

Watershed-based Water Governance: Role of Actors in Santa Cruz Watershed, Laguna, Philippines

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ABSTRACT. Water governance at the micro watershed scale has not been popularly studied. However, as population increases and urbanization sets in, water conflicts may arise due to increased competition in use. This paper examines the various water governance roles of state and non-state actors within the watershed. While users make decisions and take actions that define the processes by which water is accessed and controlled, discussion and analysis of the interactions of key actor groups: households, farmers, enterprise, and local government were framed from the understanding of resources, mechanisms of access, and outcome. Focus group discussions and key informant interviews with specific actor groups (state and non-state) were conducted in the upstream and downstream villages of the Santa Cruz Watershed (SCW), Laguna, Philippines to generate the needed data. Results suggest that both state and non-state actors positioned themselves to support their respective interests. In times of water shortage, local governments at the village and the municipal levels coordinated and negotiated among themselves for access to water sources. The study concludes that within the watershed, water governance is polycentric and creates spaces for mutual cooperation among state and non-state actors, especially during times of water scarcity. The authors recommend, among others, that in areas where there are conflicts in water access and use, a polycentric approach can be considered to include both customary and formal rules in the water governance.

Keywords: *state actors, non-state actors, water governance, Santa Cruz Watershed, Philippines*

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INTRODUCTION

Various forms of water governance have emerged in response to contemporary water issues, particularly pertaining to water rights and water management at various scales. These new governance mechanisms are mostly informal, community based and participatory (Tropp, 2007). The transformation that is seen is due to the increasingly complicated water management leading to the search for alternative forms of organizations (Marquardt & Russell, 2007; Yu, 2014). Emerging concepts such as integrated water resources management (Global Water Partnership Technical Advisory Committee, 2000) and river basin management (Allee, 1986) are examples of the governance transformation.

Water governance transformation from the highly centralized to a more decentralized one now ties national to local development objectives. According to Yu (2014), communities have roles to play especially when the situation calls for polycentric (Ostrom, 2010) forms of governance. Such governance mechanism is an expression of highly decentralized governance that gives power to local actors.

Investigating water governance at the micro-watershed is a representation of governance at the lowest level. According to Bruns (2005), the application of participatory approaches for improving such scale of water governance is consistent with the participatory nature of common property resource management, such as community based natural resources management. For Marquardt and Russell (2007), locally used technologies such as water-storage and water-sharing schemes are examples of water management strategies that are attuned to local interests and needs. Community-based legislations and participatory planning and other local governance strategies that address community priorities are also deemed more effective as water rights are negotiated (Bruns, 2005).

Water decision-makers and managers have not been able to realize new forms of governance such as facilitating inclusive decision-making processes, coordination, and negotiated outcomes (Lundqvist, 2004). The reason for this could be the lack of knowledge on the water governance mechanisms, especially at the local level. An actor-based assessment can explain stakeholder networks and negotiations at the sub-watershed level. Governance 'partnerships' among local governments and organized interest groups can be unbundled by this scale of analysis. In particular, this kind of investigation can also address

issues on integrating very local strategies in a very complex and macro and multi-level water governance sphere (Lundqvist, 2004).

The Philippines will be an interesting case study of community-based water governance in the context of multiple and layered national, sub-national, and local agencies that are concerned with water (Malayang, 2004), which do not have vertical nor horizontal linkages (Rola, Abansi, Arcala-Hall, & Lizada, 2016) and where water rights are unclear (Hall et al., 2015).

This paper explores the dynamics of water governance among the various actors in a watershed context. Specifically, the paper describes the physical and socio-economic characteristics of the Santa Cruz Watershed; determines the roles of both state and non-state actors in the water management and governance; identifies water access mechanisms of upstream and downstream communities; and discusses the environmental and livelihood outcomes as a result of the current governance mechanisms. It uses the framework developed by Cleaver and Franks (2005) to assess the various actors' resources and mechanisms of water access to arrive at expected outcomes.

Case Study Framework of Analysis

The analysis of water governance in a watershed context proceeds from the framework proposed by Franks and Cleaver (2007), encouraged by two points raised by the authors, namely: 1) that the concept of "governance" must be contextualized and localized towards a meaningful understanding; and 2) that pro-poor governance is not necessarily good governance. The authors take off from the definition that sees governance as comprising of "the mechanisms, processes, and institutions through which citizens and groups articulate their interests, exercise their rights, meet their obligations, and mediate their differences" (Cleaver & Franks, 2005, p. 3). In this sense, governance involves decision-making by all actor groups at different levels in a society. This definition underlies the framework for analyzing water governance proposed by Cleaver and Franks (2005) and is employed in this study of water governance in a sample Philippine watershed.

The framework in Figure 1 shows that the processes of management and practice by actors/agents are defined by the interactions among three key elements: 1) resources, 2) mechanisms of access, and 3) outcomes.

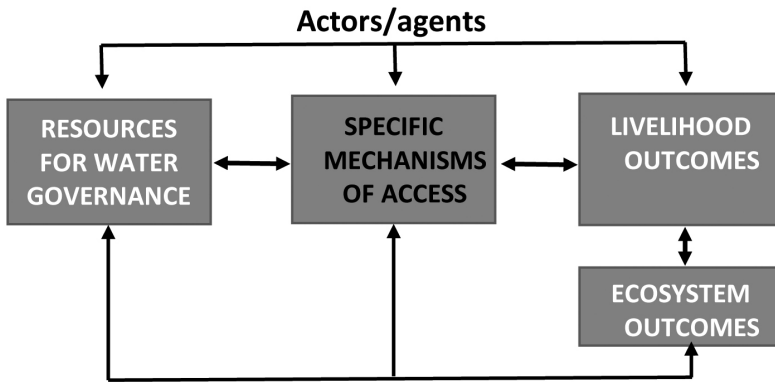


Figure 1. An actor-based framework for water governance
(Source: Cleaver & Franks, 2005)

Resources are the material or non-material properties of social systems through which power is exercised, referred to by Giddens (1984) as “allocative” and “authoritative” resources, respectively. “Allocative resources derive from human dominion over nature”, while “authoritative resources result from the dominion of some actors over others” (Giddens, 1984, p. 374). Adapting this, Cleaver and Franks (2005) suggested institutional resources, social structures, rights and entitlements, financial resources, human capabilities, the natural environment, and technology as the key resources on which water governance is built.

Actors draw on the resources available to them to develop mechanisms of access and “covers a variety of mediators of access ranging from formalized institutions to technologies that may overlap and inter-relate.” Such mechanisms include formal institutions, socially embedded institutions, family relations and kinship groups, customary and modern land and water rights, payments for rights, payments and contributions for maintenance, water control structures, and access points for surface flows. Cleaver and Franks (2005) further suggest that the different actors may develop such mechanisms consciously or unconsciously, as many of them arise out of the practice of actors’ daily lives.

Outcomes result from the deliberate and routine actions involved in water governance. Outcomes as described by Cleaver and Franks (2005) may be positive or negative. For the poor, outcomes can include access to basic supplies, support for livelihoods, structures of social cohesion and exclusion, political voice, and representation. From the perspective of the ecosystem, outcomes can be described in terms of the pattern of flows and levels of water in the catchment and downstream. In this paper, these outcomes are based on the perceptions of the actor groups.

Around these key elements, both state and non-state actors make decisions and take actions that define the processes of management and practices, and through which water governance is manifested. This paper considers the premise that water governance, as an emergent concept, should take into account a multi-stakeholder participation in shaping the public affairs in the water sector and helping the government function better. It starts with the assumption that water governance is indeed nested and interlocking (Rola, 2011), as well as multi-layered (Malayang, 2004). The framework allowed for an assessment of each actor group's water governance mechanisms at each stream by looking at the resources accessible to each actor group, how these are organized into mechanisms of access, and the resulting livelihood and ecosystem outcomes.

METHODOLOGY

The previously discussed framework was used to understand water governance within the Santa Cruz Watershed, Laguna, Philippines from upstream to downstream — from the perspective of the state and non-state actors. The latter is comprised of households, farmers, and commercial enterprises.

Qualitative data were generated from 18 focus group discussions (FGDs) conducted from February to June 2013 (Table 1), and supplemented by key informant interviews (KIIs) and secondary data. Initially, the participant-respondents were selected from three sections of the Santa Cruz Watershed in Southern Luzon, Philippines: upstream, midstream, and downstream; and from four respondent types: state actors or members of the local government units (LGUs), households, farmers, and enterprises. However, in the course of assessing the environmental setting, it was determined that only upstream and downstream environs provided distinct characters of a watershed.

Table 1. Number of actor-based focus group discussions (FGDs) in the upstream and downstream sections of Santa Cruz Watershed, Laguna, Philippines

LOCATION	HOUSEHOLDS	FARMERS	ENTERPRISES	STATE ACTORS
Upstream	Three FGD groups	Two FGD groups of vegetable farmers	One FGD for resort owners and operators; Two FGDs with hog raisers and food processors	Two FGD groups for municipal and village (<i>barangay</i>) local government units (LGUs)
Downstream	Two FGDs	Two FGDs with rice farmers	One FGD with small quarry operators (<i>pala-pala</i>)	Three FGDs with provincial, municipal and village LGUs, IAs, NIA, LLDA, SCRISA

Note: IAs = Irrigators’ Associations, NIA = National Irrigation Administration, LLDA = Laguna Lake Development Authority, SCRISA = Sta. Cruz River Irrigation System Association

The research team invited FGD participants in coordination with the municipal government coordinator, who assisted in identifying villages. Each FGD consisted of a homogenous group of actors (e.g., households, farmers, enterprises, and LGU representative) drawn from one to three villages in the stream section. The general criteria for selecting participants for each actor type include the abilities to represent and to articulate the perceptions, ideas, and situation of their respective actor group, especially with regards to water use.

Guide questions revolved around the three key elements affecting the processes of management and practice by actors/agents: resources, mechanisms of water access, and outcomes. Under resources, groups were asked about their beliefs, norms, and practices on water; notions of water rights; organizations in their communities; decision-making processes; and communication patterns. Discussion points on mechanisms of access explored knowledge of existing water-related organizations; water sources, access structures, and how these are paid and sustained; ordinances and norms related to water use; and socially

embedded institutions that relate to water. Data on outcomes were generated through questions on perception of water quality, links to livelihoods, and water conflicts.

The researchers trained FGD moderators and documenters using a training manual developed to guide the conduct of the discussions. Actual FGDs were conducted as part of the training. These sessions were critical to ensure a common understanding of the guide questions and to maintain a standard of uniformity in questioning and asking follow-up questions. FGD responses were transcribed and encoded by actor group and by watershed section. Response themes were identified.

RESULTS AND DISCUSSIONS

Biophysical Context of Santa Cruz Watershed (SCW)

The Santa Cruz Watershed or SCW (Figure 2) has a drainage area of 148.35 km² that straddles five municipalities at 215-2,149 masl. It has an area of about 15,000 ha covering the Municipalities of Liliw, Nagcarlan, and part of the Municipality of Magdalena in the upstream section; and Santa Cruz, Pila, and part of Nagcarlan in the downstream area. This study covered the Municipalities of Liliw, Nagcarlan, Santa Cruz, and Pila.

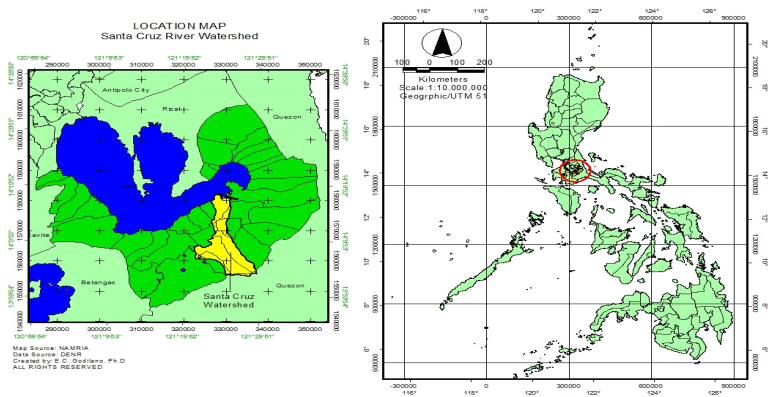


Figure 2. Location of Santa Cruz Watershed relative to Laguna province

One of the river systems draining to Laguna de Bay, the Santa Cruz river system contributes about 15 percent freshwater of the total water of the lake (Laguna Lake Development Authority [LLDA], 2012). The watershed's basin is about 25 km that extends from its watershed divide to the outlet that is considered as a coastal zone of the Laguna Lake. The watershed has five rivers, namely: San Diego, Liliw, Maimpis, Talahebing, and Tipacan, whose surface waters pass through Nagcarlan, Liliw, Pagsanjan, Pila, Magdalena, Rizal, and Santa Cruz. The watershed discharges at the mouth of Santa Cruz River. Surface water emanates from the headstream at Mount Cristobal, an edifice of the Mount Banahaw that has a height of 1,470 m (ERDB 2015).

Two provinces embrace the watershed — Laguna and Quezon. Portions of Laguna, namely Liliw, Nagcarlan, and Santa Cruz, occupy the largest proportion of land with an aggregate area of 11,304.8 ha. This represents 75 percent of the watershed, encompassing the most number of villages within the watershed. Magdalena, Majayjay, and Rizal account for about 2,453.5 ha or 16 percent of the entire watershed area. Meanwhile, Candelaria, Dolores, Sariaya, Tayabas, and Lucban are parts of Quezon.

Among the three largest municipalities covering the watershed, Liliw and Nagcarlan are endowed with many springs. Liliw has 8 springs, while Nagcarlan has 49. The populace benefits from the springs as water source for domestic use, irrigation, and home businesses, e.g., food processing, livestock, pool for resorts, and vegetable farming.

The Santa Cruz Watershed belongs to Type IV category of the Philippines Climate Corona Classification, indicating more or less evenly distributed rainfall throughout the year — a condition that benefits farming activities. In terms of land use, within the Santa Cruz Watershed are secondary forests, arable and cultivated lands dominated by coconut plantations and irrigated rice as well as built-up areas.

Socio-economic Conditions

Population. Laguna province had a household population of more than 2.6 million as of 2010, with 98.5 males to 100 females. The population of the province may be considered “young” because nearly 60 percent of the population was less than 30 years old. Moreover, more than one-third of the population belonged to ‘dependency burden’ age groups (below 15 and above 65 years old). In 2015, dependency ratio was 53.1, with 47.6 young dependents.

Among the municipalities within the SCW, Santa Cruz (downstream section) had the highest population and number of households. This was followed by Nagcarlan and Liliw at the upstream section. Annual population growth rate in the SCW ranged from 1.9 percent (Rizal) to 2.3 percent (Liliw and Nagcarlan). This implies that the populations of these two upstream municipalities grew faster than the downstream municipalities.

As of 2010, Santa Cruz was the most populous in the province having a density index of 2,874.9, yet its poverty incidence by 2012 was at 5.3 percent, which was less than that of Liliw and Nagcarlan. Liliw was the next most populated at 865.8-density index with 9.9 percent poverty incidence. Next to Liliw, Nagcarlan's population density was 764.7. Nagcarlan also had the highest poverty incidence among the three municipalities at 10.0. With the higher growth rates in the communities in the upstream section of the watershed, population is expected to increase by at least 2.3 percent annually. Moreover, poverty incidence was noted to be relatively higher in the upland communities than those at the midstream and the downstream municipalities.

Given the higher poverty incidence and population growth rates in the upstream municipalities compared with other municipalities in the watershed, use and demand for water resources are expected to increase. These may have implications on the access to water resources by downstream communities.

Local economy. The agricultural activities influence the demand for water as well as the quality of water in a watershed. Major crops in the SCW were coconut, paddy rice, and corn, while fishing, livestock, and poultry raising were the major industries. Mango and banana were also cited as major commodities of the Province. In terms of hectarage, areas planted to coconut and palay were the largest (Table 2).

Land use. Agriculture was the major land use (about 75 percent of the SCW) and source of income of the residents. The major agricultural land use was exhibited for the production of rice, vegetables, coconuts, fruit trees, and pasture/grassland. Livestock production was one major source of income in both backyard and commercial scales. Land use for other purposes comprised the next major land use or about 14 percent. This includes forestland, quarry, river and water bodies, among others. The remaining 11 percent was devoted to built-up areas, such as residential, commercial, institutional, recreational, road and infrastructure, and industrial areas. The area was also known for its small-to-medium scale food manufacturing industries, namely: bread, candies, delicacies, and meat products.

Table 2. Top five agricultural crops and livestock, Laguna province

CROP/ LIVESTOCK	2011		2012		2013	
	Area (has)	Pro- duction	Area (has)	Pro- duction	Area (has)	Pro- duction
Crop (mt)						
Palay	30,672	126,108	29,895	120,953	29,779	128,905
Corn	1,156	2,622	1,242	1,156	1,219	2,804
Coconut	62,248	109,186	62,248	114,450	62,248	119,271
Mango	187	516	187	498	187	506
Banana	7,074	85	7,074	19,509	7,074	20,086
Livestock (head)						
Carabao		37,320		36,079		
Cattle		39,850		39,874		
Goat		16,963		20,708		
Chicken		3,016,510		2,962,198		
Duck		91,755		92,678		

Source of basic data: Philippine Statistics Authority, 2015

Water Resources

An important discussion of this study focuses on how water as a resource was appropriated by different actors in SCW at two important sections: upstream and downstream rural communities.

Actors' natural environment. The SCW is comprised of five rivers and 57 identified springs. These known rivers and springs served as the major sources of irrigation and drinking water. Surface flows through streams were also important sources for rice fields, as well as for household daily domestic uses. Perceived as "water is life" and a "basic necessity," the natural water resources were appropriated by the many state and non-state actors. They stood prominently in governing water rights and access. The actors exploited the natural environment based on the extent and the manner by which they accessed these water resources.

Institutional resources. The institutional resources include water organizations or village-level people’s organizations that address water issues and concerns. These organizations ensured equitable access to water resources. In the upstream communities, the state actors employed legal instruments such as tax declarations and land titles as forms of ownership. On the other hand, the non-state actors were non-government organizations, households, and farmers’ organizations. Table 3 presents a summary of how each of the state and non-state actors exercised their functions.

FGD results showed that the state actors or institutions, by the nature of their functions, had applied legal instruments to compel water users to pay taxes for its access, even when water resources are located within private land. Similarly, the same state actors intervened on behalf of household users when water resources are located in a private lot and are being accessed by the community. The Local Government Code (LGC) emphasizes that the local government can intervene on behalf of the majority, “to negotiate with the land owner for water access at a minimal compensation.”

Table 3. Institutional roles of state and non-state actors by watershed

	STATE ACTORS	NON-STATE ACTORS
Upstream	Provide legislation, conduct monitoring of water resources, collect revenues/ water fees, manage water distribution	Employ tax declaration and land titles vis-a-vis land ownership
Downstream	Manage water resources, decentralize water quality monitoring, implement water payment policies, formulate and implement water-related ordinances down to the village level to formalize into policy guides	Provide labor force for the establishment of local infrastructure for water distribution, communicate directly with the village captain or officers of the <i>Sangguniang Barangay</i> (village council) for water-related concerns

Some water institutions in the watershed had a semi-government character such as the Nagcarlan Waterworks and the Barangay Water Works and Sanitation Associations (BAWASA). These are the formal organizations for piped water distribution. The BAWASA is managed by the *Sangguniang Barangay* (village council) officials, and engages the *purok* leaders for collection. Volunteers from the different civic organizations are involved for security and routine maintenance. Other institutions such as the Tourism Office support the resort enterprises, while the Philippine National Police provides security. On the other hand, with regard to cost of maintenance of water resources, the local government units draw on the Internal Revenue Allotment (IRA), combined with revenues from water user fees and from contributions and donations of volunteer groups, private citizens, and some politicians. The village council, headed by the village chief, has a very important role in representing the interest of water users. The council served as the voice of the community at the higher levels of government decision-making body. Public consultations with respect to water concerns were held through the village assembly meetings.

Other actors within the upstream of SCW were non-government organizations, farmers, entrepreneurs, and households. These non-state actors were using their indigenous knowledge in protecting the environment. In the upstream communities, there were two prominent non-state actors perceived to be stewards of environmental protection for water resources. These were the *Bantay Bayan* (Community Watch) and the *Luntiang Alyansa ng Bundok Banahaw* (LABB) or Alliance of a Green Mt. Banahaw. The *Bantay Bayan* is involved in river cleaning, while LABB helps in restoring the mountain landscape of Mt. Banahaw and Mt. San Cristobal.

The households as key non-state actors both at the upstream and downstream communities drew on a range of internal institutional resources that serve their respective interests and demands. In addition, farmers relied on morning dew as additional water source in a natural environment that offers fresh, clean, and abundant springs from Mt. Banahaw for their vegetable farming. Their upland crops include root crops, pechay baguio beans (*Brassica rapa*), cucumber, bitter gourd, chili, cabbage, tomato, sweet potato, and chayote, which are popular vegetables in the area, though low valued.

Aside from vegetable farming, entrepreneurs also invested large capital to access and develop water resources for recreational business activities, i.e., resorts in the upstream. Both resort owners and farmers

upstream also accessed water through the same pipe system. Resort owners, in some instances, provide their own polyvinyl chloride (PVC) pipes to get connected to the piped system, which is managed by the village waterworks.

Socio-cultural Resources: Actors' Beliefs, Norms, and Social Structures

Socio-cultural resources are social structures, customary rights, and entitlements of specific members of a community. Upstream and downstream communities, formal and socially embedded institutions such as the local government unit (village councils), waterworks systems office as well as civil society organizations were present where civic and legislative efforts are applied to manage the municipal water systems.

For example, with regard to households without their own respective connections, they could go to communal faucets that are usually located along the roadsides. These facilities were provided by LGUs and sometimes by private citizens. The study indicated that water can be accessed by anyone who needs it, and this was remarkably illustrated in terms of payment of water dues. Water was also obtained by paying for water services through the waterworks systems. In the upstream communities, they were implementing a very flexible monetary water payment scheme, depending on the village's accessibility to the main sources and capital outlays, so that users pay at various rates ranging from as low as PhP6.00 for the first 10 m³ to PhP30.00 per first 25 m³. Households were paying a minimal fee to cover maintenance of the village water system.

Households accessed their drinking water from seasonal surface water from springs. Meanwhile, villagers accessed rivers for laundry purposes. This practice exemplify the general notion that water is free, and is built on customary and modern land and water rights on the premise that everyone has a right to water because it comes from nature.

Actors' Technology and Practices

Rice farmers requiring irrigation for their crops in downstream communities sourced their water from the irrigation system managed by the National Irrigation Administration (NIA) in coordination with the

irrigators' association. The irrigators' association taps water from the river. These canals are connected to an irrigation dam that serves as a reservoir for the river flow. The source of water for the agricultural area is a smaller spring as compared with the spring used as water source for the household. This small water spring supports 85 ha of agricultural land. The farmers in the area decided to build water well where rainwater can be stored. This stored water is used for irrigation, while spring water is used for other purposes such as laundry and drinking. The Bureau of Soils and Water Management funded the construction of the water well.

In agriculture, the "hose" technology for irrigation is also used. Rustic methods of water collection, such as dug wells and rooftop tubs for rainwater collection, augmented the water supply for vegetable farms during shortages. Farmers dug pits (4m x 5m in size) or improvised catchment tub on the roofs of their houses to collect water. When some farmers were unable to collect water in their wells, other farmers were very willing to share their water supply.

Otherwise, water from their homes was transported and brought to the farm by means of a horse, motorcycle, or on foot (head loading for women or hand carrying for men). Water wells on rooftops or on the ground adequately augmented the supply from the piped water system for irrigating the vegetable farms. With these systems to assure access to supply for agriculture/livelihoods, there were no conflicts among farmers. Each farmer maintained a homemade water reservoir for farming operations. Farmers near rivers and streams had better access to irrigation water. Farmers also followed a schedule in accessing water so that there would be no conflicts.

For households downstream, the water from the spring goes to the water tank for distribution through the water pipes. Some villages connect to the tanks/spring sources (through pipes) located in other nearby villages when there is no source within the village. Spring sources were enclosed in a cemented tank like a dam, and water was tapped for use by the community through a 6-inch pipe through which water flows by gravity from the tank to the town. Distribution lines to the villages consisting of 3-inch pipes were then connected to this main line. Each barangay had a specific water line from the source.

Household and commercial water was mainly accessed from the tap through the piped water system. Other households downstream used jetmatic pumps for groundwater extraction, while others had pitcher pumps to draw ground water for domestic, commercial, or agricultural uses. To cope with the water shortage, especially during the dry season,

downstream rice farmers made use of gas-powered shallow tube wells to draw groundwater for irrigation.

Households upstream, without piped water or pumps, usually walked to the source of water. Travel time depends on the distance of the water source. In cases when typhoon or other natural elements damaged or broke the distribution pipes, some households fetched water from their neighbors' water pipes, or they went directly to the spring to fetch water.

Water becomes a problem, especially during the summer. As water supply becomes scarce, farmers shared the rainwater collected in their individual dug pit or "*balon*." When no water was collected from this pit, domestic water was transported in containers and brought to the farm on backs of horses.

The FGD respondents said that there was no need to improve access to water, but potable water was described to be problematic due to accessibility, especially during summer.

In times of water scarcity, participants looked for additional source of water by putting up more containers for water especially during typhoons, when water from springs becomes muddy. In areas where there is no waterline directly connected to the spring source, some households installed water pumps. For villages without access to a spring source, the local officials entered into an agreement with a neighboring village or town for them to build a water tank at the source in the neighboring village, to supply their own village. The Municipal Health and Sanitation Office gave advice on drinking water quality.

Actors' Socio-Political Resources, Rights and Entitlements

There are no distinct water rights issues with respect to certain actors, recognizing that "water is free and abundant" and everyone has a right to water. However, one compelling issue emerged when the relations of productive resources such as water and land are connected, challenged the factors of production. For example, land rights and water rights are intertwined. Actors appropriate water rights through formal instruments of land ownership, such as tax declarations and land titles. Thus, resort owners' access and develop natural springs within their property. However, the property rights over land do not extend to the water resources within it.

In cases where water resources are sourced outside the administrative boundaries of a village or town, the LGU usually enters into an agreement with another village group or local government unit for a way to access water for a community without water resources. A scheme similar to land swapping is usually adopted.

There are springs in privately owned lands developed by the municipal government, if the village has no funds for the development of the spring water to supply the community. This practice was recognized as a legitimate way to access water from a different village for various uses.

Mechanisms of Water Access

Upstream. State actors, represented by the local government units, led in providing water supply upstream, but the non-state actors also faced important roles. At the *barangay* level, decisions concerned with water governance rest within the local officials, through the *Sangguniang Barangay* or village council. While the council formulated the local resolutions and ordinances, fees and payment schemes were developed in consultation with different non-state actors. Water system maintenance relied solely on a plumber, who was tasked to correct technical problems in the waterworks.

Families and households likewise contributed to water system maintenance through community action. The *bayanihan* system or cooperative volunteer work was very much alive in the upstream. Farmers and regular volunteers alike engaged in the spirit of *bayanihan* for the common goal of repairing and maintaining the water and irrigation system.

The Municipal Water Works, on the other hand, managed the water system in the town proper and took charge of collecting water fees. The generated income, in addition to the internal revenue allotment (IRA) from the municipal government, would serve as an additional fund for the water system conservation. Once seen as a form of kind donation, cash payments had ultimately shifted to becoming an obligation. However, sanctions for delinquent payors were rarely implemented. This is due to the ongoing problem of faulty water distribution, especially to those residing at very high, remote areas or hamlets (*puroks*). The payment for environmental services (PES) were given by land owners to support natural resources conservation efforts in the watershed as a way to mitigate the environmental impact of resorts.

Upstream communities held on to customary rites and religious faith as socially embedded manners to safeguard their water resources. Farmers offered prayers and light candles at spring source areas, as well as participated in cleaning and tree-planting operations. Farmers also prayed to Saint Anthony for the first rains in the summer. The first rains are believed to make plants grow well. Other residents of the community also joined in growing trees and cleaning up of rivers to help maintain the watershed.

Downstream. Downstream Santa Cruz Watershed had three types of water providers: LGU-based (BAWASA), local water district, and community-based water system. The BAWASA was managing the water distribution in the village, supported by the municipal government. The Laguna Water District, meanwhile, was the major water distribution system downstream. The municipal and village government units allocated part of their funds for the local waterworks systems. Volunteer groups and individuals also gave support when considerable cash outlay is needed for repairs and maintenance, especially after calamities.

A few interesting cases also arose downstream. For instance, some homes got their water supply from one household that has a legal connection to the main line of the village. By law, multiple connections are prohibited, but this practice was generally tolerated to allow the disadvantaged access to basic supplies. These households, usually connected by kinship, had their own arrangement in paying their water bills. In some cases, each connecting household contributed to the payment of a single bill, while others took turns paying the water fees. Meanwhile, in areas where drinking water supply was contaminated, buying bottled water was increasingly practiced. Mechanisms of water access by enterprises were mediated by institutional interventions such as registration in government units to ensure water is available all the time.

One of the most prominent state actors downstream was the National Irrigation Administration (NIA). As part of the agency's irrigation management and development, NIA provides water allocation to different irrigation systems including the Sta. Cruz River Irrigation System (SCRIS) that covers the Municipalities of Pila, Victoria, Nagcarlan, Liliw, and Santa Cruz. Services include the irrigation canal maintenance, operation of water dams, and knowledge transfers with respect to farm production practices. Water allocations were scheduled, including adjustments to accommodate the needs of lowland farmers affected

by flooding or water shortages. The payment schemes, discounts, and incentives composed the financial decisions of NIA officials. These agreements were made in cooperation with the irrigators' associations and local government officials in the agricultural sector. The NIA also sought the help of the Banilad Farmers' Association, a non-state actor, in the management of the Sta. Cruz Irrigation System for decisions regarding rice irrigation.

Volunteer self-help groups of rice farmers established in the seven key sitios or sub-villages, where the major springs are located, actively addressed maintenance problems in the irrigation canals. Outside the NIA system, a rotational water distribution for irrigation water was enforced where there are no payments, particularly during water shortage.

Water Governance Outcomes

Upstream. In the upstream areas, where water was perceived to be abundant and of good quality, water issues revolved around accessibility. During the summer, there were long queues of up to 30 persons in communal faucets and pumps, indicating the insufficiency of the current system for basic water supply. Communities located at a higher elevation than the source experienced extreme water shortages.

Water scarcity in the upstream affected women heavily, as they were the ones at the forefront of domestic as well as productive activities such as vegetable farming. Women are at a disadvantage when their water source for domestic use is not easily accessible. Laundry was easier for women near rivers and streams, while others would have to travel some distance on foot or pay someone to fetch water for them. Generally, women bore the burden of accessing water for the household.

Contamination of water upstream gave rise to water-related diseases. When some pipes break, contaminated floodwater enters the pipes. However, previous water testing showed that their water quality was comparable to commercial bottled water. This is true especially for the headwaters area of the river. During the start of the rainy season, water flow became weak because pipes are damaged.

Water supply was insufficient during summer, when irrigation water do not reach the lower and farther farms. Because of this, 10 percent of rice farmers in one village suffered, resulting in a 25 percent loss of rice farming income. A rotational water distribution for irrigation

water was enforced during water shortage, without any payments. Conflicts in the agricultural sector were easily settled among farmers themselves.

Areas far away from the main pipes suffered inadequate water supply. Moreover, water was wasted due to improper maintenance, further decreasing water supply in the outer fringes of the distribution system.

Pollution discharges from piggeries and garbage continue to threaten the water supply through contamination of drinking water and clogging of irrigation canals. Contamination from farming activities was also seen as a potential threat to safe drinking water.

Downstream. Downstream areas are well placed to take advantage of the gravity flow of water from the abundant sources upstream. Groundwater is also available. Thus, the water system downstream is well developed.

Recently, water shortage has become a normal occurrence downstream for household, institutional, and commercial users. Water supply in many communities has become erratic and discontinuous. It has been predicted that in 10 years, water conflicts will intensify given the exponential increase of population.

Small-scale mining activities downstream have been blamed for the reduced flow in irrigation canals. Rice farmers claimed that the widening of the rivers due to these activities was one cause of the reduction. Another view states that dredging was beneficial to prevent flooding. However, quarrying activities near the dam for irrigation could also weaken its foundation.

Rice farmers in downstream Santa Cruz benefitted from the river flows fed by the upstream sources. Wastefulness of users near the source negatively affected those at the farther end of the distribution system.

Downstream, most women are more fortunate as piped water is available in almost every household. Water contamination came from human activities such as swimming at the water source, improper garbage disposal from households and industries as well as farm activities. These factors have led to an increase in demand for bottled drinking water as the supply of potable water declined.

Water for domestic and agricultural uses have also been affected by pollution from garbage disposal. Even if there is supply in some areas downstream, the stock of potable water might be limited. The resorts upstream have also been partly blamed for the reduced flows downstream due to the volume of water they use.

Enterprises and households downstream had better access to the piped water system than upstream communities. While upstream communities experienced relative water scarcity, downstream communities were experiencing declining water quality.

Cheap water will be particularly attractive for swine production, resorts, and candy making. Expansion of both may have positive impact on livelihoods of the poor, but care must be taken to ensure that waste is properly managed. Resorts and large-scale swine production are capital intensive and are therefore for big entrepreneurs to engage in.

Expansion in these areas can be potentially threatening to the poor because these enterprises are believed to be heavy water users. Inappropriate water pricing or taxation can lead to overuse and inequitable distribution of the water resources of Santa Cruz. In addition, adverse effects on water supply and livelihoods downstream are possible.

Finally, artisanal mining represents women's opportunity for additional income. However, this activity threatens the water supply, which supports rice farming and livelihoods downstream by damaging the dam that supports the irrigation system.

CONCLUSIONS AND RECOMMENDATIONS

This paper analyzed the roles of state (particularly local government) and non-state (i.e., households, farmers, and commercial enterprise) actors in water governance within the watershed context. The results show that the elements of good water governance such as participatory and inclusive decision-making processes, coordination, and negotiated outcomes existed within the upstream and downstream study communities, contrary to the observation of Lundqvist (2004). Formal and socially embedded institutions, such as the local government unit (*barangay* councils), waterworks systems office, and civil society organizations were present where civic and legislative efforts were applied to manage the water systems.

The dynamics between the state and non-state actors in both streams were found to be collaborative at best, also illustrating that a polycentric governance mechanism (Ostrom 2010) existed in the study villages. In both types of villages, state and non-state actors positioned themselves to support their respective interests. At each stream, state actor networked and linked with the lowest level of peoples' organizations for inclusive decision-making. As cited in this research, the village council, headed by the village chief, served as the voice of the community at the higher levels of government decision-making body. Public consultations with respect to water concerns were held through village assembly meetings.

The resources available in the villages facilitated water access. In the upstream barangays, the state actors or the LGUs provided the water at minimal fees; the households helped maintain the water system. At the municipal level, the water access was more formal where water fees were paid and maintained by the Municipal Water Works. Cash payments, which were once just donations as water is deemed not a commodity, became an obligation.

Upland communities held on to customary rites and religious faith as a socially embedded manner to safeguard their water resources. Other residents of the community also joined in growing trees and cleaning up of rivers to help maintain the watershed. Water payments were also used for watershed conservation. Households upstream without their own water connections could go to communal faucets provided by the LGUs and sometimes by private citizens. Households paid a minimal fee to cover maintenance of the village water system. These practices exemplify the general notion that water was free in the study areas, and was built on customary and modern land and water rights where everyone has a right to water because it comes from nature.

Both resort owners and farmers upstream also accessed water through the pipes set up by the LGUs. For villages without access to a spring source, the local officials entered into an agreement with a neighboring village or town for water access. It was further observed that farmers maintained a homemade water reservoir for farming operations in the upland villages. Water wells on rooftops or on the ground adequately augmented the supply from the piped water system for irrigating the vegetable farms. Water sharing was practiced with an agreed schedule for accessing water. Conflicts among farmers were not observed.

A more formal water governance system was observed in downstream municipalities of the watershed. Downstream Santa Cruz had three types of water providers: LGU-based (BAWASA), local water district, and community-based water system. Mechanisms of water access by enterprises were mediated by institutional interventions, e.g., registration in government units to ensure water is available all the time. The municipal and village government units allocated part of their funds for the local waterworks systems. Volunteer groups and individuals also gave support when considerable cash outlay is needed for repairs and maintenance, especially after calamities. Financial agreements of NIA, one of the important state actors downstream, were made in cooperation with the irrigators' associations and local government officials. The NIA also sought the help of non-state actors in the management of the Sta. Cruz Irrigation System for decisions regarding rice irrigation.

The quality of governance was put to a test during episodes of water scarcity. Village-based technology and other devices were observed to be part of the solution. The state actors established a system of organized water supply rotation through the use of technology (valves) in the main pipeline system to connect everyone during water scarcity. Similarly, non-state actors employed a rotational water distribution scheme for irrigation water during water shortage. At the village level, water storage and water-sharing regimes were observed. Downstream areas took advantage of the gravity flow of water from the abundant sources upstream. Local governments at the village and the municipal levels coordinated and negotiated among themselves for access to water sources.

However, there were observed challenges as outcomes of the current water governance system. In general, upstream communities experienced relative water scarcity, while downstream communities observed declining water quality. Water scarcity in the upstream affected women heavily, as they were the ones at the forefront of domestic as well as productive activities. Women were at a disadvantage when their water source for domestic use is not easily accessible. Contamination of water upstream gave rise to water-related diseases. Pollution discharges from piggeries and garbage continued to threaten the water supply through contamination of drinking water and clogging of irrigation canals. Contamination from farming activities was also seen as a potential threat to safe drinking water.

At the downstream, water shortage has become a normal occurrence for household, institutional, and commercial users. Water contamination supplied from human activities such as swimming at the water source, improper garbage disposal from households and industries as well as farm activities. These factors have led to an increase in demand for bottled drinking water as the supply of potable water declined.

Water for domestic and agricultural uses have also been affected by pollution from garbage disposal that even if there is supply in some areas downstream, the stock of potable water might be limited. The resorts upstream have also been partly blamed for the reduced flows downstream due to the volume of water they use.

The stricter regulations on the access and allocation of water across the watershed are seen as future governance challenges. Both formal and customary rules have to address both the scarcity and the pollution problems that were not as distinct in the past. In some parts of the watershed, water was still abundant and clean, but the problems began to set in at the populated areas. The evolving institutional arrangements and intergroup learning for adaptive collaborative water governance (see David, Rola, & Pulhin, 2016) can create more spaces for mutual cooperation among the various actors. The authors recommend that in areas where there are conflicts in water access and use, a polycentric approach can be considered to include both customary and formal rules in water governance.

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