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CONFLICT, COOPERATION, AND COLLECTIVE ACTION

Land Use, Water Rights, and Water Scarcity in Manupali Watershed, Southern Philippines

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ABSTRACT

Sustaining the environmental, social, and economic development in Manupali watershed in southern Philippines is highly dependent on equitable allocation of water use rights and judicious utilization of water as a scarce resource. There are many stakeholders and water users: smallholder farmers, indigenous people, multi-national companies, the local government, the National Irrigation Administration, and the National Power Corporation (Pulangui IV). As demand for water outstrips supply, conflict arises between different user groups over who can use water and how much each one can use. This paper reports initial results of an ongoing study that examines water rights and land use change to better negotiate for greater investment in watershed management. A key issue in Manupali is overall water scarcity, compounded by conflicting water rights of different users. To avoid hostile confrontation between different user groups and to manage competition of water use, some user groups have instituted voluntary agreements for water rights sharing. Viewed in terms of cooperation and collective action, these voluntary agreements facilitate conflict management of a disputed resource, but the fairness and equity of such agreements are in question, as the cooperating user groups extract benefits from non-cooperators who may have incurred the costs of protecting the upper watershed to maintain water supply. Supported by watershed hydrological data on water balance and its land use patterns, this paper argues that water rights sharing through voluntary agreements alone can only mediate short-term conflict but will not solve water scarcity in the longer term. The problems of water scarcity, allocation, and land use, require collective action beyond the current level if equitable distribution of benefits, sharing of responsibilities, and co-investments in watershed management are the goals.

Keywords: Water rights, water allocation, water conflict, cooperation, collective action

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1. INTRODUCTION

Scarcity, degradation, wastage, and complex management—all these describe the situation in developing countries' water resources today (Brugger 2007; Rola et al. 2004; Swallow et al. 2001; Samson and Charrier 1997). Population growth and economic development have resulted in increased water demand for domestic, agricultural, and industrial uses, with agriculture as the highest water consumer of up to 90 percent (Pacific Institute 2009), particularly for irrigation to produce more food. Simply put, how is it possible to produce more food and ensure functional industries with less water? Termed as peak water, studies reveal that many areas around the globe have already reached their optimum capacities to absorb the consequences of excessive water use (Gleick and Palaniappan 2009). Watersheds are increasingly populated and degraded through poor land use and unsustainable practices, affecting water availability. The fact that multiple property rights regimes and institutions are responsible for managing critical watershed resources makes it complicated to coordinate relevant actors (Meinzen-Dick and Pradhan 2002). As a consequence, water competition and conflicts arise among institutions and users.

Several examples help to illustrate the supply, economic, and management aspects of water competition and conflict. In Nepal, many farmers suffer from seasonal water shortages that affect food production and livelihoods (Brugger 2007; Helvetas n.d.). Instead of focusing on potable water supply facilities, the farmers formulated Water Use Master Plans (WUMPs) to protect their water resources through intersectoral cooperation among policymakers, scientists, and engineers. The plans are now used as a framework for water management by local communities and even the regional government. Since the responsibility was placed closer to the users, building local capabilities was considered a critical element that enhanced cooperation and sustained water use and management.

In Indonesia, the degradation of the Sumberjaya watershed has decreased the economic productivity of farmers and the hydroelectric power plant operating downstream of Way Besai River, which prompted conflict between local stakeholders and the government (Verbist et al. 2005). In response, the communities living along the riparian zone took the responsibility of ensuring water quality by reducing soil erosion through a RiverCare program (Leimona et al. 2009).[2] Accordingly, the hydroelectric plant rewards the community with cash payments if the Way Besai community reduces soil erosion by

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[2] RiverCare is a community group in Sumberbaya located around the hydropower reservoir that applies water conservation technologies to reduce sediment load.

30 percent or more. The incentive/payments motivated the communities to safeguard the upper watershed, and ensured that the volume and quality of water do not further decrease or degrade.

At the international level, conflicts can also arise where two or more neighboring countries assert claims on the same water resource. This situation is quite common in the Middle East, where water competition creates political tensions (Homer-Dixon 1999; Gleick 1993). One example is the Nile watershed, which is shared by ten countries. When Ethiopia, the headwater source of the Blue Nile River, planned to build a dam for irrigation to increase food production; Egypt, which claims the largest part of the Nile water, responded with political and military threats (Luhmann 2007). Sudan was also pressured by Egypt when the former considered terminating their 1959 contract about the Nile's use. Amid these conflicts, these countries united through the Nile Basin Initiative (NBI), and institutionalized an international cooperation agreement to strengthen economic and technical cooperation in water management. These examples show that even in the midst of competition and conflict over water resources, cooperation and collective action among different users is a potential response option. For this to happen, however, an enabling environment that fosters stakeholder cooperation is necessary.

In the Philippines, many cases of water competition and conflict have been reported. Misallocation of water triggered conflict between upstream and downstream farmers in San Pablo City, as the use of upstream water was shifted for municipal use, reducing the number of annual cropping cycle for rice (Ordoñez 2010). Due to the resulting crisis in irrigation water, farmers called for the government's attention to prioritize irrigation programs to enable them to produce rice to address domestic demand rather than rely on rice imports. Laguna de Bay is another example, where it's environmental and economic significance has made it a source of conflict over property rights, open access, multiple uses, and externalities in resource utilization (Nepomuceno 2004). As a management response, the government created the Laguna Lake Development Authority (LLDA) to manage conflict and ensure the integrity of Laguna de Bay. Other water disputes include arguments over compensation for changing water allocations in Angat Dam, coastal households' accusation that big industries are causing saltwater intrusion in Batangas City, and the unregulated groundwater usage in Cebu City that has caused seawater intrusion (Tabios and David 2004). The context of water competition and conflict vary at different levels, as does their intensity. However, cooperation through constructive dialogues has always been the starting point for creating solutions.

Water use and ownership rights are central to water resource management. Defined as "the capacity to call upon the collective to stand behind one's claim to a benefit stream," property rights involve a relationship between the right holder and an institution to assert that claim (Bromley 1991, quoted in Meinzen-Dick and Knox 2001). In the context of water, the rights to use include access and withdrawal, while control rights refer to management, exclusion, and alienation (Agrawal and Ostrom 2001). In the Philippines, two major national laws define water use and control rights, namely the Water Code (PD 1067) on statutory rights and the Indigenous People Rights Act (IPRA 8371) for customary rights in (Ramazzotti 2008; Kho and Agsaoay-Saño 2005). However, these same laws have often created conflict. The Code provides that "all waters belong to the state" and "cannot be subjected to acquisitive prescription," but may allow its "use or development" through the "control and regulation of the National Water Regulatory Board (NWRB)" based on the country's priorities. The customary rights upheld by the IPRA, by contrast, are based on tradition and culture of indigenous peoples (IPs) rather than on written law. The rights to access and use water, among other resources, is based on IP's concept of land—that land is granted and entrusted by a Creator, and everyone has a responsibility to harness and cultivate it. While the Water Code grants water rights as a privilege to allocate and use water, customary rights, in contrast, do not recognize private ownership but assume collective ownership: water cannot be privately owned, sold or leased. This difference in principles and perspectives has led to conflict between the government, IPs, and other water users.

It is important to note that the absence of clearly-defined property (water) rights has been identified as a major factor in the failure of sustainable watershed development, as it discourages smallholders to adopt conservation practices such as contour farming and invest in land improvements such as planting trees (Reddy et al. 2007; Swallow et al. 2001).The proliferation of agribusiness of multi-national companies in watershed areas often poses conflict with local residents, as the former are more powerful in acquiring water rights from NWRB. Similarly, conflicts often arise between IPs and other users since large portions of watersheds are commonly claimed by IPs as ancestral domains. Water can thus be as much a rights issue as it is a resource issue.

Resolving water conflict through legal means can be long and tedious and local stakeholders often do not have the means to raise their issues to higher authorities or bring cases to court, hence they often resort to amicable settlements or voluntary agreements. Local experiences show that collective action, in the form of voluntary agreements over how to cooperate in the management of water resources, works to solve shared water problems. Collective water management emerges where the value of water is central and the water scarcity problem has a direct impact on stakeholders' livelihoods (Meinzen-Dick and Knox 2001). The irrigator associations (IAs) in the Philippines who collectively agreed to operate and manage the irrigation system by themselves provide a good example (Fujita et al. n.d.). As the IAs take responsibility over irrigation management, they develop social capital and strengthen collective action to demand government services. Collective action is higher under moderate biophysical conditions, where small-sized and less spatially dispersed communities make communication easier, decision-making more efficient, and organizational mobilization and monitoring more cost-effective (Reddy et al. 2007; Sellamna n.d.). These conditions enable equitable distribution of resource benefits, which increases the incentive for cooperation (Sellamna n.d.). Stakeholders are more likely to manage water resource if benefits are easy to identify, materialize quickly, and accrue to those who incur the costs. Evidence suggests that water users' participation is critical for successful watershed management (Johnson et al. 2001). However, this requires voluntary adherence to a common set of rules and coordinated contributions amongst the stakeholders (Meinzen-Dick and Knox 2001). Governance structure and political rights to organize and manage resources locally are likewise essential to provide all water users with equal footing to share perceptions and to assert their interests (Meinzen-Dick and Knox 2001; Knox et al. 2001). Ultimately, voluntary agreements happen because of users' willingness to participate in defining their water problems, setting priorities, choosing alternate mechanisms that work for them, and learning from small collective actions towards wider application at the watershed level.

This case study describes the competition and conflict caused by water scarcity and overlapping water use and ownership rights, and the cooperative agreements adopted by different water users in the Manupali watershed, Bukidon province in southern Philippines. The key user groups are smallholder farmers and IPs for crop production, multi-national companies for banana and pineapple production, the local government unit for potable water supply, the IAs through the National Irrigation Administration (NIA), and the National Power Corporation (NPC)-Pulangui IV for hydroelectric power generation. As demand for water outstrips supply, competition and conflict arise between these different users over who can use water and how much each one can use. The case of Manupali highlights the positive potential of water competition and conflict to produce cooperative agreements that lead to benefit-sharing. However, as a first step towards collective action at the watershed level, it was important to reach a shared understanding on the actual water balance and its dependence on land use patterns.

This case study uses data from the Rapid Hydrological Appraisal (RHA) conducted from July 2009 to January 2010. RHA is a hydrological assessment tool developed by the World Agroforestry Centre (ICRAF) in Bogor, Indonesia that clarifies the relations between specific land use and the watershed services that are of sufficient value to downstream stakeholders, and become the basis for reward mechanisms (Noordwijk et al. 2008). A local team was organized and trained in 2008 to implement the RHA tool.[3] To facilitate meaningful participation of water users, the RHA integrated the local (LEK), public/policy (PEK) and scientific/modeler's ecological knowledge and perceptions (MEK) in understanding the problems related to watershed functions, as well as in finding solutions (Jeanes et al. 2006). Baseline information was collected from reports and literature. This was followed by a survey of 1,143 households for LEK acquisition, focused group discussions, current reality dialogues, problem tree analysis, stakeholder analysis, as well as 30 key informants (KI) interviews for generating PEK, to understand the nature of water competition and conflict, as well as the actions taken by different stakeholders. For MEK, the GenRiver model, a simple water balance model that simulates riverflow was used.[4] The initial results were feedback to policy-makers and stakeholders, which resulted in subsequent deliberations of potential management options.

2. LAND USE CHANGE AND WATER BALANCE IN MANUPALI WATERSHED

The Municipality of Lantapan is wholly contained in the Manupali watershed, Bukidnon province (Figure 1). It has a total land area of 35,465 hectares, of which 60 percent are devoted to agriculture while 40 are forest. Its elevation ranges from 320 to 2,938 meters above sea level (masl), and its climate falls under Type IV climatic conditions with evenly distributed rainfall throughout the year, but with indistinct dry and wet seasons.[5] The maximum annual rainfall recorded between 1987 and 2005 was 2,522.4 mm while the mean annual rainfall was 1,500 mm. About 70 percent of the area has slopes greater than 18 percent. The watershed's soils are generally well-drained with clayey surface and subsoil horizons, slightly to moderately acidic with low organic matter and high Phosphorous fixation capacity, and have low capacity to retain nutrients (West 1996). The total population recorded in 2007 was 51,406 persons with a land density 1.44 people per hectare. The ethnic groupings include 51 percent Dumagats (lowland migrants), 25

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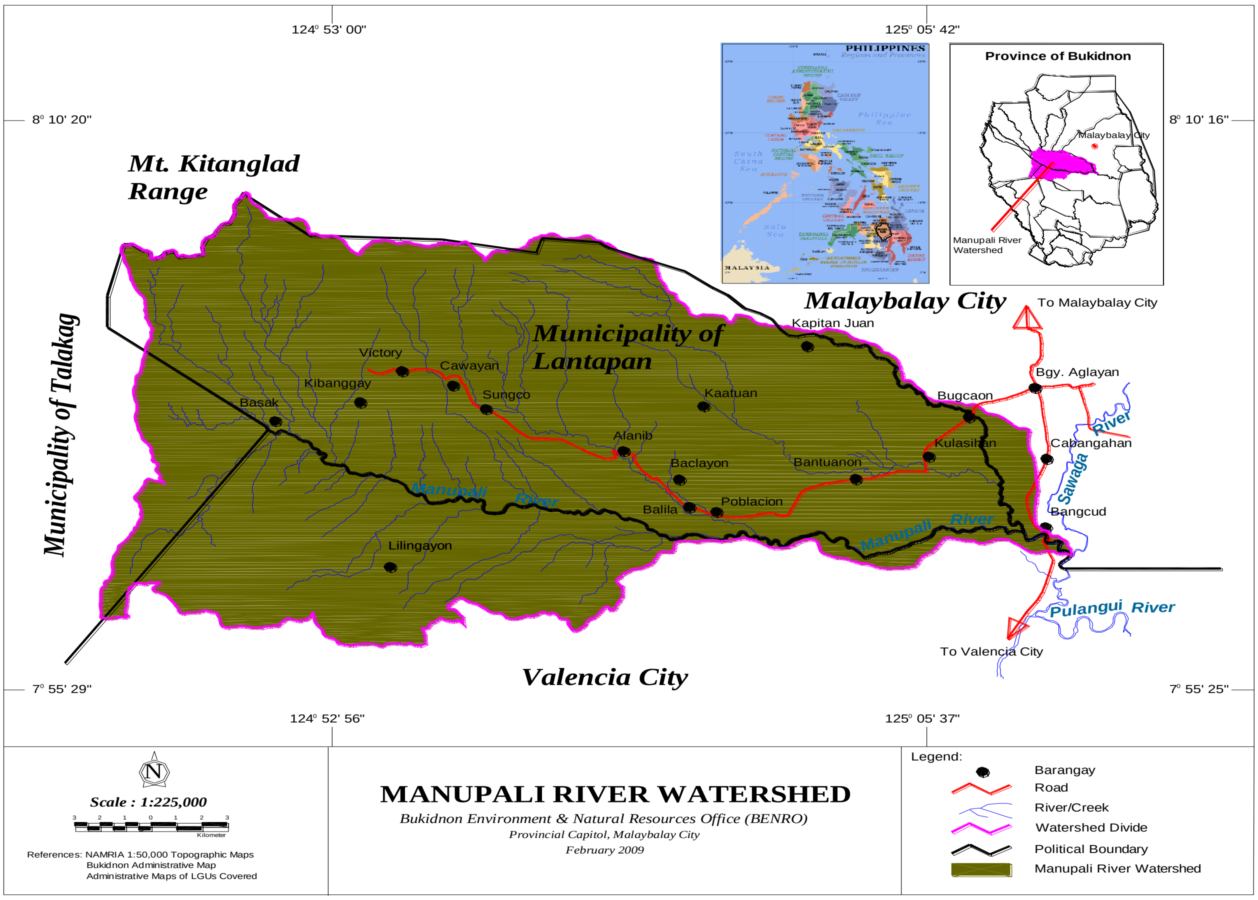
[3] The RHA team is composed of representatives from the Department of Environment and Natural Resources (DENR), the local government of Lantapan, NIA and Bukidnon Environment and Natural Resources Office (BENRO) with technical backstopping from ICRAF.

[4] GenRiver is a generic river model on river flow. It accounts rainfall and traces subsequent flows and storage in the landscape that can lead to either evapotranspiration, river flow or change in storage.

[5] According to modified Corona classification, rainfall under Type IV is more or less evenly distributed throughout the year, and has no dry season.

percent Talaandig, 14 percent Bukidnon, and 10 percent Ifugaos from northern Philippines. Amongst these, the Talaandig is the most dominant IP tribe in Lantapan.

Figure 1: Municipality of Lantapan within the Manupali Watershed, in Bukidnon



Source: BENRO

Lantapan is also a river valley located between the biodiversity rich Mt. Kitanglad Range Natural Park (MKRNP) on its northern side and the Manupali River on its southern border. Several rivers, creeks, and springs drain from MKRNP across the intensively cultivated agricultural areas of Lantapan to the Manupali River. The river runs into a network of irrigation canals currently operated by the Bukidnon Irrigation Management Office (BIMO).[6] The whole system ultimately drains into the Pulangui reservoir that supports the biggest hydropower facility in Mindanao region operated by NPC-Pulangui IV (Coxhead and Buenavista 2001).

The Municipality of Lantapan is rich in natural resources and has favorable climatic conditions for crop production. The majority of the people have long since been dependent on small farms for their livelihood, however agribusiness started to dominate agricultural activities in 2000 (Catacutan 2007). Corporate farming and swine and poultry production

[6] Deputized agency of NIA

stimulated economic growth, and were considered key drivers of land use change in the last ten years.

Agricultural expansion has led to land use conversions into banana, corn, vegetables, sugarcane, and other crops, which decreased the forest area by 6 percent and 3 percent between 1990-2002 and 2002-2007, respectively (Table 1). Similarly, the area dedicated to agroforestry has decreased by 2 percent between 1990 and 2002, and further dropped by 73 percent between 2002 and 2007.[7] Correspondingly, mixed agriculture increased by 18 and 24 percent between 1990-2002 and 2002-2007. With increasing demands for land for smallholder production and agribusiness, and lack of land use policy, it is expected that cultivation will encroach into the buffer zone of MKNRP.

In Manupali, agricultural intensification with vegetables requires application of fertilizers, pesticides, and other chemicals, and has promoted soil (Daño and Midmoore 2002). Studies report both qualitative and quantitative evidence of water quality degradation in the watershed. Deutsch et al. (2001) found that total suspended solids (TSS) were higher in areas where agricultural cultivation was more intense, while seasonal TSS coincides with months of intensive land preparation. Soil erosion also resulted in serious offsite effects including sedimentation in rivers and reservoirs, affecting the efficiency of irrigation and hydropower generation. The Manupali River Irrigation System (ManRIS) has reported sedimentation problems in the diversion dam and irrigation canals.[8] In seven years (1995-2002), ManRIS has incurred 17 million PhP in desilting the dam and irrigation canals, through dredging or flushing out silt materials to the Pulangui River, leaving the NPC reservoir with an estimated silt deposit of 1.5 m^3 per year.[9] As a result, the voluminous silt is limiting water inflow into the reservoir, thereby affecting water supply. Accordingly, siltation has reduced the reservoir's storage capacity by up to 30 percent. The NPC has already paid more than 200 million PhP to dredge the reservoir since the dam's construction in 1986.

Based on the LEK-PEK survey, the main concern of stakeholders was declining water quality and quantity due to sedimentation and diversion of flows (Table 2) (Tiongco et al. 2010). Stakeholders also reported observations on stream flow variability in association with changing rainfall patterns, although they seem to have different experiences with regards to these observations. A majority of upstream water users (such as farmers and banana plantations) did not report serious problems with regards to water supply, whereas water users from middle to the lower sections of Manupali identified water scarcity as a serious problem that severely affected their economic activities. They identified several factors affecting water scarcity, but singled out "diversion of flows" for commercial banana production as the main cause. Ultimately, stakeholders linked water shortage with land use change associated with banana expansion and forest conversion into agriculture.

[7] Agroforestry refers to trees on farms.

[8] A large irrigation system currently under the management of BIMO

[9] 392,700.39 USD;1 USD=43.29 PhP as of 19 April 2011

Table 1. Comparative land cover changes of Alanib and Kulasihan sub-watersheds within Manupali watershed (1990, 2002 and 2007)

Land use	Area (ha)						1990-2002				2002-2007			
	Alanib			*Kulasihan*			*Alanib*		*Kulasihan*		*Alanib*		*Kulasihan*	
	1990	**2002**	**2007**	**1990**	**2002**	**2007**	**Change**	**%**	**Change**	**%**	**Change**	**%**	**Change**	**%**
Agriculture mix	841.5	1033.5	1502.1	1493.9	1560.6	2597.7	0.2	18.6	0.0	4.3	0.3	31.2	0.4	39.9
Agroforestry	2256.1	2050.0	1441.4	3840.6	4090.0	2297.5	-0.1	-10.1	0.1	6.1	-0.4	-42.2	-0.8	-78.0
Banana	25.8	62.6	20.1	122.1	387.6	190.9	0.6	58.8	0.7	68.5	-2.1	-212.1	-1.0	-103.1
Cleared land	22.1	1.0	0.8	62.5	26.3	6.3	-21.4	-2136.4	-1.4	-137.7	-0.2	-22.2	-3.2	-317.1
Cloud/Shadow/ Water body	113.0	36.8	89.2	812.0	0	402.8	-2.1	-207.1		0.0	0.6	58.7	1.0	100.0
Corn/sugarcane	101.9	195.3	252	240.7	361.9	770.0	0.5	47.8	0.3	33.5	0.2	22.5	0.5	53.0
Forest	2898.5	2733.2	2664.5	2596.2	2504.3	2454.5	-0.1	-6.0	-0.0	-3.7	-0.0	-2.6	-0.0	-2.0
Pineapple	0	2.4	8.3	0	2.3	40.0	1.0	100.0	1.0	100.0	0.7	70.7	0.9	94.4
Ricefield	17.7	56.3	83.2	254.3	309.4	401.4	0.7	68.5	0.2	17.8	0.3	32.2	0.2	22.9
Settlement	12.4	14.9	20.7	14.5	96.6	123.9	0.2	16.4	0.9	85.0	0.3	28.3	0.2	22.1
Shrub land	292.1	395.2	499.1	260.6	358.5	412.3	0.3	26.1	0.3	27.3	0.2	20.8	0.1	13.1
Total	6581.3	6581.3	6581.3	9697.3	9697.3	9697.3								

Source: ICRAF-ASB

Table 2. Knowledge, perceptions and recommendations of key water-users groups on the hydrological situation of Manupali (2009)

Users	Issues & concerns	Causes	Needed interventions
Farmers	-decreasing water quantity -chemical contamination -decrease river flow by about 50% -Unsafe water condition for domestic use -siltation	-disposal of chemicals and pesticides -unsustainable farming practices -intensive cultivation -diversion of flows -decreasing forest cover - disposal of chemical wastes	-regulate tree cutting -regulate expansion of banana plantation -adoption of sustainable farming system -implementation of environmental protection programs and projects -regulate agricultural expansion in critical areas
Local government unit	-shortage of potable water supply during dry season -poor water quality -siltation at the source -high treatment cost	-population growth -expansion of banana plantation -decreasing forest cover at source -intensive cultivation in sloping areas -improper disposal of solid wastes and waste water	-massive environmental awareness - compliance of environmental protection policies -awareness campaign & training on SWC -implementation of environmental policies -regulate agricultural expansion in the buffer zone -regulate expansion of banana plantation -crop zoning
Multi-national banana corporation	-shortage of water during dry season	-increasing water demand by water users	- tree planting -water recycling - adoption of SWC
NIA-IAs	-water shortage during dry season -siltation in canals -high maintenance cost of canals -poor rice production	-diversion of flows for banana plantations and vegetable farms -increasing demand for domestic use -unsustainable farming practices	-reforestation projects -adoption of SWC -incentives to upland communities -regulate expansion of banana plantation
NPC	-decreasing river flow -high dredging cost	-decreasing tree cover in the uplands -soil erosion -intensive cultivation	-reforestation -Information, education and communication (IEC) activities -watershed rehabilitation

Source: LEK-PEK survey and FGDs.

A common understanding on watershed functions is important to make interventions acceptable to local stakeholders. Small changes in water use may have huge impacts on water balance. Alibuyog et al. (2008) used the ArcSWAT model to examine the relations between land use and sedimentation. Results of the model corroborated the observations of local stakeholders (in the LEK survey) showing that converting 50 percent of forest and grasslands of a sub-watershed into crop production will result in about a 3 to 14 percent increase in run-off, a 200 to 273 percent increase in sediment yield, and a 2.8 to 3.3 percent decrease in stream flow, with the higher value indicating a condition without soil and water conservation (SWC) measures. Much of the rainfall is lost as surface runoff, which results in significant soil erosion, sedimentation in dams and reservoirs, and downstream flooding. A recent Geohazard Assessment Report added that Lantapan is susceptible to flooding, erosion, and mass movements (Uncad 2009). These findings help to explain why landslides and flooding have been frequent in recent years, damaging millions of properties and agricultural crops in the Manupali area.

As mentioned above, MEK was obtained through the GenRiver model, to calculate the water balance of the watershed with respect to current land uses. The model shows that Alanib and Kulasihan, two of Manupali's four major sub-watersheds are in critical condition with seasonal discharges and low buffering capacity (Table 3). In terms of supply and demand, it was noted that the total volume granted to banana plantation companies and a few individuals in Alanib, Maagnao and Kulasihan sub-watersheds were 10,146 m^3d^{-1}, 13,153 m^3d^{-1} and 29,217 m^3d^{-1} respectively, whereas the total water yield for each river were 26,784 m^3d^{-1}, 128,736 m^3d^{-1} and 37,152 m^3d^{-1} based on GenRiver simulation (Figure 2). Hence, the net volumes that can be available to other water users of the three rivers are 16,525; 115,383 and 7,848 m^3d^{-1}. However, ManRIS's water rights alone, of the Manupali River and all its tributaries, are 492,480 m^3d^{-1}. This means that ManRIS cannot possibly get the volume to which its water rights entitle it.

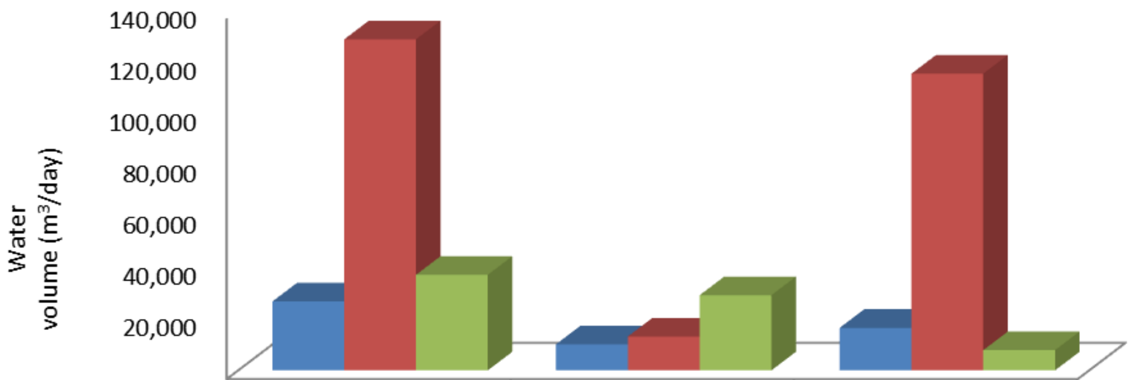
Table 3. Water balance of current, increase agriculture cover scenario (2), and increase shrub lands through fallow scenario (3) in Alanib and Kulasihan sub-watersheds during 12-year simulation (1994-2005). Percentage of precipitation indicated in parentheses

No.	Dynamics of water	Alanib sub-watershed				Kulasihan sub-watershed			
		Observed	Simulated			Observed	Simulated		
			Current	Scenario 2	Scenario 3		Current	Scenario 2	Scenario 3
1	Precipitation (mm)	2272.36	2272.36	2272.36	2272.36	2300.67	2300.67	2300.67	2300.67
2	Evapotranspiration (mm)		760.42 (33.54)	1064.58 (46.85)	1703.33 (74.96)		1058.50 (46.01)	438 (19.04)	620.5 (26.97)
3	Other Losses		667.58 (29.37)	382.12 (16.82)	71.9 (3.16)		261.82 (11.38)	599.73 (26.07)	1180.08 (51.29)
4	Riverflow		844.98 (37.18)	825.66 (36.34)	497.13 (21.88)		980.35 (42.62)	1262.94 (54.89)	500.09 (21.73)
	-Runoff (mm)	496.12	516.49 (22.72)	497.17 (21.88)	497.13 (21.88)	535.2	536.90 (23)	546.60 (23.78)	488.44 (21.23)
	-Soil Quick Flow (mm)		≥0.00	0	0		31.00 (1.35)	182.5 (7.93)	8 (0.35)
	-Surface Quick Flow (mm)		-	-	-		412.45 (17.92)	412.45 (17.92)	3.65 (0.16)
	-Baseflow (mm)		328.49 (14.45)	328.49 (14.45)	0		0	121.39 (5.47)	3.65 (0.16)

Source: Tiongco et al. 2010

It is also important to understand the relations between banana expansion and water availability. Clearly, there is overall dependence on river water by plantations given the standard irrigation requirement of no less than 45 $m^3ha^{-1}d^{-1}$ to produce high quality export bananas. Although rainwater is harvested and utilized by banana plantations, it was important to accumulate and store water in a reservoir by diverting river flows, to supply year-round irrigation. In 2007, the total banana plantation area in Kulasihan was 578.52 hectares with irrigation requirement of as much as 9,502,190.90 m^3. But the average annual yield of Kulasihan is only 11,599,019 m^3yr^{-1}, indicating that the banana plantations' share of the Kulasihan water was about 80 percent. The remaining 20 percent is presumably shared by other users such as ManRIS, farmers, poultry operators, and households. Increasing the current size of banana plantations will therefore leave other users with very little water. Ultimately, this calls for serious land use planning and enforcement of land use policy.

Figure 2. Simulated net water yield during a 12-year simulation period (1994-2005) versus volume of water rights granted in 2007 in three sub-watersheds. Note that ManRIS has prior water rights of Manupali which is more than the combined volume granted



	Total water yield	Total water granted to permittees	Net water volume for other users
Alanib River	26,784	10,146	16,525
Maagnao River	128,736	13,153	115,383
Kulasihan River	37,152	29,217	7,848

Source: Tiongco et al. 2010

Using a different approach, Lacandula (2007) compared the stream flows of a land use with and without banana, and found that the monthly average stream flow between the two is significant—"with banana land use" has 0.071 m3s-1 stream flow while "without banana land use" has 0.377m^3s^{-1}. The study also looked at the effects of diverting flows for plantation operations and found that diversion significantly reduced downstream flows. Furthermore, it was estimated that on average, 26,590 m^3d^{-1} is diverted from Maagnao River to the banana plantation, which is 100 percent more than the total granted volume of all permittees in

Maagnao. Expectedly, without diligent monitoring, it was convenient for plantation companies to divert more water than what is permitted by NWRB.

3. WATER COMPETITION AND CONFLICT

Table 4 presents the competing water demands of different user groups. As mentioned above, ManRIS and banana companies together require the highest volume of water, so their expansion will lead to a net deficit in water supply for all other users, potentially raising the likelihood of conflict. Such conflicts emerged in the early 2000s but received attention only recently, as a result of a survey by Catacutan and Piñon (2009). As discussed earlier, water use competition not only leads to scarcity, depletion, and degradation of underground and surface water, but also aggravates conflict between upstream and downstream residents due to overlapping water rights and poor benefit-sharing.

Table 4. Water demand by users in Manupali watershed (2009)

Agro-ecological zone	Land use	Users	Demand for
Protection forest	Protected area	DENR-IPAS/PAMB	Maintaining the overall integrity of MKRNP
	Agroforestry	IP farmers & households	Planting trees &food and cash crops
	Water source	Local water system & multi-national banana companies	Municipal water system & irrigating banana plantations
Production forest	Buffer zone	DENR-IPAS/PAMB	Maintaining the overall integrity of MKRNP
	Agroforestry, abaca, tree farms, vegetable farms & grasslands	IP & Dumagat farmers & households	Planting trees & agricultural crops for household use, income
A&D (Upstream)	Agroforestry, abaca, tree farms, banana, vegetable farms & grasslands	IP & Dumagat farmers & households	Planting trees & agricultural crops for household use & income
	Banana plantations	Multi-national banana companies	Producing banana for export
	Poultry & swine	Agri-business companies	Growing poultry, etc.
	Water system	Local water system	Maintaining the economic viability of the municipal water system
	Fishing & recreation	Households	Fishing, recreation

Agro-ecological zone	Land use	Users	Demand for
A&D (Mid-stream)	Agroforestry, tree farms, banana, corn & sugarcane	IP & Dumagat farmers & households	Producing trees & agricultural crops for household use & income
	Banana plantations	Multi-national banana companies	Producing banana for export
	Poultry & swine	Agri-business companies	Growing poultry
	Water system	Local water system	Maintaining the economic viability of the municipal water system
	Fishing & recreation	Households	fishing and recreation
A&D (Downstream)	Agroforestry, tree farms, banana, corn & sugarcane	Dumagat farmers	Planting trees & agricultural crops for household use & income
	Banana & pineapple plantations	Multi-national banana & pineapple companies	Producing banana & pineapple for export
	Poultry & swine	Agri-business companies	Growing poultry
	Water system	Local water system	Maintaining the economic viability of the municipal water system
	Irrigated rice	NIA-ManRIS/ Irrigators' association	Rice irrigation
	Fishing & recreation	Households	Fishing and recreation
A&D (beyond Lantapan)	Pulangui reservoir	NPC-Pulangui IV	Power generation
	Fishing	Households	Food

Source: LEK-PEK and FGDs

In upper Manupali, water scarcity has been the source of conflict in drier periods where farmers compete for access. Village leaders reported disputes among farmers who accuse each other of either stealing or cutting irrigation pipes or destroying small impounding reservoirs.

Multi-national banana plantations are located in the middle to the mid-lower section of Manupali. The first multi-nationals operating in Lantapan were Mt. Kitanglad Agri-Ventures, Inc. (MKAVI) and DOLE-Skyland Philippines. Conflict began when DOLE's application for water rights in Maagnao River was rejected by NWRB because MKAVI had already obtained water rights in 1999, including Alanib and Kulasihan Rivers. But the issue became more complicated when ManRIS presented their water rights of Manupali River and all its tributaries granted in 1979. Unsurprisingly, "water rights" became a major dispute between banana companies and ManRIS. In the Water Code, a "priority date system" applies, where the rights belong to the user in the order in which they apply—hence ManRIS would have been the senior water rights holder in Manupali. The Code also stipulates that in times of water shortage, those with senior rights can use the full volume allocated to them, while those with junior rights must do with less or nothing. The reality was the opposite: ManRIS contended with whatever water was left over from banana plantations. In 2000, the Local Government attempted to settle the dispute between ManRIS and MKAVI, but more issues surfaced including red tape, illegal processing of water rights apparently tolerated by the NWRB, and surreptitious diversion of water. It was also disclosed that the technical design of diversion canals was not presented to the affected communities; commotion thus started when the flow was cut by the diversion canal. Local people raised the issue of "water grabbing" against the plantation company, and was mediated by village officials.

Conflicts were also reported in private lands with open-access water. In one village, a piece of land with spring water was sold to a poultry operator who secured the property to build a small reservoir for his poultry business. As a result, the community was denied access to the spring. On the basis of Article 3 of the Water Code stating that "all waters belong to the State," the local community fought for their access rights to the spring. A compromise solution was reached whereby farmers were allowed access to the spring to collect the "excess water" not used by the poultry business. However, there was almost no "excess water" in drier months, so people had to walk for three kilometers to fetch water.

Competition between and among water users in the upper and middle sections of Manupali is growing, but it is the conflict between downstream institutional users that get most attention. With seasonal flows, sustaining the irrigation system with a service area of 4,395 hectares has become more challenging for ManRIS, with farmer-irrigators suffering from crop losses when water supply drops. Apparently, rotational irrigation did not help much to manage scarcity of irrigation water. Some farmers were even reported to be in possession of firearms to protect their families in times of chaos over irrigation water. One banana company operating within the ManRIS area complained of water shortage due to poor maintenance of the canals and the dam. ManRIS officials admitted their inadequacy in their maintenance work due to internal financial problems. The previous ManRIS team expressed more concern with protecting the upper watershed while current BIMO officials seem to relegate the responsibility to the Department of Environment and Natural Resources (DENR), arguing that BIMO is itself a consumer rather than a watershed manager. With regards to processing water rights and associated complains, BIMO officials stressed that their role is limited to receiving applications at the local level, while NWRB grants approval. Nonetheless, as a deputized agency of the government, BIMO was blamed for failure to raise issues arising from misallocation of water rights to NWRB. Ultimately, it was suggested that NWRB assess the condition of the watershed before granting water rights.

The fact that several management regimes and property rights exist in MKRNP is another issue. For watershed management, at least three management frameworks overlapped, but with lack of effective coordination, management often fell through the cracks (Catacutan et al. 2001). First, watersheds, protected areas, and national parks are managed by the DENR. At the local level, MKNRP is managed by the Protected Area Management Board (PAMB), which is a multi-sectoral group supported by DENR. Second, the Local Government is mandated by the Local Government Code (RA 7160) to manage natural resources within their administrative jurisdiction. Third, the IPRA Law supersedes when it comes to ancestral domains. Without proper coordination, these overlapping management regimes have in fact complicated the situation.

The Manupali watershed exhibits a classic case of tension between statutory and customary rights. For example, the Talaandigs invoked the primacy of their customary water rights over statutory rights by penalizing (termed as sala) major users, such as the Lantapan government, banana companies, and the DENR for failure to obtain pre-and-prior informed consent (PPIC) on all water-related activities implemented in the locality. At one point, some Talaandig members disconnected the calibrated meters of the Municipal waterworks, and refused to settle their water bills, for the reason that the source is their ancestral property and they should thus be exempted from paying the tariff. The Local Government seemed reluctant to resolve this issue through use of statutory rights since the IPRA states that customary laws and practices should be used to resolve disputes involving IPs. All measures embodied in the customary law must first be exhausted before resorting to regular courts, and any ambiguity in the application and interpretation of laws shall be resolved in favor of the IPs (Ramazzotti 2008; Kho and Agsaoay-Saño 2005).

4. COOPERATION AND COLLECTIVE ACTION

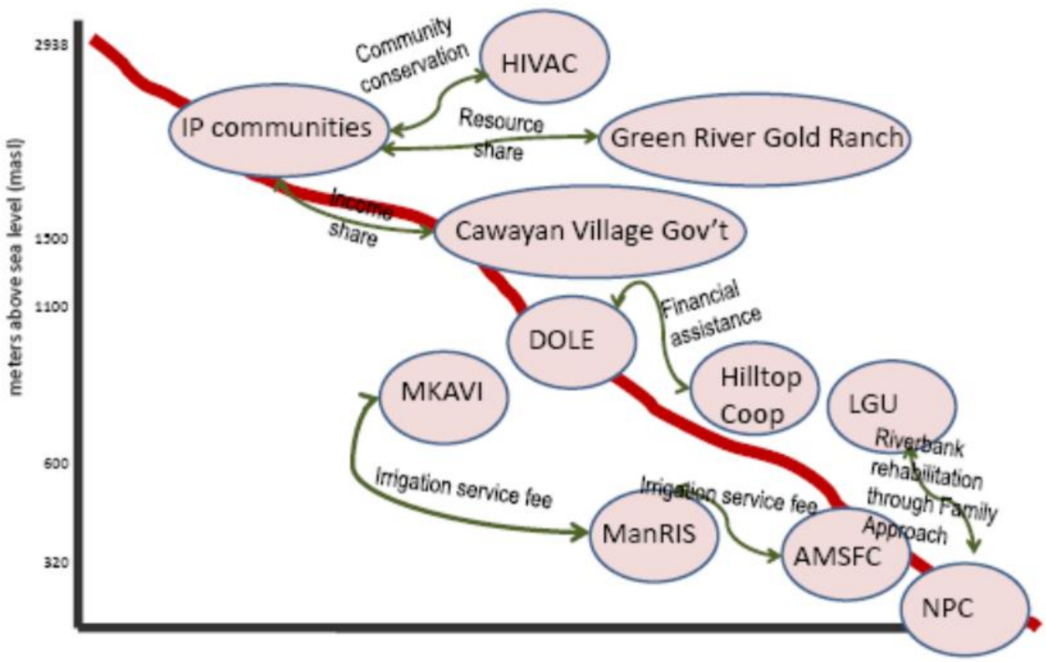
Water competition could trigger violent confrontations, but fortunately stakeholders in Manupali have opted to use different ways and means to secure their respective rights, and have avoided hostilities by voluntarily agreeing to cooperate on applicable water rights sharing schemes (Figure 3). The various cooperative schemes are summarized briefly below.

- ManRIS and MKAVI. The management of MKAVI has recognized that ManRIS has prior water rights over the Manupali River and its tributaries. They also recognize the impact of their diversion canal on the availability of irrigation water to rice producers. To avoid conflict, MKAVI agreed to pay an irrigation service fee (ISF) to ManRIS, a form of settlement to compensate for the water that could have been used for rice production. The company is currently paying an ISF equivalent of a total of 150 hectares of irrigated rice.
- Dole and Hilltop Multi-Purpose Cooperative (MPC). The company's application for water rights was denied due to overlapping rights held by MKAVI and Hilltop MPC in Maagnao River. Hilltop MPC is a farmer cooperative that obtained water rights for Maagnao River in 2000. Through negotiations mediated by village officials, MPC members entered into an agreement with DOLE to share their water rights, on the condition that the company extends livelihood assistance and employment to Hilltop farmers.
- HIVAC and the IPs. Mediated by the PAMB, the Celebrate Life Banana Company successfully negotiated with the Talaandig community within a Community-Based Forest Management (CBFM) area for the water rights of Kibuda spring. The legal basis of the negotiation was the NIPAS and IPRA Laws. In return, the company has to fund a community conservation project covering 5,000 hectares, as well as support livelihood projects.
- ManRIS and AMSFC. Since ManRIS is unable to maintain the road system within their service area, they accepted the company's offer to maintain

the road system and an ISF equivalent to 375 kg of rice $ha^{-1}yr^{-1}$. As part of the company's corporate social responsibility (CSR) program, it also supported tree planting activities along the small creeks in the service area.

- Cawayan Village Government and the IPs. To provide the residents with potable water, the IPs permitted the village government of Cawayan to develop a reservoir for the community's water system. In turn, the government will share 10 percent of the project's income to the IP tribe, which will be used for watershed protection activities upstream.
- Green River Gold Ranch and the IPs. The Green River Gold Ranch entered a memorandum of agreement (MOA) with the IP community, to draw water from an open-access spring, for a small water impoundment in the ranch. In turn, the ranch pays one cattle for every 100 cattle $year^{-1}$ to the IP community.

Figure 3. Water users in Manupali watershed and their cooperative agreements (2009)



Source: ICRAF KI interviews (2010)

5. DISCUSSION

The Manupali experience offers insights on conflict resolution through cooperation and collective action. It shows that given the complexity and ambiguity of policies on property rights, collective action through cooperative agreements can mitigate hostile confrontation (Agrawal and Ostrom 2001).These cooperative agreements were initiated independently by and among water user groups, with limited external mediations. The agreements thus have a strong voluntary element and are working to show how local stakeholders manage, organize, and cooperate in the face of change. Such agreements were based on the provisions of the Water Code, which allows the transfer or lease of water rights in whole or in part to other users, as well as the adoption of pricing schemes. Existing policies, with all their complications and ambiguities, provide a starting point for voluntary cooperative actions to manage scarce water resources, although they do not guarantee a long-term solution when it comes to addressing the root causes of water scarcity.

When viewed from cooperation theory, these cooperative acts are results of reciprocal altruism, which according to Stewart (2008) is based on the simple idea that an individual will not be disadvantaged by helping another person, provided the other helps in return. It can be argued in this case, that different users opted to cooperate because everyone recognized the (i) value of water, (ii) scarcity of water, (iii) social capital that exist between and amongst them, and (iv) legal basis for voluntary agreements and water management. However, cooperation does not emerge easily with self-interest standing in the way (Stewart 2008). There were concerns that these voluntary water rights sharing schemes were partial to the interest of banana companies, with farmers incurring much of the present and future costs of cooperating. Obviously, the banana companies could easily recoup their initial costs of cooperating as soon as water flows freely into their reservoirs, regardless of whether or not the benefits outweigh the costs of other cooperating parties.

As in any cooperative arrangement, the situation is complicated by power imbalances between the actors, which can distort the balance of the favors that are being exchanged, and eventually break reciprocity (Stewart 2008). Interviewed farmers disclosed that many of the conditions in the contract were not adhered to by the multi-national companies, while IAs reported receiving no benefits from the cooperative agreement of ManRIS and MKAVI. Similarly, farmers complained that the local government did not bring about benefits from supporting the expansion of banana plantations. Despite these complaints, stakeholders continue to cooperate to secure their respective rights by sharing them with others, instead of harboring conflict. Such cooperative acts thus have their merits, because they helped to mitigate hostile confrontation between different users. However, these forms of cooperation and temporary institutional arrangements can break down easily if the actors or cooperators cease to interact, reorganize and re-cooperate, and adapt to new rhythms of change.

An emerging problem at the landscape level is the distribution of benefits to upstream communities. As it is, current cooperators are collectively extracting favors from other stakeholders who were non-cooperators, namely farmers in the upper watershed who may have incurred high opportunity costs by not shifting their land use to maintain watershed services. It can be argued that cooperators currently in the table have cheated by receiving favors and gaining all the benefits without sharing any of the costs incurred by non-cooperating stakeholders. This creates another level or type of inequality. The threat is when upland communities shift to poor land use practices, if they continue to be excluded from the benefits enjoyed by current cooperators.

An important question that remains is whether collective action in the form of voluntary agreements for water rights sharing has, in this case, addressed the core problem of water scarcity. The RHA has shown that water availability and scarcity are linked to land use patterns, with water rights confounding the issue. From a water balance perspective, further expansion of banana plantations and poorly-designed tree plantations of fast-growing evergreen tree species will further lead to water shortage, while decrease in natural forest will lead to poor stream flow or water irregularity. Sustainable land use that helps improve water yield and reduces stream flow variability is essential to improve water balance and reduce deficits in water supply. This objective is untenable without collective efforts of all users and other stakeholders at a watershed scale. Policymakers should be much more involved in fostering collective action at that level, and in implementing policies that provide incentives for sustainable land use.

The multiplicity of interests of the stakeholders, the ambiguity in water rights, and the lack of understanding of the relations between land use patterns and hydrology, present greater challenges in fostering collective action at the watershed scales. Intra- and intergroup collective actions have been manifested by different water user groups, by agreeing to cooperate to manage conflict over water use and rights, but collective action beyond this point can be hampered by a lack of understanding of the real water balance of the watershed. As a first step, collective understanding of the importance of water balance and its dependence on land use patterns is important to foster collective action for sustainable land use. A combination of actions on land use policies, water rights, institutional arrangements, and incentives for co-investments and collective action is necessary to resolve watershed management conflict. The RHA results have proven useful to policymakers and other stakeholders, particularly the water balance and yield associated with existing land uses as well as land cover scenario simulations (Tiongco et al. 2010). As a result, the local government announced a policy statement to regulate the expansion of banana plantations.

In response to the above recommendations, the local government of Lantapan enacted Municipal Ordinance No. 14, which provides incentives to encourage farmers to invest in or shift to sustainable land use practices (Catacutan and Piñon 2010). While it is new, government agencies and private companies have started to support the program. As an example, a reward scheme for watershed services (RWS) is now being negotiated between farmers in Alanib sub-watershed and NPC-Pulangui IV, facilitated by the ICRAF-RUPES (Rewards for Upland Poor for Environmental Services) project. This RWS is hoped to foster watershed level collective action in Manupali. Ultimately, local governments can provide adequate policy response and coordinate collective actions to address water scarcity, conflict and competition.

6. CONCLUSION

From this experience, several ideas, lessons, and recommendations can be drawn that can guide policymakers, practitioners, and farmers in improving cooperation and collective action to resolve water competition and conflict that is linked to rights, scarcity, and land use:

1. Voluntary cooperative agreements are instrumental in resolving immediate water rights conflict and can lead to new forms of cooperation and higher level collective action.
2. Even when official policies are ambiguous or contradictory, they can provide legal bases for the emergence of voluntary agreements. However, issues around overlapping management regimes, lack of coordination, and low capacity of water management institutions need to be resolved in order to address systemic watershed management problems.
3. Shared understanding of the relations between water balance and land use patterns is crucial in unpacking complex issues; equitable allocation of water rights alone will not ensure water supply in the long term. Land use regulation, incentives for sustainable land use, and improving water rights can provide win-win solutions.
4. Effective watershed management requires collective action at that level; cooperation amongst all user groups should be coordinated to foster lasting watershed-level collective action.

Finally, the Manupali experience was an excellent case for understanding competition, conflict, and cooperation over scarce natural resources. The stakeholders, despite their distinctive identities and interests, were willing to cooperate and self-organize to manage conflict, with all the imperfections of water rights sharing schemes. However, the problems of water allocation, scarcity, and land use, require collective action beyond the current level if equitable distribution of benefits, sharing of responsibilities, and co-investments for watershed management are the goals.

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