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Building Better Water Governance in Response to Climate Change and Water Stress: A Case Study of Lijiang, Yunnan Province, China*

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Introduction: Water governance and the water crisis in Lijiang

China has experienced rapid economic development during the past 30 years and is facing water scarcity, water pollution, and floods, as well as other water related stresses (Xie 2009). Even though the Chinese Government is working towards becoming a water saving nation (Barker et al. 2001) and has a number of policy documents aimed at improving water supply and conservation, water related problems have not been dealt with effectively (Xie 2009). In China, water is owned and managed by the state in a highly centralized, hierarchical manner encompassing allocation, permits, and fees (Liu and Speed 2009). The principles of integrated water resources management (IWRM) form part of the basis for managing water in China, but there is little coordination between the various competing ministries, limited data sharing, and bureaucratic barriers abound. Under the current system water tenure remains obscure (Yu 2014).

Meanwhile, water policies are often simply interpreted as water infrastructure projects and implemented by a single line agency with huge investment. Between 2007 and 2012, investment in water related infrastructure increased from about USD 166 to 664 billion (Li et al. 2011). Furthermore, the financial resources of local governments at the township level have dwindling over the past 10 years, due to a series of tax reforms. To compensate, local governments have been quick to make water resources development a pillar of local politics to cash in on the huge investment in water infrastructure (Habich, 2012). In addition, public participation at any level of politics is weak or missing. For example, in China's largest water scheme, the South-North Water Transfer project, there is almost

Improving water governance in Lijiang requires political will based on government interest. At present, however, government agencies have little incentive to increase participation, cooperation, open information exchange and other hallmarks of good governance. But there are opportunities to improve water governance by linking water governance policies to local farmers' strategies to adapt to environmental change.

no room for the local people affected by the transfer to provide input (Moore 2015).

Yunnan hosts the headwaters of many of China's major river systems and provides about 33% of China's hydropower resources. However, Yunnan is experiencing water shortages, the uneven distribution of water, both spatially and temporally, and unbalanced water supply and demand (Zeng 2010; Zhu et al. 2013). Meanwhile, the region has been warming at greater than global average rates and ongoing climatic changes are projected to lead to reductions in soil moisture, river flow, glacial mass, and groundwater – changes that are increasingly impacting on water availability in Yunnan (Zomer et al. 2014). In recent years, frequent droughts have caused serious ecological damage and resulted in a decrease in agricultural products, impacting on the lives of Yunnan residents (Su et al. 2012). At the same time,

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socioeconomic pressure on water resources is increasing. Water is playing an increasingly important role in Yunnan Province, but improving the efficiency of water use and achieving good water governance, while ensuring economic development, remains a challenge (Zhu 2013). This case study analyses water governance issues in Lijiang city in Yunnan using commonly accepted indicators of good water governance to evaluate water management effectiveness. It also explores options for introducing and implementing water governance policies that are linked to farmers' strategies. With specific reference to the problems faced in the study area, the assumptions are that rapid tourism development causes a quantitative increase in demand for water and water consumption, as well as water pollution. The implementation of irrigation infrastructure construction projects alone does not necessarily solve these problems. Under these circumstances, water governance may help to balance water supply and demand and address the water crisis in the study area.

Method

This paper presents the results and analysis of a study conducted by the authors in Lijiang of Yunnan Province, China in 2013. The focus of the study was on the major changes in local people's socioeconomic situation and the natural, economic, or social problems and shocks that each household faced, as well as their impact on livelihoods and water management issues. The study consisted of household surveys, focus group discussions, key informant interviews, and stakeholder workshops.

A total of 433 households were randomly selected for the questionnaire survey, which was conducted in 16 villages. Nine key informant interviews were also conducted with two village leaders, two township government leaders, and five leaders of government water management agencies at the township and county levels. Six focus group discussions were conducted using Community-based Risk Screening Tool-Adaptation and Livelihoods (CRISTAL) in 3 of the 16 villages (representing high, middle, and low altitude villages), which helped to analyse vulnerability assessment information collected using participatory methods at the community level. Two participatory focus group discussions (one for males and one for females) were conducted in each village with 6–10 participants in each. The relevant literature was reviewed to ascertain socioeconomic evolution in the study area (Zheng et al. 2014; Ning and He 2007; Yuan et al. 2006; Wang et al. 2010 & 2012).

Study site: Lijiang City

Lijiang City is located at an altitude of 2,400 metres in the northwest of Yunnan Province, China on the edge of the Tibetan Plateau. The study site around Lijiang City, specifically the Mujiqiao watershed (54,200 hectares), is one of the major watersheds in Lijiang prefecture. The Yanggong River, Mujiqiao's main watercourse, flows down from the Yulong (Jade Dragon) Snow Mountain (5,596 metres) into Lijiang. It is a biodiversity conservation hotspot with a total population of about 1.24 million. Over the last 20 years, Lijiang has become one of the most famous tourism areas in China with the number of tourists visiting increasing from 63,900 in 1994 (Yuan et al. 2006) to 16 million in 2012. Tourism development has been an economic boost for Lijiang City, but unsustainable water use and inadequate management measures have caused the water quality to deteriorate (Ning and He 2007). Recent studies have reported a series of negative impacts on the Jade Dragon Snow Mountain and water resources associated with the increase in tourism in Lijiang and climate change, including glacier retreat, water pollution, water scarcity, negative cultural effects, negative impacts on residents' livelihoods, and inequity (Yuan et al. 2006; Wang et al. 2010; Zheng et al. 2014).

As water resources are of paramount importance in China, how are the various levels of government bodies responding to changing conditions? Are government officers well informed about international trends and following best practices in water governance? If not, what can be done to improve water governance and local adaptation to change? These questions formed the heart of the study in an exploration of how to build more effective water governance in Yunnan, as well as more broadly in China.

Principles of good water governance

Water governance comprises: "all social, political, economic and administrative organisations and institutions..." and "their relationships to water resources development and management" (Tortajada 2010, p 299). How water resources and services are governed has a profound impact on people's livelihoods and their sustainable use of water, as well as on the environment. Water governance is a part of broader social, political, and economic developments and is affected by decisions made well beyond the water sector. Hence, water governance is complex, as water is not just a natural resource, but a political one as well (Joy et al. 2014).

There is strong international consensus on the principles of good water governance (Rogers and Hall 2003; Pahl-Wostl et al. 2012; UN and ADB 2012). These principles include: open information exchange; transparency; accountability; inclusive, equitable, and ethical participatory processes; rule of law; and conflict resolution. Research has shown that, in general, the more these principles are implemented in a given situation, the better water governance decisions will be for most parties. However, these principles must be recognized as standards and goals; there is no perfect water governance anywhere.

Results: Assessing the indicators of good water governance

This study analysed the water governance situation in Lijiang by comparing the commonly accepted indicators of good water governance, using the information collected in the study. The results for each indicator are presented in this section.

Open information: Little information on water development is available or exchanged with local people or at the village level in Lijiang. Such information is shared with the village committee, but only after decisions have already been made at the higher levels of government. Although there are many water projects implemented, project funding is often allocated based on personal relationships or connections to government officials. Four focus group discussions mentioned that too much water has been transferred to the city and that more should be allocated to agricultural land, especially during the growing season. However, from the data collected from all key informants, there is no evidence that officials would accept a more open information exchange with local people.

Transparency: Transparency in water governance is low in Lijiang and villagers learn about water actions and decisions mainly from village committees and groups. Despite this low level of transparency, local people had no direct suggestions for how to improve the situation. Most local people want that the government to 'give' them more water and pay them more in compensation fees, but they do not expect direct involvement in the decision-making process, which may be because they are accustomed to top-down decision-making. There is no data showing how local government and decision makers could improve transparency.

Accountability: Accountability (responsibility) is centralized in Lijiang. Local people generally look to their village

leaders, the township government, and the water bureau for accountability, but are not always clear about who is responsible for what. Local people do not think that officials and decision makers take accountability seriously, as they answer to higher levels of government. There is no evidence that decision makers want to be more accountable for their decisions.

Participation: Only the village leaders are involved in decision-making at the township level. Villages wish that their representatives could participate more in decision-making. However, 89% of key informants said that, from the perspective of most local leaders and officials, there is little or no need for local participation by the villagers. Institutionally in China there are very few channels for community participation in water governance. For instance, in October 2014, a counselling workshop was held in Lijiang about the water crisis, but the participants were still only people from the water bureaus in Lijiang and the provincial government.

Equitability: While water governance within a given community appears to be equitable, water governance between the levels of political decision-making is inequitable. Water is allocated to Lijiang City for urban development and tourism and the compensation for local people is set by officials without local input. All major cross-scale decisions are top down. Even local village leaders are simply informed about decisions once they have already been made.

Rule of law: Rule of law is poorly implemented in Lijiang. For instance, although deep-water wells are illegal, many are constructed by wealthy people and high-level officials.

Conflict management: Conflict over water related issues is managed by the village group or village committee. If a conflict is unable to be resolved at the village level, it is referred to the township government, then to the district, and finally to the city level. More than 95% of conflicts are resolved at the village or township level. The village committee manages water related issues at the village level. Issues that demand large-scale (watershed-level) management are difficult to solve in this hierarchical manner, particularly given the lack of cooperation among agencies responsible for water.

Discussion: Improving water governance needs political will

The results of this study reveal that, although there is a clear need for more government support for better water governance, the current government appears to have little interest in moving away from the highly-centralized water management system in Lijiang. Moreover, local people are buffered from the immediate negative impacts of change by relatively high household incomes, government financial support, and good technical capacity (Zheng et al. 2014). Yet government transparency, along with peoples' participation in decision-making processes, remains very low. At present, there are few leverage points from which to build more effective water governance. The city water bureau, flush with funding from Beijing and the provincial government, is mainly interested in infrastructure construction and technology improvement (hardware). To make progress, it may be better to work with the city and provincial financial departments, which provide funds to the water bureaus.

There may also be room for change around climate policy. According to the Vice Minister of Water Resources, China is adopting new approaches to deal with climate and water issues, which include improving water allocation; more integrated water management; accelerating the construction of water diversion projects; developing more hydropower; and promoting science and technology for more efficient water usage. However, these solutions are mostly technical and do little to address the need to enhance participation and institutional capacity for better water governance.

The problems with water governance in Lijiang are not amenable to technical, scientific solutions. Local people simply do not have enough access to information or decision making due to inequities in political, social, and economic power. These issues reflect political and social barriers, the resolution of which requires political influence. Solutions must be based on actions that stand a chance of being implemented at the local and higher levels of government. It would be helpful if the government understood how allowing open information exchange and more local leadership could be of value. Another study in China (Guo et al. 2014) has shown that change toward good water governance is stimulated when supportive leaders are operating on at least two administrative levels. Yet, paradoxically, while the current government shows little interest in a transition toward more participatory water governance, the nature of politics in China is such that change can occur relatively quickly and funding and technical capacity are no barrier to reform.

Lessons

Improving water resource management is a long-term task requiring a holistic approach with continuous effort. But how can government interest in good water governance be stimulated? First, it is important to understand where government agencies are positioned on cooperation, support for local participation, open information exchange, and other characteristics of good governance. While it may be that institutional and legal fragmentation leading to poor governance are rooted in lack of 'capacity', these issues are often a consequence of explicit state development goals and strategies (Suhardiman and Giordano 2014).

Second, strategies to improve water governance must be evaluated through the power relations, institutional capacities, and development visions that drive change. Although IWRM has been the standard bearer for building more effective water governance, a limitation of this approach is that it does not highlight the politics behind decision making (Gain et al. 2013). It may be better to emphasize general holistic systems thinking, provided that such thinking captures the values and politics embedded in decisions around water.

Third, research that does not account for unruly politics and institutional disincentives to change is unlikely to influence decision makers. Therefore, research results need to be communicated in a clear, culturally-sensitive manner to a variety of audiences, including local people, decision makers, donors, NGOs, and scientists (Ross and Berkes 2013).

Finally, there are some opportunities to improve water governance through local action. Multi-community, multi-scale, and multi-organizational linkages that bring in new perspectives on water governance and climate change must be promoted. At the same time, respecting customary water tenure, traditional ecological knowledge, and cultural values is key. Better water governance is not just about open communication; it involves good communication among multiple actors.

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