcomes of the Parón and Conococha conflicts suggests that Peruvian water institutions can encourage national recognition of local water rights, but that achieving equitable governance at the watershed level will require a cohesive strategy on the part of those most vulnerable to changing water availability, a strategy that would include the building of durable cross-sectoral, cross-jurisdictional, and upstream–downstream coalitions.

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