Working Papers

Mobilizing Hybrid Knowledge for More Effective Water Governance in the Asian Highlands

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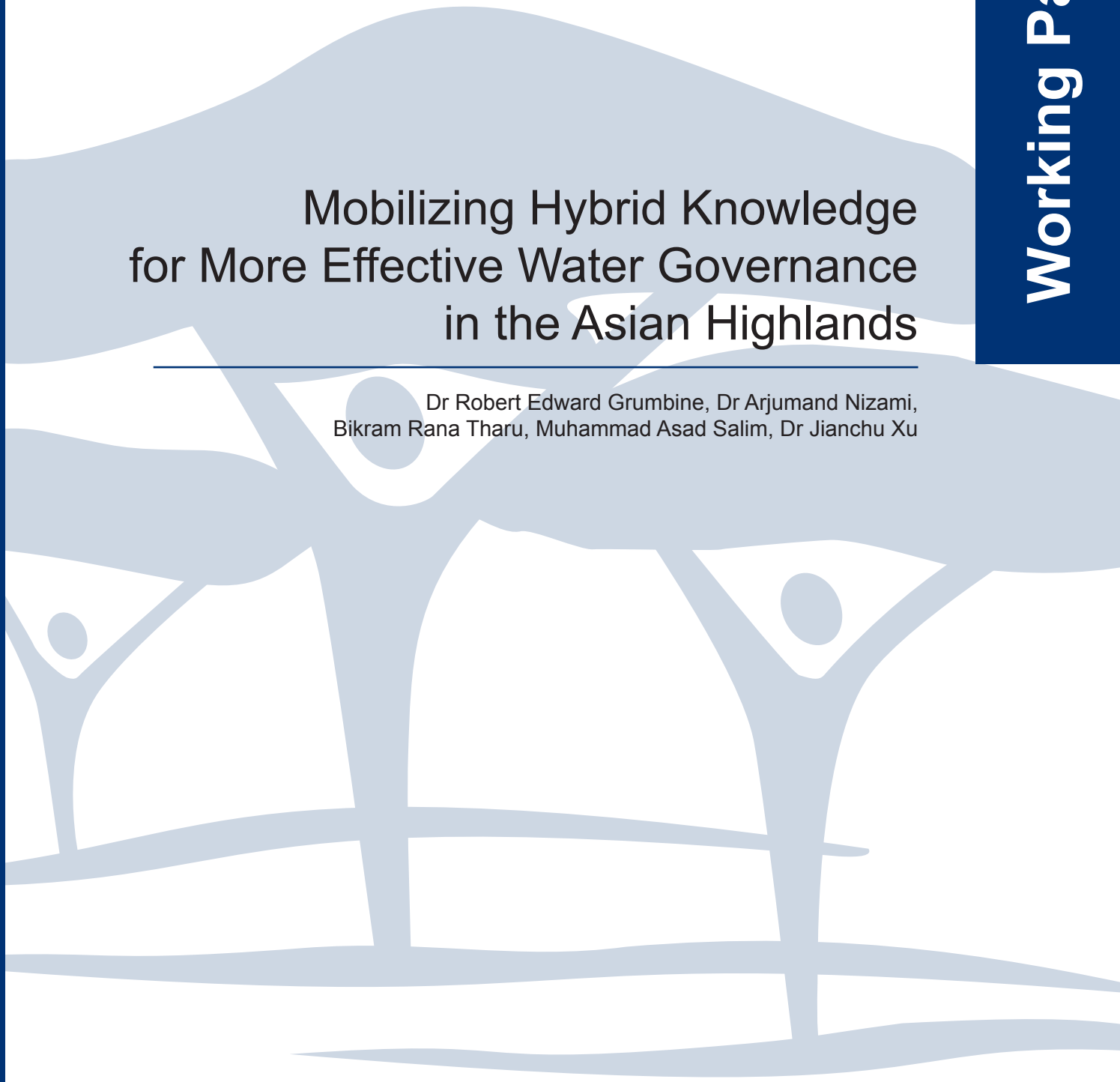

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Abstract

Climate is increasingly impacting water availability in the Asian Highlands, but it is not the sole driver of change. Socioeconomic drivers include regional population growth, ongoing needs for human development (infrastructure, clean water, sanitation), growing food insecurity, strong rural-urban migration resulting in changes in water allocation, as well as delivery and demand and increasing flows of cross-border, market-based goods and services. Highland dwellers experience both threats and opportunities from these transformations, yet many regional and local governments remain entrenched in styles of policymaking where citizen participation is low. Most research shows that it is imperative to move beyond traditional top-down approaches and engage highlands' people in order to better understand the biophysical and social drivers of vulnerability that may lead to resilient adaptations to change. Evidence is accumulating to show that Asian Highlands' communities are employing new blends of traditional knowledge, market access, and government program support. They are evolving hybrid forms of adaptive capacity where "bottom-up" behaviours are mixing with "top down" market signals and state development strategies. There are several region-specific elements from our research and that of others that would better support hybrid adaptations of villagers. Given that climate change impacts are projected to intensify, now is the best time to experiment with small-scale projects across the highlands' multiple cultures, sub-regions, elevation gradients and livelihood practices.

Keywords

Water Governance, Climate Change, Asian Highlands, Hybrid knowledge, local adaptation

Contents

Introduction

Over the past decade in the Asian Highlands–the vast mountainous area above 1 000 m.a.s.l. stretching from the Afghanistan/Pakistan border in the west to Yunnan, China in the east–the pace and magnitude of environmental and social change have been accelerating due to global warming and increasing rates of socio-economic transformation. This region, though poorly known scientifically, includes the Himalayan massif and the Tibetan Plateau, and is of global significance. Often referred to as Asia's "Water Tower", it is the source of most of the major rivers of Asia whose waters sustain about 19% of the worlds' people (Pandit et al 2014; Xu et al 2009).

Climate change in the Asian Highlands is already imposing biophysical impacts on water resources. The region has been warming at greater than global average rates (Hijioka et al 2014), and projections indicate continuing increases in temperatures by 2-4 °C into the 2050s (Zomer et al 2014). Despite much regional variation and uncertainty, rising temperatures and associated changes in precipitation and evaporation are projected to lead to reductions in soil moisture, river flow, permafrost, glacial mass, and groundwater, along with increasing occurrences of extreme weather events including floods and storms. By mid-century and beyond, these climatic changes may spur widespread and unprecedented ecosystem "regime shifts" where shrublands replace grasslands and forest species shift to higher elevations (Xu and Grumbine 2014). These shifts will likely lead to impacts on local people who depend on water resources and ecosystem services and have a low capacity to deal with current climate change.

Climate is increasingly impacting water availability in the Asian Highlands, but it is not the sole driver of change. Socioeconomic pressures on water and other resources are also growing. Drivers include regional population growth, ongoing needs for human development (infrastructure, clean water, sanitation), growing food insecurity, strong rural-urban migration resulting in changes in water allocation, as well as delivery and demand and increasing flows of cross-border, market-based goods and services. Highland dwellers experience both threats and opportunities from these transformations, even as developments are often poorly planned and implemented (Gupta 2014). In addition, about half of the 170 million people living in the highlands are poor (Chaudhary et al 2012). Many inhabitants, particularly women and minorities, face disproportionate vulnerabilities. In the past, people in the region adapted to climate and social variability through diverse forms of mobility, storage, and communal pooling of natural resources. However, todays' private and state-sponsored economic integration has meant that regional and global markets, which local people are little able to influence, increasingly affect villagers' community-oriented livelihoods. Most regional and local governments remain entrenched in styles of policymaking where citizen participation is low, particularly in remote high-altitude areas and with people from lower socio-economic classes. Yet, most research shows that it is imperative to move beyond traditional top-down approaches and engage highlands' people in order to better understand linkages between biophysical and social drivers of vulnerability that may lead to resilient adaptations to change.

Social, political, and biophysical constraints on local peoples' participation in decision making are also manifest in a lack of regional upstream/downstream discussion of water resource issues. There is considerable research available that spotlights the benefits of: integrated analysis, planning, and problem solving; institutional interplay that supports environmental protection and social policy development upstream, downstream, and across national borders; and adaptive governance to bolster responses to climate change. In the Asian Highlands, however, little of this information has been accessed or employed. The consequences are a region that is stratified by political and social inequity as well as stressed by climate change and poorly managed development.

Building Hybrid Knowledge

Limited understanding about climate change impacts on water resources; vulnerability of Asian Highlands' people to ongoing change; lack of participatory dialogue across upstream and downstream stakeholder groups; low political capacity to employ integrated frameworks for regional security–these are problems demanding solutions. How have local people in the highlands responded?

For centuries, people have employed flexible systems for foraging and farming, trade, maintaining cultural identity, food security, and protecting genetic diversity using local knowledge and social networks such as "bio-cultural refugia" (Barthel et al 2013). However, over the last decade or so, evidence is accumulating to show that Asian Highlands' communities are employing new blends of traditional knowledge, market access, and government programme support (for a review, see Xu and Grumbine 2014). They are evolving hybrid forms of adaptive capacity where "bottom-up" behaviours are mixing with "top down" market signals and state development strategies in various, location-specific blends. People are rearranging their livelihoods to include more dependence on state-sponsored infrastructure, market information, services and remuneration, financial credit, extension services, and meteorological information. Of course, people have not necessarily given up traditional practices, but they have added in more market and state support to reduce local risks and increase adaptive capacity.

Here is what we discovered about the most common forms of village-level hybrid adaptation from a survey of published research across the region, as well as observations at our three field sites in China, Nepal, and Pakistan (countries where research was done in parenthesis; specific references in Xu and Grumbine 2014):

- Changing crop varieties/planting timing and patterns/substituting traditional plant varieties for cash crops (all countries).
- Adjusting grazing timing/duration in response to government mandates (China).
- Reducing livestock and shifting grazing grounds in favor of planting trees (Pakistan, China).
- Diversifying means of livelihoods away from farming (all countries).
- Purchasing more outside commodities with cash (all countries).
- Pursuing seasonal out-migration for cash jobs, particularly among young men (China, Nepal, Pakistan, India).
- Engaging in various partnerships with NGOs and the government to strengthen forest and rangeland protection (Bhutan, Nepal).
- Working in partnerships with NGOs and the government to create disaster risk management plans (Nepal, Pakistan, Bhutan).
- Supporting climate change education facilitated by outside experts in local schools (Nepal, India).

As outside forces have become more powerful drivers of change, local people understand that they may not have the insights and abilities to adjust on their own. They recognize that traditional knowledge is not sufficient as the sole means to support ongoing adjustment to climate and social change (Brunner and Lynch 2010). In particular, local knowledge is limited to applying short-term measures and there is very little capacity for adjustment on a long-term basis.

Scholars also observe three important trends related to the evolution of hybrid knowledge. The first is that adaptation behaviours based on local knowledge may be losing their effectiveness; some observers suggest that local climate adaptations may be inadequate to deal with projected future magnitudes of change (Lebel 2012). The second is that the development of hybrid knowledge challenges the conventional wisdom that solving natural resource issues requires rational actors to behave selfishly. However, many of the processes resulting in blends of knowledge that we read about in the literature and witnessed at our study sites were partially dependent on trust, cooperation and had roots in social preferences, community norms, and individual reputation (see Janssen 2015). Third, development of hybrid knowledge in the highlands is similar to–but not the same as–that occurring in other global regions where multiple actors "co-produce" new adaptations by design (Alexander et al 2010, Armitage et al 2011). In the Asian Highlands, such co-production is mostly generated in reaction to events without much foresight or planning. Why is this so? We observe that highlands people are developing hybrid adaptations because they live on the ground where changes are occurring and, other than out-migration, they have little choice except to adjust as best they can.

Barriers to Hybrid Adaptation

Even as hybrid knowledge appears increasingly essential to local climate change adaptation, the global (see Lemos 2015) and regional literature, as well as our research results, reveal evidence of a lack of government support for locally-based adaptation. Examples from around the region abound:

> In western China, herders' ability to use local knowledge to adapt to climate change is constrained by top-down, central government rangeland reform programmes (Cao et al 2013). These programmes Iimit the use of incentives to reward good stewardship and constrain herders' ability to organize (Wang 2014). In some areas, after herders were resettled, livelihood and water security decreased (Fang 2013).

In Nepal, ongoing government instability is so pervasive that, even with state-sanctioned national climate action plans that specifically endorse local knowledge, officials have little capacity to support climate adaptation in villages (Bartlett et al 2010; Regmi and Bhandari 2012). There are also barriers that are not due to state behaviour: in socially stratified Nepal, social barriers to adaptation also exist (Jones and Boyd 2011). And outside donor goals and operating procedures can undercut local adaptation (Biggs et al 2013).

In Pakistan, even as local people are increasingly unable to predict crop planting periods, government agricultural extension agents appear unable to cope with the pace of climate-induced change (Bulkeley et al 2014). As in Nepal, local knowledge of water resources and climate vulnerabilities has not yet been integrated into development planning (Joshi et al 2014). Regional government officials are responding to more frequent extreme weather events by spending larger sums on relief and rehabilitation after the fact; support for less costly, up front disaster risk planning is lacking (Jones et al 2014). In India, stakeholder engagement has been shown to increase effectiveness in assessing local water and climate vulnerabilities (Bhadwal et al 2013). But, even in democratic India, it remains uncommon to see government support for local participation, for example, in hydropower development (see Grumbine and Pandit 2013).

These examples of barriers to hybrid knowledge show that, even as mountain people gain benefits from an expanding array of strategies, new, local-level water and climate change adaptation efforts often remain ad hoc, with inadequate state support. There is an irony here: in many places in the Asian Highlands, poorly educated local people with little scientific training, poor access to extension services, and less political power are contributing to efforts to adjust to changing conditions, while educated political decision makers and experts in positions of authority often create barriers to change. The question is, how can this situation be changed?

Strengthening Support for Hybrid Adaptation

Since at least the mid-2000s, research has shown that linking local and expert knowledge based on citizen participation, community-based learning, and targeted use of scientific information that is communicated in a culturally-sensitive way can lead to more robust adaptation responses (Moser and Dilling 2007). Current efforts in the Asian Highlands speak of "mainstreaming" adaptive knowledge into state development decision making, but why would this happen now if it has not been supported before? What can past failures teach us about how to move forward in the future with mobilizing support for hybrid adaptation?

From our work at our three study sites and a review of efforts around the highlands, we believe that there are two essential elements at play–one general, one specific–that must be addressed to move hybrid knowledge forward. The general element is cultivating awareness of the politics of regional and local change. The crux of the problem, noted in virtually every study, is that, at most levels of government, cross-sector coordination and integration of science with local hybrid knowledge remains low. This is true in regional upstream/downstream water governance, in specific project-level work, and in resource management actions around each driver of change mentioned in this paper. Many people believe this lack of coordination exists due to "limited capacity" in technological and institutional expertise and this has led donors and NGOs to assume that more data from more studies will lead to better decision making (Suhardiman and Giordano 2014). But lack of integration and coordination are also products of highland political decisions made by leaders who often appear satisfied with the status quo.

Long-standing political and power inequities mark the Asian Highlands (Scott 2010); better governance cannot be secured through better science alone. Donors, NGOs and other experts need to realize this and position their efforts within a more nuanced and strategic understanding of the political incentives that drive decision making at their project sites and in the region. One general way to do this is to frame support for hybrid knowledge, increased coordination and citizen participation through benefit-sharing that can result in win-win ecosystem protection and economic development for local people, states, and the region (Price 2014). Another way is to take politics into account in early stages of project design and not initiate work as if inequalities and barriers to change don't exist. Reform of cultural and political norms is slow and goes beyond any specific research effort; projects that invest in understanding local and regional political incentives will be better positioned to contribute to incremental progress.

There are several region-specific elements from our research and that of others that would better support hybrid adaptations of villagers in the highlands. First, the water use master planning framework (Rautanen et al 2014) that we used in Nepal has been successful at bringing villagers and local officials together to discuss how to manage local water sources. The central government is now debating whether and how to support more use of this valuable participatory planning tool and it certainly could be exported beyond Nepal. In fact, our Pakistani partners are now mobilizing water use master planning to engage villagers and government departments in their project area in the Khyber Pakhtunkhwa Province. This is creating a multi-level interface on water governance with provisions to combine local knowledge and experience and experts' recommendations.

Second, assessing village-level vulnerability is critical to do at early stages of any research that aims at supporting hybrid knowledge. There are numerous tools with which to accomplish this; building on the experience of our Pakistan partners, we used the Community-based Risk Screening Tool-Adaptation and Livelihoods (CRiSTAL) for hazard and vulnerability risk assessment at all three sites in our study. CRiSTAL is based on the understanding that only if both policy makers and communities are familiar with local natural hazards and vulnerabilities can preventive solutions be sustainable and effective. Working with partners, we now have an opportunity to use CRiSTAL in the first meta-study of vulnerability and risk across the Asian Highlands.

Third, scientific information can play a more prominent role in village-level planning, but it needs to be communicated in a more intelligent, simple, and culturally-sensitive fashion (Hussain and Hussain 2013). Villager livelihoods are often carbon-negative and their insights into local ecological conditions contribute to expert knowledge (Salick 2014); the barriers here mostly involve social norms that scientists interested in implementation can learn to be aware of (Haenn et al 2014). Scientists, in their communication activities, need to de-emphasize long-term consequences of, say, climate impacts, and focus more on short- and medium-term actions that local people can participate in (Chapman 2014). As part of this approach, we envision an "ecologized" hybrid knowledge with traditional knowledge linked more specifically to biodiversity conservation. Up until now, such efforts have been rare since most people working on local planning are development experts, local people, and village officials with few conservation scientists involved.

To address potential regime shifts, land-use and agricultural drivers of change in the Asian Highlands, we advocate the development of climate-smart landscape linkages. "Climate-smart" means working with local people to optimize the climate mitigation and adaptation potential for their agricultural lands combined with connecting wildlife habitat through landscape linkages (Harvey et al 2014). These linkages could help plants and animals track climate-induced range shifts and help maintain the ecological processes that deliver ecosystem services to local people. So far, this type of "mixed-use" conservation planning that features integration of biodiversity and development goals has only been experimented with in Bhutan (Wildlife Conservation Division 2010), though similar efforts are underway in the Mt. Kailash area of Pakistan, Nepal, and China (Chettri et al 2012).

A fourth way to mobilize hybrid knowledge is through increasing state support for agricultural extension services. At our study sites, we found little evidence that formal service providers (government departments and researchers) regularly extend their support to communities to help them adapt to climate change. Communities are mostly on their own. However, a benefit of global infrastructure reaching highlands communities is communications connections such as access to online agro-meteorology services. Again, however, social values serve as an "enormous challenge" to

the use of technology since government extension agents don't often view villagers as collaborators (Balaji et al 2014, p. 21). In addition, service providers themselves are often not well-educated on how to introduce adaptation to water risks and climate change. Most efforts are not institutionalized into the normal functioning of government departments. We did find that some agents are aware of the magnitude and implications of global change at the local level, but they lacked the training and policy mandate to support the hybrid knowledge-based coping actions of local people in specific situations. Given the history of these issues in the highlands, we expect that investment in multi-stakeholder partnerships that go beyond binary government/villager collaboration to include NGOs and private parties may help to open up all participants to change.

Another strategy has been employed by our partners in Pakistan working in the INGO Intercooperation using disaster risk reduction planning as a tool to open up development processes to active participation by villagers (Nizami et al 2009). In the Asian Highlands, water appears to be the single most important factor for both the vulnerability and well-being of local people. For risk reduction, as in water use master plans, government departments can learn from communities through the documentation of customary and de jure knowledge related to water management. Problems with disaster risk planning in Pakistan and Nepal stem less from local peoples' contributions and more from inadequate government efforts; for example, climate change and monitoring of results are not included in Pakistan's disaster planning framework (Ahmad et al 2014). Yet the obvious needs and benefits to both communities and the state that result from this work, combined with its low cost, make this a high priority for future work.

Supporting a diverse mix of livelihood strategies in the highlands is a fifth way to mobilize hybrid knowledge and is recommended by almost all researchers who are focused on villager vulnerability to change (Nizami and Robledo 2010). Here again, villagers have taken the lead as they look for multiple ways of adapting to change while governments often pursue rigid programmatic goals. In our experience, this is where an understanding of local politics can help. For example, in Pakistan and Nepal, there is often more room to accommodate a diversity of livelihood strategies while local and regional governments in China are more inflexible (Zheng and Byg 2014). One size does not fit all situations in a region as vast as the highlands.

Understanding the role of women is a sixth specific way to support the mobilization of hybrid knowledge. In Pakistan and Nepal (less so in China), women are increasingly becoming custodians of local knowledge around land use change, water management, disasters, and coping strategies to respond to agricultural impacts. This is mainly due to the part- or full-time migration of men away from home villages to seek cash employment which, in turn, is triggered increasingly by higher levels of climate-related risk that negatively impacts household livelihoods (Banerjee et al 2012). Assuming this trend continues, its influence will grow to affect virtually all aspects of how support for hybrid knowledge can be generated especially with the still extremely-limited exchanges between women and scientists. Even more challenging is acceptance of women's participation as leaders on matters of livelihood coping strategies. This development challenge brings us to question how to shift local behaviour from coping to long-term adaptation to climate change.

The Future of Hybrid Knowledge

Given the entrenched political and cultural barriers to mobilizing hybrid forms of knowledge, we do not see easy prospects for rapid local responses to global change in the Asian Highlands. After all, climate change adaptation is a relatively new sector in the highlands and understanding, awareness, and capacities are still growing. Yet, evidence is everywhere that linking local people, government workers, researchers, and NGO experts to participate in projects can lead to greater success and reduced vulnerability. Although implementation is slow, climate-smart upstream/downstream ecological planning, the evolution of local-level hybrid climate adaptations with a biodiversity conservation component and a more savvy focus by donors and outside experts on the critical role of governance in decision making are all signals of positive change.

Work from the highlands of China (Fu et al 2012) and Nepal (Amaru et al 2012) shows that local governments can be key actors to support resilient adaptation since they are in a position where they can mediate between central authorities' (often narrow) concerns and local community realities. Focusing work on bottom-up, local-level projects is likely to yield benefits faster than attempts to influence policy making at higher levels in the highlands (Simon and Scheimer 2015). The question then becomes how to scale up local-level successes and spread them widely, something that often cannot be done without state involvement.

Since Asian Highland countries will continue to be saddled with low capacity for integrated decision making and poor governance that constrains hybrid knowledge-based adaptation, the tools we offer here will only go so far as to nudge support for hybrid knowledge forward. In other parts of the world, many approaches are being experimented with that seek to integrate traditional knowledge with scientific information, increase information transparency, stimulate community learning about water and climate issues, and are adaptable to multi-stakeholder settings (for one example, see Webler et al 2014). However, given that climate change impacts are projected to intensify, now is the best time to experiment with small-scale projects across the highlands' multiple cultures, sub regions, elevation gradients and livelihood practices. We need to discover what works and what does not work among many local practices and political arrangements.

One lesson that we have learned from our work in the Asian Highlands: human livelihoods, nature conservation, and ecosystem resiliency are different facets of one relationship. Given that healthy, functioning ecosystems provide the services that allow people to respond to change, both people and nature will be at increased risk until more effort is expended on integrating local responses to change with state programmes for development and conservation.

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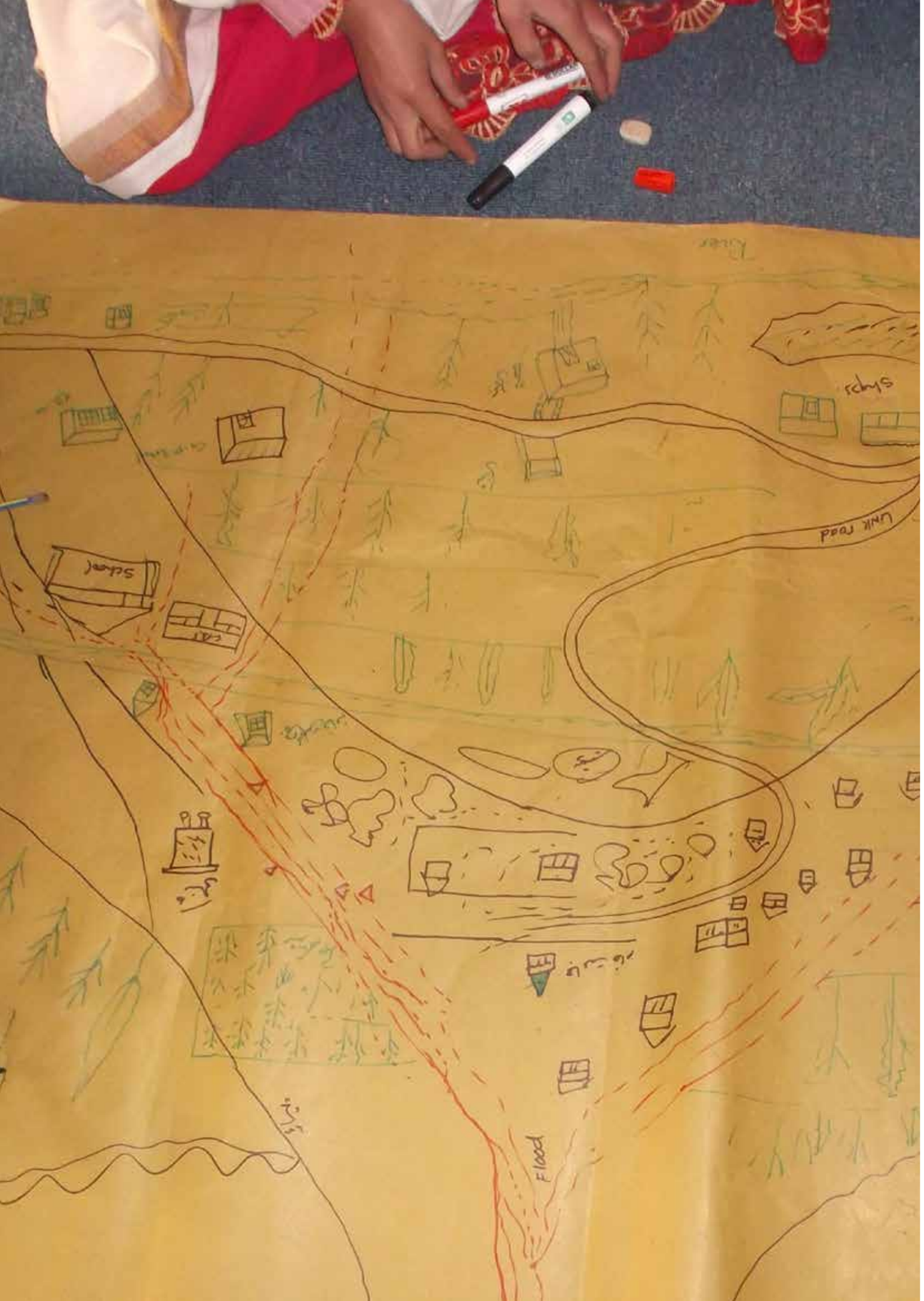

The World Agroforestry Centre is an autonomous, non-profit research organization whose vision is a rural transformation in the developing world as smallholder households increase their use of trees in agricultural landscapes to improve food security, nutrition, income, health, shelter, social cohesion, energy resources and environmental sustainability. The Centre generates science-based knowledge about the diverse roles that trees play in agricultural landscapes, and uses its research to advance policies and practices, and their implementation that benefit the poor and the environment. It aims to ensure that all this is achieved by enhancing the quality of its science work, increasing operational efficiency, building and maintaining strong partnerships, accelerating the use and impact of its research, and promoting greater cohesion, interdependence and alignment within the organization.

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