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Upstream-Downstream Interdependencies and Water Security in Dhulikhel

Kaustuv Raj Neupane, Anushiya Shrestha and Tikeswari Joshi

SUMMARY

Dhulikhel town relies on the upstream of Kalanti Bhumidanda for its water supply since the late 1980s and has been incentivizing the upstream community through formal agreements. In this chapter, we document these agreements and underlying negotiation processes. Our findings and reflections are based on qualitative research including in-depth interviews, focus group discussions, and review of agreement documents, conducted between 2014 and 2020. Findings show that rather than valuation of environmental services and benefits, socially embedded norms associated with water and socio-political relationships played important role in succeeding and sustaining the water-sharing agreements with upstream communities. Besides, the incentive model has changed over time from social benefits and material support to monetary inputs as the social values associated with water have eroded while the economic benefits of water have become an attraction. Dhulikhel-Bhumidanda case depicts negotiation processes need to carefully identify and involve the affected actors and ensure that mechanisms for mobilizing monetary incentives are transparent. In lack of attention to these details, incentives, as in this case, can backfire as a cause of conflict rather than flourish upstream-downstream relationships. Involving different water users in the dialogues and decision-making processes can help internalize and institutionalize the upstream-downstream inter-dependencies and contribute to making both, villages and towns water secure.

1. INTRODUCTION

The increasing water stress is leading contestations and conflict over water sources (Falkenmark, 1992). Such cases of conflict and contestations are increasingly common in urban areas as growing water demands outrun the supply from traditional water sources located within their administrative jurisdiction. Many of such water-stressed towns have tapped water from distant sources and augmented their water supply (Celio, Scott, and Giordano, 2010). Traditionally, such water-sharing mechanisms materialized through informal negotiations and mutual understanding (Upreti, 1999). However, over time, such practices often become a contentious issue between the water provider, upstream and the water user, downstream communities. Water Aid (2012) reported a steady decline of local sources compelling local communities to cut supply to some traditional water users, which resulted in conflicts between drinking, irrigation, and other water user groups.

Payment for Environmental Services (PES) schemes emerged as a conflict-resolution instrument in solving downstream-upstream conflicts (Kosoy et al., 2007). PES schemes in watershed gained popularity between 2002 and 2008 (Porrás et al., 2013). The PES¹ is defined as a free-market-based approach designed to conserve the environment, in which the users of ecosystem services (ES) pay producers (or managers) to adopt (or maintain) environment-friendly regimes to ensure the long-term supply of such services (Wunder, 2005). However, PES schemes remain criticized for the commodification of nature by narrowing down of ecosystem complexity to individual and distinguishable 'services' and single value systems which do not recognize ecological, social, or spiritual values as separate from an income dimension (Kosoy and Corbera, 2010). Given that watershed resources are needed for human survival and that watershed governance is dependent on social institutions and evolving knowledge systems, proponents of PES have stressed the application of PES for enhancing mutual benefits

1 A PES scheme depends upon a number of criteria. It is described by: (1) a voluntary transaction, in which (2) a well-defined land use likely to secure that service is (3) bought by a (minimum of one) ES buyer from (4) a (minimum of one) ES provider if (5) the ES provider secures ES provision (conditionality).

in managing watersheds (Kolinjivadi, Adamowski and Kosoy, 2014; Tacconi, 2012).

Muradian et al. (2010) defined PES as ‘a transfer of resources between social actors, which aims to create incentives to align individual and/or collective land-use decisions with the social interest in the management of natural resources and considered any scheme where economic transfers play a role in facilitating the coordination between participants either that meet market transaction nature or not is a PES scheme’. They stress on the need to pay special attention to social embeddedness in administering and analyzing PES schemes in developing countries. For instance, in Bolivia, besides providing material support, water schemes were built on pre-existing social norms and promoted through social embeddedness rather than environmental support (Grillos, 2017). Social norms are informal rules derived from social systems that prescribe what behavior is expected, allowed, or sanctioned in particular circumstances (Kinzig et al., 2013). The concept of social embeddedness recognizes that any economic activity depends upon the social context in which it takes place and the interpersonal relationships and social ties (Cui and Liu, 2018).

Dhulikhel, a hilltop town in Nepal provides a striking example of water-related negotiations that involve incentivizing the water-rich upstream community, explicitly by providing economic incentives, and implicitly by mobilizing socio-political position and interpersonal relations (Joshi et al., 2019). Until 1987, Dhulikhel residents depended on local springs located in its *Thulo Ban* (big forest) (for detailed history, see Chapter 2 of this book by Byanju et al., 2021). Attempting to improve water supply in Dhulikhel town, in 1985, Dhulikhel Village Panchayat made the first agreement with Bhumidanda Village Panchayat. Following the agreement, in 1987, a Dhulikhel water supply project started based on a Roshi watershed. Roshi watershed lies in the Kalanti Bhumidanda Village Development Committee (VDC), referred to as Bhumidanda after this (since 2017 it belongs to Panauti Municipality). The primary source of this water supply project is the Saptakanya fall of Kharkhola, a stream originating from the Kharkhola Mahabharat Community Forest of the Roshi watershed.

Over the past three decades, Dhulikhel municipality made two more agreements for diversion of water to the Dhulikhel town; in 2010 and 2011 (for a summary of the agreements, see Table 1). In this chapter, we elaborate these three agreements and underlying negotiation processes with a focus on the influences of social embeddedness in reaching and sustaining negotiations and water-sharing agreements between the upstream and downstream communities. Our analysis shows that Dhulikhel made perseverant efforts in bringing the upstream communities into a series of negotiations and sustaining the water-sharing agreements through material and non-material contributions. Besides, Dhulikhel as the district headquarter and the district hub of education and health services made upstream community dependent on Dhulikhel. This dependency on Dhulikhel and embedded socio-political power made Dhulikhel able to negotiate with upstream communities and secure water for its residents.

Evidence and reflections we present in this chapter are based on interactions and observations made during qualitative field research conducted between 2014 and 2020. We also collected and reviewed the three agreement documents, interviewed farmers (5), water mill operators (7) in the upstream community, and the agreement signatories of both, upstream and downstream communities. Additionally, we organized focus group discussion (2) with Dhulikhel Drinking Water and Sanitation Users Committee (DDWSUC).

Following this introduction, the second section narrates the history of the negotiations. The second section is further divided into three sub-sections elaborating on the agreements of 1985, 2010, and 2011. For each of the agreements, we explain (a) why the agreement was required (b) the process of negotiation, and (c) analyze how social-political relations played role in making negotiation and agreement successful. Finally, we conclude by highlighting key messages and insights, and policy recommendations.

Table 1
Agreements and incentives between upstream Bhumidanda and downstream Dhulikhel

Agreements	Upstream Signatories	Downstream Signatories	Water Supply Area in downstream	Incentives to the upstream community
The first Agreement, July 27, 1985 Tap water from Khar Khola at Bhumidanda and supply Dhulikhel	Bhumidanda VDC – Pradhanpancha	Chair of Dhulikhel Development Board	Dhulikhel Village Panchayat (ward no 2, 3, 4, and 5 of Dhulikhel Municipality)	Constructed school building and paid more than NPR 1 crore on ad hoc basis till 2011 for different development projects in the upstream area
The second Agreement, March 12, 2010 Tap water from Roshi river and its tributaries at Bhumidanda and Kushadevi VDC for KVIWSP	Bhumidanda VDC- VDC secretary and local political leaders	KVIWSP –political leaders of 7 major parties from Kavre valley	Dhulikhel ward no 1, 6, 7, 8, 9 and Banepa and Panauti Municipality	NPR 75 lakh in over five-year period, and subsidies in treatment at Dhulikhel Hospital and support in upgrading health post building scholarships at Kathmandu University.
The third Revised agreement, May 08, 2011 Enlarge water intake at the tap from Khar	Bhumidanda VDC Secretary in presence of three members of All Party Mechanism	Dhulikhel drinking water user committee in presence of representatives of Kathmandu	2, 3, 4 and 5 and few parts of ward no 1, 6, 7, 8, and 9 of Dhulikhel Municipality	NPR 8 lakh for VDC and NPR 2 lakh for school teachers and NPR 36000 for forest steward annually, provide a discount

2. HISTORY OF WATER NEGOTIATIONS BETWEEN DHULIKHEL AND BHUMIDANDA

This section of the chapter provides details of the three agreements made between Dhulikhel and upstream community Bhumidanda Village from the 1980s to 2011. It also draws key messages of each of the agreements and shows how social relationship and support was a key factor in materializing these water-sharing agreements.

2.1. The first agreement, 1985

Severe water shortages led some local leaders of Dhulikhel to negotiate with the upstream Bhumidanda community for water sources and with potential donors for funding a water supply scheme in the early 1980s. The local leadership consisted of the Chief of the then Dhulikhel Village Panchayat and Dhulikhel Development Board (DDB), a community-based organization formed for the overall development of Dhulikhel. Bhumidanda community, led by their Village chief, agreed to allow Dhulikhel to withdraw water through a 6-inch pipe on the condition that Dhulikhel would provide them the financial support they needed for constructing a school building. The upstream community demanded the construction as the building of the only primary school in this community was washed away by a flood in 1981.

Our interviewees who took part in the negotiation process during this first agreement explained that the socio-cultural norm of sharing water as a 'social good' that everyone should have access to contributed in making this bilateral agreement successful. Additional factor to this was the inter-personal relations between the community leaders of these two communities. According to the then president of Bhumidanda Village Panchayat (interviewed in 2015):

Chairman of Kavre District Panchayat - the district headquarter, who is my friend, requested us to provide water for Dhulikhel residents who were suffering from water scarcity. In response, we requested them to construct our local school building as it was damaged by a huge flood of the Roshi River in 1981. The Pradhan

Pancha² agreed to the conditions we put forward, and accordingly, as per the decision of the Village Council, we decided to allow them to take water and establish a new water supply system.

Bhumidanda Village Panchayat discussed the proposal in a wider citizen forum and, recognizing the severity of the water crisis in Dhulikhel, agreed to provide water to the latter. The elected Pradhanpancha, the Village head of Bhumidanda, and the chief of Dhulikhel Development Board on behalf of the downstream community signed this non-expiring five-point agreement on July 27, 1985 (see Figure 1). Point two of this first agreement mentions the construction of the school building as:

With an objective of improving the education status of Bhumidanda Village Panchayat immediately, Dhulikhel Development Board will develop a blueprint and estimate cost for the financial support for the construction of a primary school building of Bhumidanda.



Figure 1 Exchange of agreement document between Dhulikhel town and Bhumidanda (*Photo source: DDWSUC*)

2 Pradhan Pancha were the village head in the Panchayat Period.

The key message of the first agreement is that the inter-personnel relations between community leaders along with material support (for the school building) were the key factors in making the agreement possible. The social relationship was established as Dhulikhel was the district headquarter, which the people of Bhumidanda had to visit to get state services such as citizenship, land ownership registration, and electricity connection. Also, important was the role of the facilitator, who was a common friend of both community leaders and facilitated in building the mutual trust needed for the agreement. Similarly, the social norm regarding water as a social good and sharing water as a spiritual deed (Devkota and Neupane, 2018) was a crucial factor underlying this agreement.

Following the first agreement, Dhulikhel Panchayat explored an organization that could support them in developing a water supply system. Although GTZ agreed to support, Dhulikhel needed to 'upgrade' itself into a municipality to qualify for this support. This was achieved by incorporating some adjoining rural villages (Bajrayogini, Srikhandapur Village Panchayat, and some parts of Kavre Village Panchayat) in 1986. However, the proposed water supply project was designed for Dhulikhel Village Panchayat only, referred to as the 'core settlement' excluding the annexed surrounding villages (for detailed history, see Chapter 2 of this book by Byanju et al., 2021).

2.2. The second agreement, 2010

In the following decade, both Dhulikhel and Bhumidanda settlements expanded, their socio-economic contexts changed, and water demands soared with increasing urbanization and growing tourism-based economy. Kathmandu University, Dhulikhel Hospital, and several hotels were established in Dhulikhel. In Bhumidanda, the shift from traditional farming system to more intensive agriculture practices increased irrigation water use.

While the core settlement of Dhulikhel, which comprised of wards 2, 3, 4 and 5 of Dhulikhel Municipality had adequate water supply, peripheral wards (ward no 1, 6, 7, 8, 9) of the municipality remained excluded. The residents of these wards continued protesting,

demanding for the water supply. In 2006, there was a huge protest during which the protestors broke the intake pipeline of the Dhulikhel water supply system. This stopped water supply to Dhulikhel town for a week. After this demonstration, Dhulikhel Municipality explored options for new water supply projects. Subsequently, a new project called the Kavre Valley Integrated Drinking Water Supply Project (KVIWSP), funded by the Asian Development Bank (ADB) was designed (For details about KVIWSP, see chapter 3 of this book by Timalina et al., 2021).

To arrange the water source for KVIWSP and enable its construction, a new 9-points agreement was signed with the upstream community of Bhumidanda on March 12, 2010. VDC secretary and six local political leaders (two from each Nepali Congress, Unified Maoist and Leninist and Unified Communist (Maoist) Party of Nepal) of Bhumidanda VDC signed the agreement on behalf of the upstream community. On behalf of the Kavre Valley, the political leaders of seven major political parties along with Chief executive officers of Banepa, Dhulikhel, and Panuati municipalities as the invitees signed the agreement. During this period, the country did not have elected local representatives and the government authorized the VDC secretary, a civil servant, to take over the roles of the local government. Local leaders of different political parties, through All-Party Mechanisms (APM)³, had significant influences in making resource-related decisions and were active in these negotiations between upstream and downstream communities that happened over a period of nine months.

This agreement offered new incentives to the upstream: cash amounting to a total of NPR 75 lakh over five years, subsidies in treatment at Dhulikhel Hospital, contributions in upgrading their health post building, and scholarships at Kathmandu University⁴. Although the agreement also entitled Bhumidanda VDC to an undeclared percentage of annual royalty collected upon operation of the project, this is yet come into practice as the project operation

3 In absence of local elected governed in 2008-2012, the government introduced All Party Mechanism (APM) to make consensus-based decisions at the local level. APM members represented different parties on a one-party-one-representative basis.

4 KVIWSP has signed agreement with Kusha Devi VDC for additional water sources and has paid NPR 60 lakh

has not started. This agreement was made as a single time agreement that does not need renewal. The decision 1 of the agreement document (2010) mentions the payment mechanisms as follows:

In response to the demands of Bhumidanda VDC concerning the operation of Kavre Valley Integrated Drinking Water Project, Banepa, Panauti, and Dhulikhel Municipalities agreed to provide a grant of fifteen lakh rupees (five lakh from each municipality) to Bhumidanda VDC annually. This shall continue for five fiscal years and a total sum of seventy-five lakh rupees.

Water Resource Act (1992) of Nepal sets a priority order for water uses, drinking and domestic uses being the priority, followed by irrigation, agriculture uses, hydroelectricity and other various uses in the priority order. As per the above-mentioned agreement, Bhumidanda communities have the '*prior rights*' and the diversion of water for Kavre Valley cannot hamper their existing water uses such as irrigation and water mill operation. In case the water source volume decreases, the amount of water diverted to Dhulikhel will be curtailed to reduce the consequent loss of water-based livelihoods options for the upstream communities. Although the Bhumidanda communities complain that "the decision for the entire village was made by involving only a few people" (FGD, 2015), the local leaders of Bhumidanda argue they had no option except signing the agreement because of the repeated 'requests' of the district-level political leaders.

Although the upstream residents are satisfied with the amount of money paid to them, both, the incentive providers and receivers opined the coordination between the VDC authority, local political leaders, and affected people in the allocation and use of the funds and services was weak. For instance, the downstream community illustrated, "we have provided water pipes for proper water distribution in the upstream region, but it remains unused. It is the duty of the upstream community to lay that pipe" (Vice-chairperson, DDWSUC, 2015).

Bhumidanda has two micro watersheds: Roshi catchment and Kalanti water catchment, which meet in the downstream (Panauti)

as the Roshi River. The agreement does not lay any condition on how these upstream communities should use the funds. This has, however, allowed the upstream leaders to divert the fund to sectors and areas not affected by the water supply project. Many residents in Bhumidanda argue that the incentive fund should be used only for the Roshi catchment. One of the residents interviewed in 2016 mentioned that, “Dhulikhel has given an incentive amount but our leaders have used it for development activities in areas that are not impacted by the water supply projects.”

All these factors have led to forming a protest group in the upstream community to oppose these ongoing activities. Local people from Bhumidanda also painted the walls with protest slogans such as: “Do not ask only water with us, give us development”, “irrigation and water mills cannot be finished by diverting water’ and ‘water cannot be sold”.

The key message of the second agreement is that the negotiations process and the resulting PES-oriented agreement were strongly influenced by the pre-existing social connections between the political leaders, and embedded unequal power positions at the district, municipal, and within the village level. These agreements were made at a higher political level and the water user groups of the upstream communities, despite being affected by the water supply projects, were neither included nor well-represented in the negotiation processes. Hence, the decisions lacked attention to their stake, including those regarding mobilization of the incentives. While the agreement has provided the upstream community immediate benefits, they suspect that the political leaders had hidden interests and therefore did not involve the affected water user groups in the negotiation processes. Additionally, they are dissatisfied with the ongoing haphazard mobilization of the incentive fund. Growing grievances among the water users are resulting in conflicts among the water provider communities and contestations against the sharing of water for the water supply projects. Moreover, the use of the incentive fund has been limited to improving the access to the basic services which the upstream communities lacked. Hence, the valuation and sustenance of environmental services, a major component of PES, has not been a primary focus in this water-sharing agreement.

2.3 Revised agreement, 2011

The DDWSUC was facing increasing challenge to run the water scheme. On one hand, water demand was increasing. On the other hand, people from upstream area of Bhumidanda were demanding redefinition of the earlier agreement and some additional payments. Without taking into account the agreement of 2010, in 2011, DDWSUC inked a new agreement to increase the water supply immediately and to establish a regular payment mechanism. The president of DDWSUC reported (interviewed in 2015):

Upstream people used to come to us demanding money for development activities; we had already paid them nearly 1 crore Nepalese rupees on an ad hoc basis. So, we thought to formalize the payment mechanism to make it more transparent and clearer.

Responding to the request of the DDWSUC to forge consensus on the demand and supply of water, the then mayor of the Dhulikhel Municipality and the then DDC chairperson had started a dialogue with the then VDC chairperson of Bhumidanda already in 2000. In order to bring the actors into a constructive dialogue, the chairperson of DDWSUC was actively involved in the negotiation process. The manager of the DDWSUC recalled:

During the negotiations, representatives from the Kathmandu University (KU) and Dhulikhel Hospital facilitated the discussions between the communities. The Vice-Chancellor of KU himself was involved in the negotiation process. Their facilitation helped to end the negotiation with fruitful decisions.

Upstream Bhumidanda community actively participated in the negotiation process. They were represented by local leaders of different political parties and other local institutions. After several dialogues, an addendum to the first agreement of 1985 was signed in 2011. The revised agreement laid ground for increasing the volume of water that Dhulikhel could intake for Dhulikhel drinking water supply. It also established a mechanism for a regular payment to the upstream community.

DDWSUC and upstream Bhumidanda signed a new nine-point agreement on May 8, 2011. The document states:

This contract is held between Dhulikhel Drinking Water Users Committee (first-party) and Bhumidanda VDC (second Party) [...] after a series of discussions between the representatives from Dhulikhel Drinking Water Users Committee and Bhumidanda to repair and increase the volume of water being tapped (as per the agreement between Dhulikhel Village Panchayat and Bhumidanda Village Panchayat on 27 July 1987) from Sapta Kanya spring of Khar Khola forest from Kavre district Bhumidanda VDC ward no.3 under German project by Dhulikhel Drinking Water Users Committee to Dhulikhel Municipality.

VDC secretary of Bhumidanda, on behalf of the upstream community, signed the agreement in the presence of three leaders from representatives of All-Party Mechanism (political leaders belonging to UCPN (Maoist), Nepali Congress, and CPN (UML)). The president of DDWSUC signed the agreement in the presence of the chairperson of the district water resource committee, chief executive officer of Dhulikhel Municipality, representative of Kathmandu University and Dhulikhel Hospital.

According to the agreement, DDWSUC will financially support the upstream community, mainly for their school and forest management. Every year, DDWSUC will pay a sum of NPR 800,000 to the upstream VDC and NPR 20000 for the school at the upstream. Dhulikhel also agreed to increase the payment being given for the salary of a forest guard to NPR 36,000 per annum. Similarly, it was agreed that the Kathmandu University will plan and implement activities for upgrading education standards at Bhumidanda. Dhulikhel Hospital also agreed to provide discounts on the treatment costs for the poor and vulnerable population of Bhumidanda. Further, Dhulikhel Hospital will support Bhumidanda in improving its health sector.

Dhulikhel has regularly paid the agreed-upon amount annually. Dhulikhel Hospital is also providing a discount for medical treatment at the Hospital and Kathmandu University provisioned scholarship at an intermediate level for people of Bhumidanda.

However, the upstream stakeholders were dissatisfied because of continued poor transparency in the disbursement of the incentive fund and questioned the accountability of upstream local political leaders. Consequently, the upstream community obstructed DDWSUC in increasing the water intake to a 10-inch pipe (from the existing 6-inch water pipe), which hindered the full implementation of the project. The smoldering grievances have resulted in growing opposition against the new agreements.

Similar to the above-discussed first and the second agreements, the key lesson of this agreement is that the social relations and embedded power positions have strong influences on the water-sharing agreements. However, the social values associated with water continue degenerating. Rather the negotiating parties prefer and prioritize monetary and social incentives as the desired way out to materialize water-sharing agreements. This shift can be related to a general trend of growing demands for local schemes based on the payment for environmental services. For instance, Nepalese city Dhankuta has recently established a PES mechanism led by the Municipality for Nibuwa Khola Watershed conservation (Aryal et al., 2019). Similarly, in Baglung Municipality, the drinking water users committee had paid 18 lakh to the upstream forest users committee (Acharya and Khatri, 2013). In the agreement for the KVIWSP, the committed monetary and social incentives seem to have heated protracted debates and heightened the expectations of the upstream service provider community. This agreement also shows that the involvement of powerful local institutions, in this case, Kathmandu University and Dhulikhel Hospital, added credibility in dialogue, taking these prolonged negotiations into an agreement. Support in developing the health and education sector of Bhumidanda as per their commitment will be crucial in sustaining the agreements amid growing distrust against the local leadership and objections to the agreements.

3. CONCLUSION AND WAY FORWARD

This chapter delved into the details of water-sharing agreements between Dhulikhel Municipality and the upstream Bhumidanda VDC, with a focus on the influences of social embeddedness in the

negotiations and agreements for securing water in Dhulikhel. Analysis of the Dhulikhel-Bhumidanda case shows the social norms that, until the past few decades, motivated people to come into water-sharing agreements have become weak against the growingly popular, payment-driven 'mutually beneficial' mechanism. Sharing of resources for immediate economic incentives, a practice influenced by the idea of Payment for Ecosystem Services (PES), has become a key factor in making water-related negotiations successful. Nevertheless, pre-existing social relations and embedded social, political, and institutional privileges continue to facilitate and stimulate the dialogues between negotiating parties.

According to Muradian et al. (2010), this intermingling of economic incentives and socio-political relations in resource-related negotiations is a major criterion of PES. Dhulikhel-Bhumidanda water-sharing agreements and the underlying process showcase intersection of social norms, values, and socio-political relations where material supports are a continuous and evolving process. Socio-political relations, the economic ability to pay for accessing water resources, and the perseverance to continue dialogues enabled Dhulikhel to overcome its water scarcity and regain its socioeconomic and political vibrancy. Although debates and dissatisfaction against the mobilization of funds exist, sharing of the water resource has increased the pace of socio-economic development in Bhumidanda. What remains largely neglected in this reciprocal relationship is the valuation of environmental services despite that conservation of water sources is vital for the real success of these agreements and sustainability of the water supply systems. As elaborated in the above sections, these agreements are not free from conflicts and controversies. One of the reasons for this is the changing social norms from one that attributed social and spiritual value to water to one that urges to draw maximum economic benefits from water.

The second major cause of contestations seen is the weak representation of the affected community in the negotiation process and lack of attention for developing a strong mechanism for mobilizing and monitoring the incentive funds. In addition, whether the revenue generated by the water governing body should be shared

with the water source owning upstream communities remains unanswered in applying PES schemes in Nepal (Bhatta et al., 2014). Moreover, as seen in this case of Dhulikhel-Bhumidanda, transparent mobilization of the incentive fund has been a conflicting issue rather than the incentive amount. In such a situation, additional incentive, if not properly managed can proliferate the simmering conflict.

In these scenarios of inter-dependencies of Dhulikhel and Bhumidanda for water and development, we draw the following key messages:

1. Social relations and embedded power positions strongly influence water-sharing agreements. Social values associated with water have weakened while monetary and material incentives that have become crucial for succeeding and sustaining the water-sharing agreements. Nonetheless, a pure market-based practice involving sharing of revenue or royalty can add distrust and complicate the negotiations resulting in breaching of agreements. Monetary incentives do not ensure socio-economic development and watershed conservation at the upstream nor do these ensure sustained water supply for downstream water users. Socio-political relationships when mobilized along with institutionalized participatory and transparent monetary and material support mechanisms for the development of the upstream community, help in making negotiations for water successful and sustaining the water supply system.
2. Addressing the growing dissatisfactions, reinforcing good relations between upstream water-rich villages and downstream urban centers as well as clear mechanisms for mobilizing incentives remain crucial, not only for sustaining these water supply systems but for the socio-economic development of both communities. Identification of affected actors and their participation in the institutional mechanism can help to sustain symbiotic relationships between different water user groups in both upstream and downstream communities. Such an institutional entity must be formally authorized, institutionally, and technically capable, and socially inclusive. Such

internalization and institutionalization of the inter-dependencies of different local government units will be increasingly important in managing water, mutual development, and for making both villages and towns water secure.

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