

International Journal of the Commons
Vol. 9, no 2 September 2015, pp. 744–771
Publisher: Uopen Journals
URL:<http://www.thecommonsjournal.org>
URN:NBN:NL:UI:10-1-117253
Copyright: content is licensed under a Creative Commons Attribution 3.0 License
ISSN: 1875-0281

Turning conflict into collaboration in managing commons: a case of Rupa Lake Watershed, Nepal

Pashupati Chaudhary

Local Initiatives for Biodiversity, Research and Development, PO Box 324, Pokhara, Nepal
pchaudhary@libird.org

Netra B. Chhetri

School for the Future of Innovation in Society, Arizona State University, Tempe, 85287, AZ

Brian Dorman

Consortium for Science, Policy and Outcomes, Arizona State University, Tempe, 85287, AZ

Tom Gegg

The IDLgroup, Church and Court Barn, Church Lane Tickenham, Bristol BS21 6SD, UK

Ram B. Rana

Local Initiatives for Biodiversity Research and Development, PO Box 324, Pokhara, Nepal

Milan Shrestha

School of Sustainability, Arizona State University, Tempe, 85287, AZ

Keshab Thapa

Local Initiatives for Biodiversity Research and Development, PO Box 324, Pokhara, Nepal

Krishna Lamsal

Local Initiatives for Biodiversity Research and Development, PO Box 324, Pokhara, Nepal

Surya Thapa

Rupa Lake Restoration and Fishery Cooperative Ltd., Lekhanath Municipality, Kaski Pokhara

Abstract: A growing body of literature on the commons has provided fascinating and intricate insights on how some local institutions have successfully managed to avoid a seemingly inevitable “tragedy of the commons” once popularized by Garrett Hardin. Primarily benefitting from the recent studies on the common-pool resources conducted by Elinor Ostrom and colleagues, polycentric self-organization and autonomy, rather than the direct state or market control over the commons, are often recognized as key features of the long enduring commons. However, these commons are quite diverse and the outcomes are often multiple and complex, accentuating the needs to differentiate among multiple commons outcomes. Furthermore, relatively under-reported are the cases where the degradation of common-pool resources are actually halted, and even restored. This study examines both the turbulent history of fishery mismanagement in Rupa Lake, Nepal and its reversal built around the participation, engagement and inclusiveness in the governance of its watershed. We find that Rupa Lake’s experience tells two stories. Reflecting Hardin’s dire forecast, the Rupa Lake watershed verged on collapse as population grew and seemingly selfish behavior intensified under an open-access regime. But the users also found a way to rebound and reverse their course as they adopted a bottom-up approach to fishery management and established an innovative community institution, the ‘Rupa Lake Rehabilitation and Fishery Cooperative’, dedicated to the sustainable governance of the commons. This case highlights how one community at the threshold of ‘tragedy’ transformed itself by turning conflict into collaboration, which we hope contributes to the effort of better understanding multiple commons.

Keywords: Biodiversity, collective action, governance, institutions, watersheds

Acknowledgements: The authors would like to thank the people in Rupa cooperatives for sharing valuable information and time with us, and LI-BIRD that has been continuously making endeavour to strengthen the cooperatives’ capacity through support from different funding partners. Netra Chhetri, Brian Dorman and Milan Shrestha were supported by the USAID Feed the Future Innovation Lab for Collaborative Research for Adapting Livestock Systems to Climate Change at Colorado State University under sub-award 9650-30. The constructive comments from the reviewers have helped improve the quality of the manuscript and thus we are grateful to them.

1. Introduction

Rangelands, forests, riverbanks and lakes constitute resource commons – natural capital of which members of a community share access. With the growth in population, the competition for resource commons between communities has heightened, resulting sometimes in conflict (Homer-Dixon 1994; Escobar 2006; Sekeris 2014). This increasingly salient problem has thus given rise to questions

regarding how to properly manage resource commons, or Common-Pool Resources (CPRs).

Part of the contemporary debate on this issue may be traced to the 1968 publication of Paul Ehrlich's book, *The Population Bomb*, and, later that same year, to an article in *Science*, "The Tragedy of the Commons," authored by biologist Garrett Hardin. While both Ehrlich and Hardin were concerned with population growth, Hardin also thought, philosophically, about how a growing community might share resource commons. Hardin was specifically critical of an idea, often associated (incorrectly) with Adam Smith, that "decisions reached individually will... be the best decisions for an entire society" (1968, 1244–1245). Hardin contends that human beings *are* selfish and short-sighted and individuals acting in their own self-interest would *not* "promote the common good," as Smith supposedly speculated.¹ Instead, contrary to Smith, Hardin asserts that "*ruin* is the destination toward which all men rush" if each individual attends only to "his own best interest" (emphasis added). Applying this logic to commons management, Hardin argues that if each seeks only to maximize their own personal gain, which comes naturally to any "rational being," the commons will eventually be destroyed.

Thus, unless our biologically endowed instincts are somehow radically transformed, tragedy is inevitable; the common pasture will be overgrazed, the common lake overexploited, and the common forest cleared. Cognizant of the fact that amending human nature would likely prove an impossible difficulty, Hardin's analysis led him instead to conclude that in order to avert tragedy on the commons, an external force was called for – one that would have to be imposed upon communities sharing resources. For Hardin, only two systems presented themselves as logical solutions: shared resources must either be parceled up and allotted to the greater responsibilities of private ownership, or they must be strictly regulated by an interventionist authority, which elsewhere Hardin describes as a "Leviathan," borrowing language from Hobbes's description of an absolutist and autocratic state (1978, 314). Although Hardin noted that his proposals were "objectionable," he nevertheless insisted that "we must choose – or acquiesce in the destruction of the commons" (1968, 1245).

¹ Hardin is mistaken, as are many free-market enthusiasts, when he suggests that Smith's account somehow justifies, if correct, laissez-faire economics. Quite the opposite appears to be Smith's intention. A careful reading of the chapter where the Smith invokes his now famous metaphor about the 'invisible hand' (which is used exactly once and is in any case irrelevant to his theory of competitive markets) would not lead one to take it as implying that selfish behaviour is either directly or indirectly beneficial to society. Rather, Smith is attempting to demonstrate two things. First, that capital support of domestic (and not foreign) trade may be advantageous to the domestic economy, but that this is largely the result of a bias for the home country (a merchant may prefer to operate where he knows the laws, for instance). This preference, or bias, has the unintended consequence of bolstering domestic industry (thus the public prospers "led by an invisible hand"). Smith goes on to note, however, if such a bias did not exist, the free movement of capital and trade might actually be harmful to the domestic population – the "home market" [Great Britain] – who "would probably suffer" under such conditions (Smith 2003, 568–576).

Borrowing from the overlapping disciplines of economics and political science, Hardin begins his discussion on resource commons by uncritically adopting two widely held theoretical paradigms: rational-actor theory and political realism. While much has been written on each of these, two fundamental assumptions underpin Hardin's argument. The first assumption, noted above, incorporates a positive claim about what constitutes 'human nature'; namely, that individuals always pursue self-interest with the desire to maximize utility, lies at the heart of the rational-actor approach (Petraicca 1991; Green and Shapiro 1994). The second assumption evolves readily from the first and has long been an integral, but mostly unstated, theme in political theory: that *because* people are driven primarily by self-interest, it is *necessary* to put into place, or to impose, some system of control in order to ensure peace and stability where a chaotic anarchy would otherwise obtain. That Hardin seems to embrace the political theory of Thomas Hobbes. Recall that Hobbes's principal contribution to theory is his argument that political authority need not be provided by a doctrine of divine right, but could be established on purely naturalistic foundations. In Hobbes's view, we must be subject to, and kept in "awe" by, a common and "paternal" power (1986, 185).

That Hardin's conclusions, that only state-centric or market-oriented institutional arrangements resolve the deep problems inherent in social relations of production, naturally derive from the elemental principles of rational choice theory and, by extension, political realism – theoretical frameworks that are deeply flawed themselves, but wildly popular, particularly in Hardin's day² – is fairly pronounced. Accordingly, when Hardin asserts that it is human nature that men are compelled to maximize personal gain regardless of the public welfare, and that in such a "dog-eat-dog" world, only a hegemonic "Leviathan," or a "coercive force outside" our "individual psyches," could countervail the 'tragedy of the commons,' reason dictates skepticism (1978, 314).

In the decades since Hardin's influential article, much scholarship has emerged that challenge the underlying assumptions built into his argument – on both theoretical and empirical grounds. Following in the tradition of Kropotkin and Huxley (1955 [1902]), for example, who wrote partly responding to the growing popularity of theories advancing social Darwinism, many natural and social scientists today dismiss simplistic representations of human nature as being inherently selfish, and in fact suggest the opposite (Clark 1991; Wilson 1998; Rilling, et al. 2002; Chapman and Sussman 2004; Henrich and Henrich 2007; West et al. 2007; Adami and Hintze 2013). And while still dominant in the field of international relations and political theory, the political realism that partly originated in the writings of Hobbes has come under significant attack from Critical Theorists and others concerned with its integral commitment to

² It is unlikely that Hardin would have been unaware of Gordon (1954) and Scott's (1955) bio-economic models, which conceptualize commons degradation in much the same fashion, or that Hardin would have been unaffected by the ubiquitous appeal of political realism at the height of the cold war.

reproducing relations of domination and power (Ashley 1981; Cox 1981; George 1994; Vasquez 1998). But Hardin's conclusions, too, have been demonstrated to be rather inadequate for properly analyzing commons governance, or lack thereof, and the policy interventions society presumably requires. In her 1990 book, *Governing the Commons*, Nobel laureate Elinor Ostrom, made a significant contribution to a growing body of literature showing that contrary to the conventional wisdom, Common-Pool Resources (CPRs) could be managed successfully without state intervention, or privatization. Through a detailed, comparative analysis of several case studies, Ostrom demonstrated that communities themselves can, and do, self-govern shared resources, and sometimes with remarkable success.

In order to understand the innovative institutional regimes governing shared resources that Ostrom and others 'discovered' and evaluated, contemporary scholars have sought to analyze a number of important factors that may drive bottom-up institutional change towards new regulatory systems, resulting in sustainable practices in community governance of commons. Innes and Booher (2003), for instance, stress the importance of what they call "collaborative dialogue" for encouraging experimentation and building new networks of trust; Rodima-Taylor (2012) notes that decentralized organizational arrangements often improve community participation; Fraser et al. (2005), emphasize the need for environmental management experts to collaborate with community members; Crona and Parker (2012) underscore how "bridging organizations... facilitate collaboration and knowledge coproduction" between actors; Bowles and Gintis (2002) highlight social capital as critical in contributing to community governance; Upton (2012) underlines the influence of community partnerships with external supporters; and Chhetri et al. (2012), affirm that connectivity and inclusion of plural knowledge systems are powerful drivers of institutional innovation. Other determining variables, too, have been found to be "critical to the organization, adaptability, and sustainability" of CPR governance, including the nature of the resource system itself, the characteristics of its users, and the political, economic and social settings they inhabit (Agrawal 2001, 1651).

Given all these, and many more, theoretical perspectives and analytical foci on CPRs, the literature increasingly emphasizes the need for adopting a general framework so that scholars working across disciplines can critically investigate complex socio-ecological systems (SES), where commons are studied and governance carried out (Ostrom 2007, 2009; McGinnis and Ostrom 2014). Related to the SES framework is the institutional analysis and development framework (IAD), initially articulated by Kiser and Ostrom in 1982, and since expanded upon (Kiser and Ostrom 2000; Poteete et al. 2010). The very thrust of the IAD framework is a microanalysis where boundedly-rational actors, either individually or collectively as formal or informal groupings, interact with each other to determine the outcomes (Ostrom 2011; McGinnis and Ostrom 2014).

Framed by the empirical observations and theoretical arguments advanced by Garrett Hardin and Elinor Ostrom, this paper offers a case study illustrating how a diverse community came together to collectively manage a shared natural

resource in the wider watershed of Nepal's Rupa Lake. The history and current circumstance of Rupa Lake vividly depicts the development from a situation Hardin would doubtless have hailed as emblematic of a 'tragedy of the commons' into an exemplar of collaborative and sustainable CPR governance by local communities.

Once mired in conflict and environmental degradation, Rupa Lake has transformed itself. With the help of a cooperative formed among people relying on ecosystem services produced in the watershed, and with the modest support of a domestic NGO called Local Initiatives for Biodiversity, Research and Development (LI-BIRD), Rupa Lake today provides a textbook example of successful local stewardship of shared natural resources. In what follows, we will provide context to the factors leading up to both the commons mismanagement at Rupa Lake, and those factors that have been conducive to sustaining Rupa's bottom-up approach to natural resource governance.

2. Rupa lake: the resource system, its actors, and governance system

Rupa Lake, like many other lakes around the country, collectively represent Nepal's principal forms of CPR, harnessed for household water requirements, industry, irrigation, hydropower generation, recreation, and fisheries. Many of Nepal's lakes, however, face multifaceted environmental problems and its dependents encounter numerous socioeconomic challenges, which frequently interlink with the local ecological conditions, and Rupa Lake is no different. Overexploited wild fish stocks, unsustainable agricultural practices, use of chemical fertilizer and pesticides, deforestation, soil erosion, sedimentation, hydroelectric damming, destructive fishing methods, untreated effluent discharges, road and building construction, and nonpoint source pollution have all threatened to destabilize Rupa Lake, degrading its watershed and jeopardizing the livelihood security of its integrated communities.

Located approximately 16 km northeast of Pokhara, at an altitude of 600 meters above sea level, Rupa is the third largest lake in Kaski district in the western region of Nepal, situated just south of the massive Annapurna range that feeds the lake by a network of streams. Separated by the Pachabhairavi ridge from the much larger Begnas Lake only a few kilometers away, it covers an area of 1.12 sq km running along from north to south. The average water depth of the lake is 3.0 meters and maximum depth is 4.79 meters. Rupa's water holding capacity is 3.1 million cubic meters and its watershed extends over 30 km² of steep slope comprising of forest and arable land (see Figure 1). Rupa's watershed is also rich in biodiversity. The forests on the eastern and western part of the lake are dense whereby the major forest species include Sal (*Shorea robusta*), Chilaune (*Schima wallichii*) and Katus (*Castanopsis indica*). The surrounding forest and lake provides habitat for a number of different animal species, and more than 150 species of birds and ducks (Kafle et al. 2008). The lake drains south to Tal khola

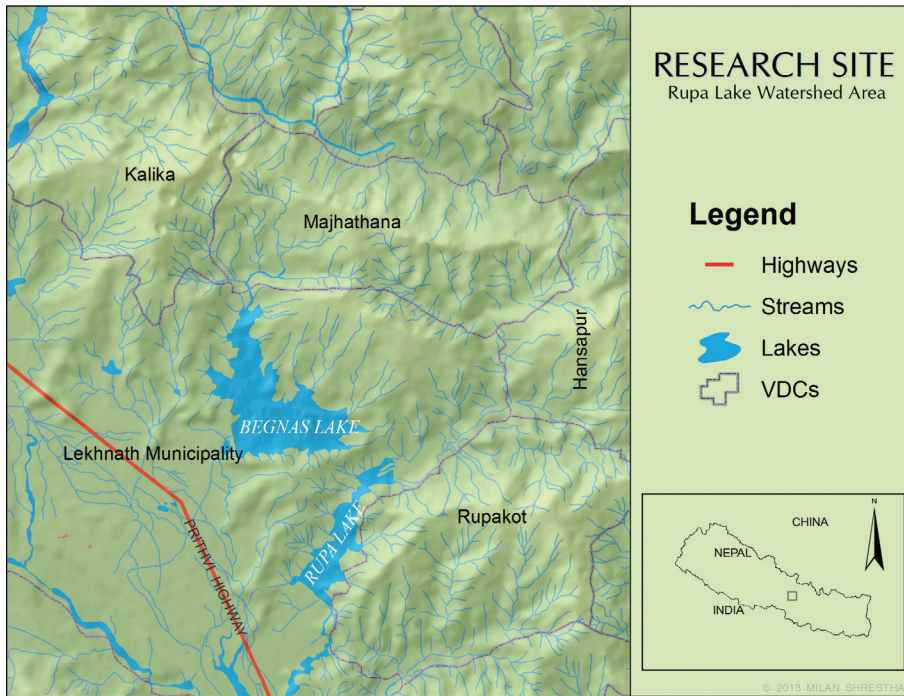


Figure 1: Rupa Lake watershed area.

at Sistani ghat, joining the Seti Gandaki River, and ultimately discharges its fresh Himalayan waters nearly 1000 km away into the Bay of Bengal.

The northern and eastern parts of the lake's watershed are densely populated. It is where most of the cultivated lands are found. Generally, farming, fishing, and tourism are the primary sources of income for the communities dotting the foothills of the Himalayas. While mountain climbing has long been an obvious attraction, nearby Rupa has also become a major tourist destination, hosting approximately 3000 visitors every year. With respect to fishing, the three major lakes of Kaski district (Phewa, Begnas, and Rupa) collectively provide approximately 1.5 megatons of fish a day to the expanding city of Pokhara, a short distance away (Gurung 2003).

Until the mid 1980s, direct lake users were composed mostly of fishermen, known as *Jalahari* – an ethnic group of over 50 shoreline households whose livelihoods are traditionally associated with fishing at Rupa. Over a short period, these households were gradually joined by a slow but steady influx of migrants, mostly other fishermen, from the surrounding hills. Perhaps keen to exploit the lake's apparently abundant fish resources, these newcomers and the *Jalahari* began to experience competition as Rupa Lake's user base expanded. Although

the new households had no direct user right, they nevertheless became important system stakeholders. Their communities integrated: both groups practiced rod and net fishing, and both introduced more recent aquaculture activities together, leading, predictably, to increased catches.

According to Kugel and Huseynli (2013), roughly 15,000 individuals with different ethnic background, including the Majhi and Jalahari, live in moderately close-knit settlements across the lake's catchment. A large number of them are also depended on the wetland resources for their livelihoods. Following Regmi et al. (2009), the communities inhabiting the lake watershed are divided into two distinct groups based on their geographic proximities – upstream and downstream villages. This form of group definition appears to be far more relevant in Rupa rather than by classifying communities based in caste and ethnicity – as commonly practiced in Nepal (Gurung et al. 2005). Farmers, youths, and particularly women also play an important part in community cohesion in Rupa (Udas 2007). Women also are actively involved in biodiversity conservation at Rupa (Regmi et al. 2009).

Another important actor in Rupa is the a well recognized national NGO, Local Initiatives for Biodiversity Research and Development (LI-BIRD), which began working in the area in 1998 through a project called “Strengthening the Scientific Basis for Agro-biodiversity Conservation *On-farm*.” Since then, the organization has regularly worked with the local communities through development-oriented agricultural and natural resource management projects with the twin goals of promoting institutional and policy change, and improving local livelihoods through poverty alleviation. This group has been particularly important, as we will see, for building up social capital and cultivating leadership at the local level.

The Rupa watershed has multiple political institutions that make up a somewhat complex and overlapping system of governance. Nepal itself has five administrative layers to any location. Rupa Lake is located just east of the major city of Pokhara (famous tourist destination). Pokhara, the second largest city in Nepal, is the headquarters of the Western Region, and is also located in the center of Kaski District, an important administrative zone in Nepal as it oversees the entirety of the Annapurna Conservation Area, the largest protected area in Nepal. Along with the Lekhnath Municipality, the Rupakot, Hansapur, and Majhthana Village Development Committees (VDCs), all of which are essentially localities, constitute the most local-level dimension of governance directly over Rupa Lake. Rupakot, Hansapur, and Majhthana, however, have a more indirect governing relationship with Rupa as they merely border the lake, and their populations are overwhelmingly engaged in agriculture, as opposed to fishing, as the primary livelihood activity. The complex and layered nature of the governance system in and around Rupa points to its extended and bureaucratic structure, but also to the in cohesive and hierarchically distant relationship between networked governing components – from the lowly Village Development Committee, to the executive at the national level and prone to occasional failure (Khadka 1991; Shrestha 1997; Perrow 1999; Gautam et al. 2004).

3. Methodology

Our assessment draws on two data sets: a) focus group discussions (FGDs) and interviews with key informants representing both upstream and downstream catchment, and b) systemic review of historical archives, meeting minutes, and progress reports of the Rupa Lake Rehabilitation and Fishery Cooperative (Cooperative) and the Local Initiatives for Biodiversity Research and Development (LI-BIRD). Additionally, several authors of this paper, both from LI-BIRD and Arizona State University, have made frequent visits to the area and several of them have assisted the community in social mobilization, and in the formation of cooperative planning for sustainable watershed management. Recent LI-BIRD projects include scale-up of Rupa learning to the surrounding lakes, supported by a Swiss Resource Award. An earlier project focused on Payment for Ecosystem Services (PES) through watershed management, which was supported by the International Union for Conservation of Nature (IUCN). CARE-Nepal also implemented watershed-based conservation and development projects in the region.

We conducted 5 face-to-face semi-structured interviews with officials (past and present) of the Cooperative. The interviews lasted between 1 and 2 hours and were stopped if the information became redundant. The purpose of face-to-face interviews was to understand the history and the background that led to the formation of the cooperative, the challenges of running such cooperative, and mitigation measures taken by the members. The interviews were structured in two parts. Part one was dedicated to understanding the history of the lake resources, its users, and the experience of resource use. We also asked if any external help was received in the process of the formation of the cooperative. Part two focused on knowledge integration, developing practices, and the evolving governance mechanisms of the Cooperative in response to emerging challenges. We further used this opportunity to triangulate information obtained from secondary sources and author's observation.

To identify knowledge integration, practices, and governing mechanisms involved in the management of Rupa Lake and its watershed, we conducted two FGDs (May–June 2013). The first FGD was held with 12 members of the cooperative from upstream communities, the second with 15 members from downstream communities. Because of our focus on understanding the history of the rehabilitation of Rupa, we targeted informants with longstanding interest and direct experience in the rehabilitation project. The interviewees were asked to share (i) information with regard to the users base of Rupa, (ii) important events and activities conducted by the community, (iii) management experience of the rehabilitation project, and (iv) information on the governance of the Cooperative.

We further reviewed the historical archives to gather quantitative information with regard to membership, annual fish catch, profit, and investment in ecosystem services. Some of the documents we reviewed include meeting minutes, auditor's reports, and monthly records of the fish catch as recorded by the cooperative.

4. Common-pool resource governance: top-down or bottom-up?

4.1. Tragedy of the commons

In Hardin's article for *Science*, he describes a scenario, hypothetically applicable to all forms of commons – from grazing pastures and groundwater reserves to lake fisheries – in which all individuals are permitted to freely exploit an open access resource for their personal gain. Hardin argues that the selfish and myopic nature of each user of the common resource invariably leads them to continuously expand their own operations to increase personal benefits, whilst neglecting (consciously or not) the external costs to the commons (which are conveniently divided amongst all). Unrestrained resource users therefore unknowingly march towards the inexorable destruction of the commons, as the cumulative damage of each individual's continually expanding extraction eventually exceeds the resource's carrying capacity, bringing "ruin to all" (Hardin 1968, 1244). To counter the inevitable "tragedy" awaiting open-access resources, Hardin asserts that shared resources must either be instituted under a private-property rights regime; or highly regulated, taxed, or licensed – a burden that could only be responsibly shouldered by a tightly centralized, rationally optimized, bureaucratic state (1978). In any other situation, he implies, the overarching principles of sustainable management and environmental conservation fall prey to resource users' rampant hunt for personal profit. Most importantly, his presumption of universality is a *prima facie* case of intellectual over-extension (Basurto and Ostrom 2009).

4.2. Governing the commons through local institutions

Partly responding to Hardin's pessimistic worldview (which was, and in some cases still is, widely accepted as fact), Ostrom proposed that Hardin's argument nevertheless represented a crudely simplistic and wildly unrealistic description of CPR systems of use, as a common resource completely devoid of any management structure or governance regime by the users themselves is improbable and indeed incoherent (Ostrom 1990; Ostrom et al. 1999). Hardin's dueling solutions of either total state control or aggressive privatization clearly disregards the myriad institutional mechanisms occupying a middle ground between centralized government control and simple individual autonomy, whether regulated by market forces or not. In fact, Ostrom argues that communities can, and in most cases have, created, harnessed, or modified existing institutional arrangements to govern the commons they share. While identifying institutions as per Western standards has sometimes proved difficult, as they may be formal, consisting of cooperatives, or informal, as in the case of trusts, cultural groups, mother groups, and the like (Lansing 1991).

The effective governance of a common pool resource by local institutions is certainly far from guaranteed, however. Nepal's struggles since the last three decades to ensure the dual objectives of the conservation of its woodlands and tangible gains for forest users through its Community Forestry (CF) program

are a testimony to the governance of commons. After forestry management responsibilities were formally devolved to local communities in the 1990s, CPR management often hinged on relationships within stratified user communities dictated by wealth, status, power, caste, and gender (Nightingale 2011). In some cases such disparities have determined individuals' access to and control over shared resources (Acharya 2002; Nagendra 2002; Agrawal and Gupta 2005), but in other cases it has allowed all users equal access to forest resources (Ojha and Kanel 2005; Persha et al. 2011).

Successful governance of CPRs via bottom-up, community-based institutional arrangements can be a challenge. Identifying rightful users, creating mechanisms for participatory governance, developing inclusive policies, institutionalizing rules and regulations, and implementing enforcement mechanisms all would appear to be daunting tests even to the most resolute policy-maker. But once such an assemblage has successfully taken root, dismantling it might appear equally alarming. In the course of this case-study, it was revealed that the entire governance structure was tightly bound-up with each other in a new socio-ecological system that in turn discursively reproduced and reinforced. In what follows we will attempt to tease-out the dynamic interrelations that led to Rupa's innovative institutional change; in turn, analyzing the fragmented genealogies, multiple meanings, and potential futures awaiting Rupa Lake.

5. Conflict and tragedy at Rupa Lake

5.1. A complex picture

Rupa Lake's history seemingly fits well into Hardin's bleak narrative, offering an illustrative example of a 'Tragedy of the Commons' in action. But it is more complicated than that. During the 1950s, and before, Rupa Lake was effectively governed as an open-access resource and was traditionally used by only a small population of Jalahari (fisher folks) households living on its shorelines, without much in the way of systemized management. Locals freely practiced net and rod fishing and over the ensuing years cage and pen aquaculture interventions were slowly introduced with technical helps from Fisheries Development Centre of the government of Nepal.

Up until the early 1990s, a number of other problems had also become much too conspicuous to ignore. First, with the expansion of infrastructure projects from the nearby urban centre of Pokhara, people began extending ever closer to the lake watershed where locals were already experiencing the pressure of migrants from surrounding hills. Unregulated stone mining, construction of roads, overgrazing and deforestation resulted in the formation of active landslides across the watershed – ultimately increased sediment load on Rupa Lake. While there was undeniable appreciation towards the infrastructure projects by all, the lake watershed declined precipitously. With population growth, new inhabitants began to exploit the lake's resources alongside the traditional Jalahari fishing communities. Faced with non-local competition, a result of the construction of a

new road to Pachbhaiya and Tal Khola, independent lake users began extracting maximum personal harvests from the fishery without restraint, leading to rising tensions between its growing user-base. The ecological costs of a steadily degrading aquatic ecosystem stoked feelings of resentment between lakeside inhabitants and their upstream counterparts. These tensions were not abetted by the poor interconnectivity between distant up and downstream communities, and the consequent lack of efforts to cooperatively resolve disputes and settle growing umbrages (Pokharel and Nakamura 2012).

Relentless fishing led increasingly to heated disputes among the growing diversity of communities sharing the lake frontier, many of whom were new to the institutional dynamic that had been adapted at Rupa over many decades. Quarrels over the ownership of portions of the water body, the allocation of fishing rights (dictated by whoever arrived first), and the conservation of unmeasured fish populations were commonplace. This was further complicated by the introduction of aquaculture activities promoted jointly by Nepal's Agricultural Development Bank and the Government's Fishery Development Program.

Middlemen, too, exploited fragmented user groups to dominate access to Pokhara's market, extracting a healthy slice of fishers' profits (Pradhan et al. 2010).

Beyond the lake itself, other serious problems arose which put increased stress on the watershed and its inhabitants – many of which were attributable to Nepal's effort to modernize, inspired by its neighbors (Rose 1971; Khadka 1991). Regional commercial and industrial development, hydropower and dam construction, unregulated irrigation and agriculture run-off, over-grazing, habitat fragmentation and deforestation, and biodiversity decline (including species extinction) combined to greatly increase pressure on the surrounding watershed. Expanded, government sanctioned, agricultural activities on nearby hillsides placed a heavy burden on the entire ecosystem. The deforestation of steep landscapes for terraced agriculture, timber and firewood collection, and increased livestock grazing also began to concern lakeside inhabitants as they witnessed the gradual erosion of the slopes encircling Rupa Lake. Although by the mid-1990s government policy reversed and the control of local forests was devolved to local communities, reforestation efforts remained trivial compared with the growing and unrestrained agricultural and fishing activity, which continued unabated (Oakley 1991; Pokharel and Nakamura 2012).

Watershed inhabitants, particularly the new arrivals, while presumably aware of the consequences of their increasingly destructive actions, nevertheless did not curtail them. In fact, national government policy for the most part encouraged such activity as far as it could contribute to agricultural and economic productivity. As hill slopes continuously shed their soils and the lake gradually shrank, blame was liberally heaped upon upstream users by those living on the lake shores. Downstream users were frustrated by the lack of control from upstream users and their seemingly inconsiderate decisions to not only deforest the hillsides, but to continue house and road construction works during the monsoon seasons, further exacerbating the flow of sediment into the lake (Basnet 2008).

In an attempt to correct the growing power imbalances and disconnect between the two communities, concerned residents presented their worries to state representatives through written petitions and persistent visits to local government offices. Unable or unwilling to intervene, government authorities and concerned line agencies simply ignored the developing situation and the appropriation of management responsibilities remained unclear and poorly implemented. This apparent lack of interest in Rupa Lake by regional civil servants and government bureaucrats, however, might be better attributed to the fact that during this time Nepal was extremely politically unstable. From 1996 to 2006, the country was embroiled in a bloody and destructive civil war between the Communist Party of Nepal (which had created weak, poorly resourced provisional governments at the district level) and the Nepal government that repeatedly dissolved the parliament and carried out numerous civilian killings (Bell 2014).

5.2. Decline of the commons

While transparently not insulated from the political instability surrounding Rupa Lake, and the various modernization projects that directly impacted it, throughout the 1990s, a general lack of common accord locally and between communities to reverse the destructive trends to the watershed persisted. Despite the fact both upstream and downstream residents were aware of the deteriorating situation, some measure of which was out of their hands, nothing concrete was done to mitigate the problems they faced. Increasingly, the ecosystem services produced in the watershed were under threat, and this plainly affected Rupa's communities in a variety of ways.

Sedimentation of the lake became a major issue for fishery users, with entire fields created by sediment deposits emerging at the northern shore of the lake. Quickly reclaimed by opportunist rice paddy farmers, this new land became a source of conflict. Even the Rupakot VDC allowed the construction of a secondary school in reclaimed land in early 1980s. The deepest point of the lake decline and as a result cage farming became impracticable in some areas.

Rupa's progressive rising intake of agricultural runoff and effluent deposits from surrounding settlements and siltation from soil erosion gradually loaded lake waters with nutrients. By 2000, Rupa was heavily colonized by aquatic weeds such as the invasive water hyacinth, blue green algae, pickerel weed, and lotus, facing the threat of rapid eutrophication. As the thick mantle of weeds restricted access to the lake water, locals noticed a significant reduction in fish populations. As a consequence, fishing activities began to decline.

From the 1980s, the relative open-access nature of Rupa Lake's fishery, the growing population and development, swelling animosity between user-groups, and failure to tackle damaging externalities of the watershed's exploitation seemingly fulfill Hardin's prediction about common resource management. 'Freedom on the commons' in Rupa certainly appeared to be leading to 'the ruin of all,' resulting in a 'tragedy of the commons'. Following Hardin's advice, one

would be inclined to suggest that only a strong and restrictive intervention policy set by the Nepali state would reverse the declining situation. The remaining requirement would only be to somehow wrestle fishing rights from both traditional Jalahari and the more recent arrivals, and to strictly regulate and monitor land use in the hills. The subsequent action of Rupa's local community members, however, reveals that alternatives to Hardin's desperate options exist. More in accord with Ostrom's findings, concerned lake users and watershed stakeholders instead acted cooperatively and in collaboration in order to preserve their lake commons.

6. Turning conflict into collaboration

A wealth of scholarship exists today that seeks to explain institutional change and collective action towards self-organization and self-governance of shared resources. Ostrom (1990, 39) notes that "at the most general level, the problem facing CPR appropriators is one of organizing: how to change the situation from one in which the appropriators act independently to one in which they adopt coordinated strategies to obtain higher joint benefits or reduce their joint harm." Agrawal's (2001) synthesis of the facilitating conditions identified by Ostrom and others serve to highlight some of the key features (design principle) that may account for such a shift. The size of the user group, the location and nature of the resource, the relative homogeneity and interdependence among group members, past experiences with cooperation, and external aid together make up "some of the themes" emphasized as being "significant to achieve cooperation" (ibid, 1653). In all, ten second-level variables have been "observed and measured by field researchers" which are "posited to affect the likelihood of users' engaging in collective action to self-organize" and manage a resource, in line with the SES framework (Ostrom 2009).

In 2001, Varughese and Ostrom acknowledged existence of unresolved theoretical issues and again in 2009, in a paper coauthored with Basurto, she noted the core challenges of explaining why some resource users are able to self-organize and govern the use of a resource over time and in a sustainable manner (Basurto and Ostrom 2009). While the work of Ostrom and her colleagues on IAD framework is partially useful in helping to organize heuristically external variables, and actors and actions in their interactions and their discursive outcomes, we believe that more work needs to be done so that the *collaborative shift*, to the extent that one takes place at all, may be better explained. After all, systems of classification, no matter how intricate, combined with relational propositions alone do not make a record of change, but merely provide the minimal components of an explanatory mechanism (Meehan and Long 1968).

In the case of Rupa Lake, arguably a unique instance, two theories, perhaps combined in some way, may help to reveal how 'conflict' translated into collaboration. One model of collective action introduced by Hargrave and Van De Ven (2006, 884) views "institutional change as a dialectical process in which partisan actors espousing conflicting views confront each other and engage in

political behaviors to create and change institutions.” From this perspective, the “generative mechanism of change” is “dialectics” and “according to [this] model, change is a field-level property that emerges from interactions among the members of the field” (ibid, 884). That the animus produced at the lakeside between upstream and downstream communities was overcome by the creation of an innovative institutional dynamic that empowered Rupa Lake inhabitants, finally allowing them to sustainably govern their shared resources. In fact this institutional innovation may be attributable to ‘conflict’ itself. In this case, then, it was the interactions between actors involved in a “problematic situation” that allowed for the ‘emergence’ of multi-stakeholder collaborative learning and cooperation, ultimately leading to a process of institutional innovation (Woodhill 2010). Another approach, found in Crona and Parker (2012), emphasizes the importance of “boundary organizations” in facilitating collaboration through linking multiple actors through some form of collaboration. Acting as a source of information, a broker, deal negotiator, and a mediator of conflicts (ibid), a well-respected and well-integrated NGO, LI-BIRD, may have filled such a role of boundary organization.

Lastly, the influence of the larger institutional setting in which the communities of Rupa were embedded cannot be overstated. This idea was “central” to James March’s theoretical work on institutions and organizations; that any social action is also linked to a historical context of which they are part (Dosi and Levinthal 2003). Following Ostrom (2003), too, noted that the variables outlined in the framework of SES is influenced and mediated by the larger regime in which users are embedded. If the larger regime recognizes the legitimacy of communal systems, the probability of participants adapting more effective rules over time is higher than in regimes that presume that all decisions about governance and management need to be made by central authorities (ibid). Nepal’s three decades of experience in successful devolution of authority to local communities, especially in forest management, likely provides significant background to Rupa’s willingness and ability to cooperatively engage in natural resource governance themselves.

6.1. Cooperative formation

In 2000, two community based organizations – *Jaibik Shrot Samrachan Abhiyan* (Bioresources Conservation Movement), *KiDeKi* (Farmers to Farmers) – and representatives from both downstream and upstream communities organized to form the Rupa Lake Rehabilitation and Fishery Cooperative (Cooperative). The Cooperative was registered in Lekhnath, the governing municipality. In its first year, an eleven-member interim committee was formed, but that increased to fifteen immediately after the registration of the Cooperative, whereby the additional four seats were set-aside for representation from minority communities. During this initial stage, a total of 36 households/individuals joined as members of the Cooperative, each committing shares of 5000 NPR (US\$ 65).

These committee members provided their time and intellectual resources purely on a voluntary basis. With critical support from LI-BIRD, the Cooperative established

a benefit sharing mechanism to provide incentives to communities and various upstream user groups to conserve the catchment. Additionally, LI-BIRD provided training for farmers and forestry groups in sustainable practices, and for community members in biodiversity conservation, including technical assistance and other aid to the Cooperative. LI-BIRD also began to implement wetland management and community-based biodiversity management programs in the area.

6.2. Restoration of traditional rights

Replacement of traditional rights to CPRs by new actors without proper consultation to its rightful users is often a source of conflict (Dietz et al. 2003). Rupa experienced a similar fate. Implemented as one of their first policies, the Cooperative imposed a total ban on fishing by any individual, putting a cap on livelihoods options for large numbers of lake users. Hardest hit were the members of the Jalahari communities. This led to an initial tension between the Cooperative and the Jalahari as the members of the Cooperative were blamed for stealing their traditional rights to livelihoods. Disagreements in these first months intensified to a point where the leaders of the Cooperative received threats from heated opponents. Mediated by the representatives from LI-BIRD, members of the Village Development Committees (VDCs) and the Lekhnath municipality, several rounds of reconciliatory meetings between the members of the Cooperative and the Jalahari community were held. This enhanced the participatory nature of the Cooperative, and making it inclusive. During this process many Jalahari individuals were selected as new cooperative members, one elected to fill the post of vice chairperson, and two (one male and one female) as executive members. Additionally, the members of the Jalahari communities were allowed to join the Cooperative with reduced membership fees, and were given a temporary fishing permit for an initial buffer-period of six months. They were also encouraged to apply for jobs in an area they were known for their boating, fishing and net weaving skills.

Not long after, the Jalahari community began to play a significant role in managing the Cooperative, enjoying reduced membership fees, salaried jobs, representation in the executive committee, and scholarships for their children to attend school. The Cooperative also began to hire full-time employees at average monthly wage of NPRs 7000 in 2003 and NPR 14,500 in 2013 (US\$ 155). The structure of governance of the Cooperative, grounded in the principle of fairness and equality, gradually brought a sense of hope. Cooperative employees, both Jalahari and others, repeatedly described the rewarding sense of livelihood security they had found in a regular wage as opposed to relying solely on daily independent fish sales.

6.3. Reaping the benefits

Rupa fish were sold exclusively through the Cooperative to individuals and entrepreneurs in Pokhara for prices fixed by the committee in the beginning of each month. This policy of fixed prices substituted the earlier one based on negotiation

between sellers and buyers, which unfortunately favored the latter. One of the noticeable outcomes of this fixed-price policy was an immediate gain of profits for the Cooperative. Annual profit rose by 20%, and annual fish catch increased by over 35% (see Table 1). In year 2003 (first year of operation), net profit reached NPR 1,463,889 (approximately US\$ 19,199), followed by NPR 4,501,430 (US\$ 65,724) in 2008, and NPR 6,070,637 (US\$ 67,452) in 2013. The early success of the Cooperative demonstrated its obvious value to the members of the community, who, not surprisingly, were skeptical in the beginning. As a result of this success, membership in the cooperative increased steadily, as did membership fees: NPR 5000 (US\$ 71) in 2003, followed by NPR 12,000 (US\$ 175) in 2008, to NPR 16,000 (US\$ 178) in 2013.

Year after year, new members enthusiastically contributed to join the Cooperative, some of them being elevated to leadership roles. The executive committee regularly meets to discuss pricing policy, lake rehabilitation, and other personnel issues, including membership fees. In addition, all members are invited to participate in the annual general assembly. During the general assembly, members are provided with progress updates, as well as the dividend of their investment, which was calculated to be NPR 3,482,000.00 (US\$ 38,690) in 2013.

Table 1: Rupa Lake Restoration and Fishery Co-operative ltd: Membership, employee, fish catch and net profit, 2003–2013.

Year	Members (women)	Employees	Membership fee; NPR (US\$)	Fish catch (Kg)	Net asset NPR (US\$)	Total income NPR (US\$)
2002	36 (0)	NA	5000 (64)	NA	NA	NA
2003	281 (38)	11	5000 (66)	2410	2,685,647 (35,222)	1,463,889 (19,199)
2004	329 (49)	15	5000 (68)	6530	3,700,883 (50,428)	1,306,176 (17,798)
2005	332 (49)	13	5000 (71)	7015	4,070,517 (57,697)	1,400,635 (19,853)
2006	332 (49)	13	7000 (95)	7358	4,728,143 (63,851)	1,471,720 (19,875)
2007	354 (57)	16	8000 (123)	13,970	4,209,489 (64,961)	2,694,014 (41,574)
2008	444 (112)	14	12,000 (175)	20,100	7,583,885 (110,730)	4,501,430 (65,724)
2009	668 (221)	20	13,000 (173)	33,582	5,954,448 (79,340)	6,716,494 (89,494)
2010	720 (278)	20	16,000 (216)	23,116	8,732,512 (117,879)	5,779,145 (78,012)
2011	727 (287)	20	16,000 (223)	26,848	8,044,027 (112,112)	6,712,024 (93,547)
2012	741 (298)	18	16,000 (179)	21,445	6,969,657 (77,812)	5,361,408 (59,857)
2013	746 (307)	17	16,000 (178)	24,282	5,878,895 (65,321)	6,070,637 (67,452)

6.4. Expanding its institutional role

With the decision to expand membership to all watershed inhabitants (lower and upper), the members of the Cooperative increased from an initial 36 in year 2002 to an impressive 444 in 2008, and 746 in 2013 (approximately 40% of whom are women). These impressive gains in Cooperative membership clearly illustrates their achievement in drawing the attention of a larger set of watershed stakeholders into an inclusive circle of direct resource users, many of whom had been disengaged or excluded from the benefits that the Cooperative was enjoying.

To date, with the expansion of membership, the scope of the Cooperative has also widened. The Cooperative has adopted several new fishery projects. For example, in 2012, six nursery ponds on the north bank of Rupa were constructed so that the Cooperative could begin a fingerlings breeding scheme. Additionally, this past year, the Cooperative also set aside one of the nursery ponds to exclusively raise fish species indigenous to the region.

With the suggestion from LI-BIRD, a new species of Grass Carp (*Ctenopharyngodon idellus*) was introduced in 2008 to control invasive weeds. While a complete elimination of this weed took nearly a year, it is considered to be a successful intervention that the members of the Cooperative are very proud of. In the ensuing years, the Cooperative also began introducing fingerling stocks to revive the fish population. Whilst catches are nearly always totally sold, the Cooperative also invested in a solar drier, allowing surplus fish products to be preserved and sold for a better price. In addition to their fishing duties, Cooperative employees also perform overtime shifts in lake maintenance, tending nets and performing security rounds to ensure that fishing rules are actively enforced.

6.5. Payment for Watershed Services (PWS)

The inclusion of the greater watershed communities of Rupa through their engagement in the governance of the lake ecosystem also draws attention to the value of watershed services. According to Asquith and Wunder (2008), PWS is a conceptual cousin of the Payment for Ecosystem Services (PES). Generally, the PES approach has had some success, however in most observed cases governments, rather than NGOs or cooperatives, are involved in buying the watershed services. Huang et al. (2009) explain that disconnect between economic goals and environmental outcomes have encouraged experimentation with PES. Additionally, the failure of top-down policy on environmental governance associated with the challenge of addressing the needs of a politically and economically marginalized upland communities, an ongoing process of political decentralization, [and] limited trust in markets have contributed to the adoption of PWS adoption in Asia. Although there is a challenge of monitoring environmental services and tracing their source, watershed services scheme that is implemented by the Cooperative across the watershed of Rupa Lake is exemplary. Most importantly the PWS program has fostered collaboration between upstream and downstream communities. Reconnecting communities with the lands that provide livelihoods, cultural heritage, and recreational opportunities that they

value is critical to mitigate threats to the overall health of the lake ecosystem. As both up and downstream communities attempt to satisfy multiple demands with limited resources, investment of the Cooperative in watershed management has been a critical force in sustaining the bottom-up approach to CPR governance at Rupa cooperative.

Since 2008, the Cooperative has devised a policy to contribute about as much as 25% of its annual net profit after all expenses to projects aimed at sustainable management of the lake's watershed. As shown in Table 2, local Mothers Groups, Youth Clubs, Community Forest User Groups (CFUGs), and schools receive financial and technical support to conduct a range of activities in the watershed. Also stemming from this fund are annual educational scholarships for 50 students from both upstream and downstream communities. Last year, the Cooperative invested NPR 150,000 (US\$ 1685) in activities related to watershed health, of which NPR 95,000 (US\$ 1100) was invested in 6 Mothers Groups and 17 CFUGs

Table 2: Investment for payment for watershed services by Rupa Lake Restoration and Fishery Cooperative Ltd.

Calendar year Nepali fiscal year (AD)	Total investment NPR (US\$)	Name of organization	Number of groups/ individuals supported	Support in cash NPR (US\$)
2064/2065 (2008)	100,000 (1460)	Mothers Groups	6 Group	24,000 (350)
		CFUGs	12 Groups	38,000 (555)
		Schools	10 Schools	20,000 (292)
		Scholarship	34 Students	18,000 (263)
2065/2066 (2009)	110,000 (1467)	Mothers Groups	6 Groups	24,000 (320)
		CFUGs	15 Groups	41,000 (546)
		Schools	15 Schools	25,000 (333)
		Scholarship	40 Students	20,000 (266)
2066/2067 (2010)	115,000 (1554)	Mothers Groups	6 Groups	25,000 (337)
		CFUGs	15 Groups	42,000 (567)
		Schools	15 Schools	25,000 (337)
		Scholarship	52 Students	23,000 (311)
2067/2068 (2011)	125,000 (1742)	Mothers Groups	7 Groups	28,000 (390)
		CFUGs	17 Groups	44,000 (613)
		Schools	19 Schools	22,000 (307)
		Scholarship	52 Students	26,000 (362)
		Youth Clubs	5 Clubs	5000 (70)
2068/2069 (2013)	150,000 (1685)	Mothers Groups	6 Groups	42,000 (469)
		CFUGs	17 Groups	50,000 (558)
		Schools	19 Schools	25,000 (279)
		Scholarship	52 Students	26,000 (290)
		Youth Clubs	5 Clubs	7000 (78)
2069/2070 (2013)	150,000 (1667)	Mothers Groups	6 Groups	45,000 (500)
		CFUGs	17 Groups	50,000 (556)
		Schools	19 Schools	25,000 (278)
		Scholarship	52 Students	26,000 (289)
		Youth Clubs	5 Clubs	4000 (44)

CFUGs = Community forestry users group.

(see Table 2). To put these numbers in perspective, from 1984 to 1997, the Begnas Tal Rupa Tal Watershed Management Project (BTRT), co-implemented by CARE-Nepal and the Government of Nepal, had an operational budget of US\$ 3,272,765.

Womens' Groups receiving financial support from the Cooperative engage in a number of activities that benefit the watershed including preserving indigenous plant species in the watershed's wetlands, organizing awareness camps on the role of biodiversity in watershed services, and leading hands-on training in organic farming techniques – low-tech capacity building for high-end rewards and income generation. Some of the most successful income generating activities include beekeeping, goat rearing, and backyard poultry, where local women also contribute. As illustrated in Table 3, some other conservation activities include fencing off habitat for wild rice and wild bird nesting.

The activities conducted by the CFUGs with the Cooperative's support include protection of natural forest, policing illegal felling, bio-engineering activities to stabilize gullies, the installation of gabion boxes to protect active landslides, tree plantation in marginal lands, and forest fire protection. Since 2008, the CFUGs have also installed over 300 biogas digesters for cooking. The Youth Clubs have been very active in preserving the wetlands surrounding the lake, and also in attracting tourists to visit the area. The funds received by the local Rupa school, that also feed into the Youth Clubs, are used for various environmental awareness programs, including essay and art competitions, debating events, and for purchasing and designing posters.

Table 3: Activities conducted by the collaborators supported by the Rupa Lake Restoration and Fishery Co-operative ltd.

Collaborators	Activities performed
Mothers group	<ol style="list-style-type: none"> 1. Preservation of indigenous plant species in the watershed 2. Management of wetlands surrounding Rupa Lake 3. Awareness for biodiversity conservation 4. Hands-on training on organic farming 5. Low tech and high reward income generating activities
Community forestry users group (CFUGs)	<ol style="list-style-type: none"> 1. Protection of natural forest for healthy watershed 2. Bio-engineering activities to stabilize active landslides 3. Afforestation of degraded lands 4. Protection from forest fire
Schools	<ol style="list-style-type: none"> 1. Increasing awareness on the importance of wetland biodiversity 2. Education of the importance of eco-tourism in the area 3. General information on the consequences of climate change 4. Essay competition on local and global environmental issues 5. Scholarship support to the children of economically marginalized members of the community such as Jalahari
Youth clubs	<ol style="list-style-type: none"> 1. Community development through engaging youth 2. Skill training on income generating activities such as bee keeping 3. Training on the value of biodiversity conservation 4. Hands-on training on home gardening

Driven by the overarching goal of conserving the Rupa watershed through reduced deforestation and soil erosion, the activities promoted and implemented by the Cooperative are also geared toward preserving the lake fishery itself. Active investment in restoration and maintenance of a flow of ecosystem services of the lake can be characterized as PWS in that the exchange for the economic value obtained from the fishery's growing economic importance directly impacted sustainable watershed management activities. The success of schemes implemented by the Cooperative in the watershed of Rupa Lake also illustrate that its utilization of PWS has had numerous and positive pro-poor impacts, more so than other environmental management interventions prescribed in the past. An inclusive approach, designed and implemented by the Cooperative, to manage the lake and its watershed can also empower the poor and marginalized communities by recognizing them as valued members of society. The Cooperative might be able to diversify their overall income net worth by enhancing the overall health of watershed ecosystems. This includes enhancing the habitat for wildlife and birds, preserving biodiversity, and maintaining habitat for medicinal and herbal plants found in the area. They have also initiated management of the lake biodiversity by establishing and maintaining different conservation blocks, which are being managed by mother groups, cooperatives, and women groups. In the different conservation blocks, they have conserved wild rice, local fishes, wetland floras (such as white lotus and *kade simal*), and birds.

7. Ongoing challenges

7.1. Fishery management

As shown in Table 1, Rupa's fishery has greatly increased its harvest and stocking rates over the last decade, stabilizing rising demand by establishing its own nursery to repopulate the lake with both exotic and indigenous fish species. However, as both conventional fishing theories (Beverton and Holt 1957; Ricker 1975) and the upholders of CPR self-governance (Ostrom 1990; Wade 1988; Agrawal 2001) state, the relationship between the resource itself (here the fish stock) and the institutional body governing it (the Cooperative) should ensure that harvest rates are closely matched to the regeneration of resource units. While the Cooperative has been able to steadily increase annual fish catch, the absence of comprehensive investigation masks two possible eventualities. First, it may be that the Cooperative is complacent about current catch and not exploring options towards a maximum sustainable yield – a best-case scenario. A second, more troubling contingency, is that focusing simply on annual fish catch may hide a situation akin to Pauly's 'sitting baseline syndrome' (1995), wherein stable catches disguise a gradual, long-term depletion of the resource while seemingly persistent catch rates eventually lead to an unforeseen collapse in fish stocks (Mullon et al. 2005). In either case, more research into harvest rates, fish stock trends, and current repopulation efforts should be employed to estimate Rupa's potential yield.

7.2. Monitoring and enforcement

An additional issue facing the Cooperative lies in its ability to effectively monitor and enforce its own lake-use rules, which remain a fractious issue for certain inhabitants and continue to be challenged on a regular basis. Lake patrols by Cooperative employees, often supported by government police protecting their own aquaculture projects, routinely encounter illegal fishers. Equipment confiscations and threats of physical violence appear to be failing to deter a number of persistent youths who regularly return to 'plunder' the lake's resources, either by rod fishing or stealing from unattended Cooperative nets. Whilst the vast majority of Rupa's surrounding population respect Cooperative rules, this ongoing issue presents significant costs to the Cooperative, including an additional workload for employees. The establishment of clearly stated graduated sanctions, perhaps leaning on the support of government officials to enforce fines or even arrests, may strengthen the Cooperative's current enforcement efforts.

7.3. Community cohesion

While the inclusive nature of the Cooperative is innovative, the sharing of endowments between upstream and downstream communities is not as transparent as it could be. This may undermine the Cooperative's efforts to expand outreach to the greater watershed population in equitable manner. During the FGD, several upstream members expressed concern about the continued domination of downstream communities in the management of the Cooperative. This is despite increased cooperation and participation from the upstream community. Members of the upstream community also feel that whether they are members or not, they are being 'watched' by the Cooperative for their supposedly environmentally irresponsible behavior. Unfortunately, the current size, and financial and technical resources of the Cooperative precludes at present the comprehensive inclusion of all those residing in upstream areas. Their eventual participation, however, even if limited, is a prerequisite for the continued success of the Cooperative because their land use practices determine the fate of Rupa Lake in the longer term. Further, convincing those upstream communities who have not yet adopted Cooperative standards in environment-friendly agricultural practices might pose a challenge to the Cooperative.

Greater efforts to build upon and enhance the institutional network in Rupa watershed are needed to improve dialogue between upstream and downstream communities. Part of the challenge to such negotiations involves the significant difference in resource endowments between watershed inhabitants, which is fraying the fragile social capital that the Cooperative initially produced. While the well-watered downstream fields benefit from two rice growing seasons, and a relatively flat landscape providing easy access to their fields, the upstream communities do not. Further, upstream areas have not benefited much from downstream investments in new roads, which provide quick connections to markets. Also, physical proximity to educational opportunities and medical

services have greatly benefited the downstream communities, while the upstream communities have been marginalized in this respect. These perceived advantages that one community has over the other has inspired blame and resentment. In order to ameliorate tensions, new deliberative and participatory forums may be required where members (and non-members) from upstream can voice opinions, complaints, and requests constructively without fear or exclusion. These, and other related issues, will require ongoing community negotiation efforts, building strong social capital, while advancing forward with policy transparency in information and benefit sharing across the landscape. IAD framework will be helpful to systematically assess the ongoing challenges among upstream and downstream stakeholders and develop a realistic plan to address them (Ostrom 2011; McGinnis and Ostrom 2014).

8. Conclusion

The history of Rupa Lake appears at first glance to illustrate a descent into a tragedy of the commons scenario, displaying numerous symptoms of Hardin's dire predictions. However, the institutional innovation that occurred during the past decade defies Hardin's restrictive selection of solutions. Instead of privatizing the watershed, or nationalizing it, the upstream and downstream communities of Rupa Lake took it upon themselves to establish a Cooperative that would eventually lead the declining ecosystem to prosperity and environmental health. Not unlike the community-based environmental management systems explored by Ostrom and others, the Rupa Lake cooperative, and its subsequent inclusion of other inhabitants of the watershed, has displayed a reversal of 'ruin for all' on the commons and an embrace of bottom-up solutions. The cooperative institution has built upon the attributes of the lake resource itself, and communities have continued to invest in repopulating fish stocks and restoring the surrounding watershed. Membership expansion plans led to not only a widened and well-regulated user group, but to the incorporation of stakeholders who previously engaged the lake commons only through the degrading effects of their activities. The sustainability of the Cooperative's governance model is underpinned by a solid and reliable economic return and a transparent management process led by a core of dedicated committee members. The inclusion of watershed inhabitants in both the management of the lake fishery and in conservation efforts, through stringent self-regulation and a generous benefit-sharing program, including restoration of Jalahari family's traditional rights to access to benefits, has further aided to concretely define the relationship between local inhabitants and their duties in commons governance. The cooperative as an institution has securely embedded itself within local political and economic settings, whilst gaining a respected position amongst the majority of local inhabitants.

The obstacles facing the Cooperative in its governance role remain difficult to overcome, however. Both the exploitation of the fishery itself, and the meaningful integration of a large watershed containing disparate and heterogeneous

communities with numerous differences, remain problems that the Cooperative struggles to investigate and reconcile. The establishment and growth of the Rupa Lake cooperative, however, provides a compelling case for the potential of commons users to reverse their resource's fate from tumbling into Hardin's seemingly inevitable tragedy. This case study demonstrates that motivated and dedicated communities can themselves create and sustain the type of strong institutional system Hardin thought impossible: one dedicated to and capable of sustainably managing the commons. This model might be replicated in other lake watersheds and river basin regions of the country to combine collective efforts of upstream and downstream communities for sustainably managing the resources shared by them. The learning from this case study might also be adopted across the world where similar social and biophysical situations are present.

Literature cited

- Acharya, K. 2002. Twenty-Four Years of Community Forestry in Nepal. *International Forestry Review* 4(2):149–156.
- Adami, C. and A. Hintze. 2013. Evolutionary Instability of Zero-Determinant Strategies Demonstrates that Winning is Not Everything. *Nature Communications* 4:2193. doi: 10.1038/ncomms3193.
- Agrawal, A. 2001. Common Property Institutions and Sustainable Governance of Resources. *World Development* 29(10):1649–1672.
- Agrawal, A. and K. Gupta. 2005. Decentralization and Participation: The Governance of Common Pool Resources in Nepal's Terai. *World Development* 33(7):1101–1114.
- Ashley, R. K. 1981. Political Realism and the Human Interests. *International Studies Quarterly* 25:204–236.
- Asquith, N. and S. Wunder, eds. 2008. *Payments for Watershed Services: The Bellagio Conversations*. Fundacion Natura Bolivia: Santa Cruz de la Sierra.
- Basnet, A. 2008. Understanding the causes of decline in the health of Rupa Lake, Nepal. Proceedings of Celebrating Dialogue: An International SAS2 Forum. Ottawa, Canada: Carleton University.
- Basurto, X. and E. Ostrom. 2009. Beyond the Tragedy of the Commons. Retrieved from <http://papers.ssrn.com/abstract=1304688>.
- Bell, T. 2014. *Kathmandu*. Haryana: Random House India.
- Beverton, R. J. H., and S. J. Holt. 1957. *On the Dynamics of Exploited Fish Populations*. Fishery Investigations, London, Series 2 19:533 p.
- Bowles, S. and H. Gintis. 2002. Social Capital and Community Governance. *The Economic Journal* 112:419–436.
- Chapman, A. and R. Sussman, eds. 2004. *The Origins and Nature of Sociality*. New York: Aldine de Gruyter.
- Chhetri, N., P. Chaudhary, P. R. Tiwari, and R. B. Yadaw. 2012. Institutional and Technological Innovation: Understanding Agricultural Adaptation to Climate Change in Nepal. *Applied Geography* 33:142–150.

- Clark, M. S., ed. 1991. *Prosocial Behavior*. London: Sage.
- Cox, R. W. 1981. Social Forces, States and World Orders: Beyond International Relations Theory. *Millennium: Journal of International Studies* 10(2): 126–155.
- Crona, B. I. and J. N. Parker. 2012. Learning in Support of Governance: Theories, Methods, and a Framework to Assess How Bridging Organizations Contribute to Adaptive Resource Governance. *Ecology and Society* 17(1):32.
- Dietz, T., E. Ostrom, and P. C. Stern. 2003. The Struggle to Govern the Commons. *Science* 302(5652):1907–1912. doi:10.1126/science.1091015.
- Dosi, G. and D. Levinthal. 2003. Institutions and Organizations: Introduction to the Special Issue in Honor of James G. March. *Industrial and Corporate Change* 12:647–652.
- Escobar, A. 2006. Difference and Conflict in the Struggle Over Natural Resources: A Political Ecology Framework. *Development* 49(3):6–13.
- Fraser, E., A. J. Dougill, W. E. Mabee, M. Reed, and P. McAlpine. 2005. Bottom up and Top down: Analysis of Participatory Process for Sustainability Indicator Identification as a Pathway to Community Empowerment and Sustainable Environmental Management. *Journal of Environmental Management* 78:114–127.
- Gautam, A. P., G. P. Shivakoti, and E. L. Webb. 2004. A Review of Forest Policies, Institutions, and Changes in the Resource Condition in Nepal. *International Forestry Review* 6(2):136–148.
- George, J. 1994. *Discourses of Global Politics: A Critical Introduction to International Relations*. Boulder: Lynne Rienner.
- Gordon, J. S. 1954. The Economic Theory of a Common-Property Resource: The Fishery. *Journal of Political Economy* 62:124–142.
- Green, D. P. and I. Shapiro. 1994. *Pathologies of Rational Choice Theory: A Critique of Applications in Political Science*. New Haven: Yale University Press.
- Gurung, T. 2003. Fisheries and Aquaculture Activities in Nepal. *Aquaculture Asia* 8(1):14–19.
- Gurung, T., S. Wagle, J. Bista, R. Dhakal, P. Joshi, R. Batajoo, P. Adhikari, and A. Rai. 2005. Participatory Fisheries Management for Livelihood Improvement of Fishers in Phewa Lake, Pokhara, Nepal. *Himalayan Journal of Sciences* 3(5):47–52.
- Hardin, G. 1968. The Tragedy of the Commons. *Science* 162:1243–1248.
- Hardin, G. 1978. Political Requirements for Preserving our Common Heritage. In *Wildlife and America*, ed. H. P. Brokaw, 310–317. Washington DC: Council on Environmental Quality.
- Hargrave, T. J. and A. H. van de Ven. 2006. A Collective Action Model of Institutional Innovation. *Academy of Management Review* 31(4):864–888.
- Henrich, J. and N. Henrich. 2007. *Why Humans Cooperate: A Cultural and Evolutionary Explanation*. Oxford University Press.
- Hobbes, T. 1986. *Leviathan*. New York: Penguin.
- Homer-Dixon, T. 1994. Environmental Scarcities and Violent Conflict: Evidence from Cases. *International Security* 19(1):5–40.

- Huang, M., S. K. Upadhyaya, R. Jindal, and J. Kerr. 2009. Payments for Watershed Services in Asia: A Review of Current Initiatives. *Journal of Sustainable Forestry* 28:551–575.
- Innes, J. and D. Booher. 2003. Collaborative Policy-Making: Governance Through Dialogue. In *Deliberative Policy Analysis: Understanding Governance in the Network Society*, eds. M. A. Hajer and H. Wagenaar, 33–59. Cambridge: Cambridge Univ Press.
- Kafle, G., M. Cotton, J. R. Chaudhary, H. Pariyar, H. Adhikari, S. B. Bohora, A. Chaudhary, A. Ram, and B. Regmi. 2008. Status of and Threats to Water Birds of Rupa Lake, Pokhara, Nepal. *Journal of Wetlands Ecology* 1(1/2):9–12.
- Khadka, N. 1991. *Foreign aid, Poverty and Stagnation in Nepal*. New Delhi: Vikas Publishing.
- Kiser, L. L. and E. Ostrom. 1982. The Three Worlds of Action: A Metatheoretical Synthesis of Institutional Approaches. In *Strategies of Political Inquiry*, ed. E. Ostrom, 179–222. Beverly Hills, CA: Sage.
- Kiser, L. L. and E. Ostrom. 2000. The Three Worlds of Action: A Metatheoretical Synthesis of Institutional Approaches. *Polycentric Games and Institutions* 1:56–88.
- Kropotkin, P. A. and T. H. Huxley. 1955. *Mutual Aid, a Factor of Evolution*. Boston: Extending Horizons Books.
- Kugel, C. and A. Huseynli. 2013. Community Based Lake Restoration Increases Income from Fisheries, Nepal. TEEB Study Report. Retrieved at <http://www.teebweb.org/media/2013/10/Community-based-lake...Rupa-Nepal.pdf>.
- Lansing, J. S. 1991. *Priests and Programmers: Technologies of Power in the Engineered Landscape of Bali*. Princeton: Princeton University Press.
- McGinnis, M. D. and E. Ostrom. 2014. Social-Ecological System Framework: Initial Changes and Continuing Challenges. *Ecology and Society* 19(2):30. <http://dx.doi.org/10.5751/ES-06387-190230>.
- Meehan, E. J. and N. E. Long. 1968. *Explanation in Social Science: A System Paradigm*. Homewood (Illinois): Dorsey Press.
- Mullon, C., P. Fréon, and P. Cury. 2005. The Dynamics of Collapse in World Fisheries. *Fish and Fisheries* 6:111–120.
- Nagendra, H. 2002. Tenure and Forest Conditions: Community Forestry in the Nepal Terai. *Environmental Conservation* 29(4):530–539.
- Nightingale, A. 2011. Bounding Difference: Intersectionality and The Material Production of Gender, Caste, Class and Environment in Nepal. *Geoforum* 42:153–162.
- Oakley, P. 1991. *Projects with People: The Practice of Participation in Rural Development*. Geneva: International Labor Office.
- Ojha, H. and K. Kanel. 2005. 25 years of Community Forestry in Nepal – A Review of Fourth National Workshop Proceeding. *Forest and Livelihood* 4(2):56–60.
- Ostrom, E. 1990. *Governing The Commons: The Evolution of Institutions for Collective Action*. Cambridge: Cambridge University Press.

- Ostrom, E. 2003. How Types of Goods and Property Rights Jointly Affect Collective Action. *Journal of Theoretical Politics* 15(3):239–270.
- Ostrom, E. 2007. A Diagnostic Approach for Going Beyond Panaceas. *PNAS* 104(39):15181–15187.
- Ostrom, E. 2009. A General Framework for Analyzing Sustainability of Social-Ecological Systems. *Science* 325:419–422.
- Ostrom, E. 2011. Background on the Institutional Analysis and Development Framework. *Policy Studies Journal* 39(1):7–27.
- Ostrom, E., J. Burger, C. Field, R. Norgaard and D. Policansky. 1999. Revisiting the Commons: Local Lessons, Global Challenges. *Science* 284:278–282.
- Pauly, D. 1995. Anecdotes and the Shifting Baseline Syndrome of Fisheries. *Trends in Ecology and Evolution* 10:430.
- Perrow, C. 1999. *Normal Accidents: Living with High-Risk Technologies*. Princeton: Princeton University Press.
- Persha, L., A. Agrawal, and A. Chhatre. 2011. Social and Ecological Synergy: Local Rulemaking, Forest Livelihoods, and Biodiversity Conservation. *Science* 331(6024):1606–1608. doi:10.1126/science.1199343.
- Petracca, M. P. 1991. The Rational Choice Approach to Politics: A Challenge to Democratic Theory. *The Review of Politics* 53(2):289–319.
- Pokharel, S. and M. Nakamura. 2012. Integrated Lake Basin Management (ILBM) for the Sustainable Conservation of Himalayan Lakes of Nepal. IPSI. Available at: http://wldb.ilec.or.jp/data/ilec/WLC13_Papers/S17/s17-11.pdf.
- Poteete, A. R., M. A. Janssen, and E. Ostrom. 2010. *Working Together: Collective Action, The Commons, and Multiple Methods in Practice*. Princeton University Press.
- Pradhan, N., I. Providoli, B. Regmi, and G. Kafle. 2010. Valuing Water and its Ecological Services in Rural Landscapes: A Case Study from Nepal. *Mountain Forum Bulletin*. URL http://www.forestrynepal.org/images/publications/pes_article_mountainforum_forcirculation.pdf.
- Regmi, B. R., G. Kafle, A. Adhikari, A. Subedi, R. Suwal, and I. Paudel. 2009. Towards an Innovative Approach to Integrated Wetland Management in Rupa Lake Area of Nepal. *Journal of Geography and Regional Planning* 2(4):80–85.
- Ricker, W. 1975. Computation and Interpretation of Biological Statistics of Fish Populations. *Fisheries Research Board of Canada Bulletin* 191:1–382.
- Rilling, J. K., D. Gutman, T. R. Zeh, G. Pagnoni, G. S. Berns, and C. D. Kilts. 2002. A Neural Basis for Social Cooperation. *Neuron* 35(2):395–405.
- Rodima-Taylor, D. 2012. Social Innovation and Climate Adaptation: Local Collective Action in Diversifying Tanzania. *Applied Geography* 33:128–134.
- Rose, L. E. 1971. *Nepal: Strategy for Survival*. Berkeley: University of California Press.
- Scott, A. 1955. The Fishery: The Objectives of Sole Ownership. *The Journal of Political Economy* 63(2):116–124.

- Sekeris, P. 2014. The Tragedy of the Commons in a Violent World. *RAND Journal of Economics* 45(3):521–532.
- Shrestha, N. 1997. *In the Name of Development: A Reflection on Nepal*. Boston: University Press.
- Smith, A. 2003. *The Wealth of Nations*. New York: Bantam Dell.
- Udas, E. 2007. Strengthening community based conservation approach for sustainable management of Rupa Lake Ecosystem. Project Report. URL: <http://www.rufford.org/files/35.07.06%20Detailed%20Final%20Report.pdf>.
- Upton, C. 2012. Adaptive Capacity and Institutional Evolution in Contemporary Pastoral Societies. *Applied Geography* 33:135–141.
- Varughese, G. and E. Ostrom. 2001. The Contested Role of Heterogeneity in Collective Action: Some Evidence from Community Forestry in Nepal. *World development* 29(5):747–765.
- Vasquez, J. 1998. *The Power of Power Politics: From Classical Realism to Neotraditionalism*. Cambridge: Cambridge University Press.
- Wade, R. 1988. *Village Republics: Economic Conditions for Collective Action in South India*. Oakland: ICS Press.
- West, S. A., A. S. Griffin, and A. Gardner. 2007. Social Semantics: Altruism, Cooperation, Mutualism, Strong Reciprocity and Group Selection. *Journal of Evolutionary Biology* 20(2):415–432.
- Wilson, E. O. 1998. The Biological Basis of Morality. *The Atlantic Monthly* April 1998:53–70.
- Woodhill, J. 2010. Capacities for Institutional Innovation: A Complexity Perspective. *IDS Bulletin* 41(3):47–59.