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The Challenges of Inclusive Cross-Scale Collective Action in Watersheds

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Abstract: *Increasing attention to watershed management is part of an international policy trend toward integrated water resource management. Integration is multidimensional–across sectors, administrative regions, ministerial portfolios and levels of hydrologic structure and socioeconomic organization. Collective action is key. Individuals need to work effectively together to share common water points; upstream land users and downstream water consumers need to manage and resolve potential conflicts over water quantity and quality, while all the industries, farming communities, urban residents and public agencies that have interests in resource use and environmental quality need to agree on development and conservation objectives and approaches at the basin level. Initiatives that seek to foster collective action in watersheds need to account for the very different interests in water and watershed management. While there may be relatively straightforward ways to foster collective action at a local scale, some forms of collective action may, in fact, be detrimental to other stakeholders. In the developing world in particular, there are often geographic pockets and social groups that are chronically disadvantaged in collective and public processes. Water-users' associations and basin authorities may exacerbate these disparities and further marginalize already poor people. New statutory institutions may intentionally or inadvertently disempower effective customary local institutions. To enable project and program designers to address these challenges better, this paper lays out a framework for assessing the potential for, and implications of, individual and collective decisions in a watershed context. The framework integrates concepts drawn from the biophysical and social sciences, including new perspectives on watershed components, poverty, and collective action. Collective action is seen as a fractal process: collective action for water management at one level of social-spatial organization can have spillover effects at lower and higher levels of social-spatial resolution. To be pro-poor, watershed-management institutions must be genuinely inclusive, deliberately recognizing the interests, perspectives and knowledge of groups that may be systematically excluded from other political and social processes. Researchers, evaluators, watershed-management practitioners and others who apply the framework should be better placed to lay the foundations for that illusive goal: pro-poor, inclusive and resource-conserving development.*

Keywords: *Watershed management, Collective action, Scale, Action resources, Developing countries, Integrated water resource management*

Introduction

The increasing emphasis on watershed management in many developing countries is being fueled by four related concerns: (i) environmental degradation, particularly soil erosion and loss of hydrologic buffering in upstream areas, which have negative consequences in downstream areas; (ii) changes in settlement patterns that expose greater numbers of downstream residents to fluctuations in stream flow; (iii) increasing demands for limited supplies of water, in both upstream and downstream areas; and (iv) alleviating poverty, which tends to be clustered in particular locations within watersheds. In this context, attention within watershed-management programs is shifting from technical interventions to more integrated approaches, with particular attention to social issues (Hinchcliffe et al., 1999; Farrington et al., 2000; Hooper 2005; Sabatier et al. 2005). Particularly in South Asia, watershed programs are often promoted as being automatically pro-poor. However, a more critical examination of the evidence reveals that watershed-management approaches do not automatically deliver environmental benefits or poverty reduction.

As more and more watershed-management programs are put in place, both researchers and program designers increasingly recognize that collective action is key for watershed management. Emphasis was initially placed on local collective action. Pretty and Ward (2001) estimate that during the 1990s, some 30,000 watershed and catchment management organizations were formed in India, 3000 more in Kenya, and 3000-5000 water-harvesting groups were formed in Burkina Faso and Niger. At the same time, there are over 1500 river basin initiatives in the United States (Lant, 1999). To support greater community involvement in water resource management, water laws in Africa, Latin America and elsewhere are being reformed to give greater authority to water-users associations and multi-stakeholder water-management authorities (Wester et al., 2003). The need for other forms of collective action is now being recognized. Government agencies responsible for water management are coordinating with agencies responsible for forestry, land, agriculture, industry and environmental management (Hooper 2005). Local authorities and private firms that supply drinking water and hydropower are engaging with upland resource users, whose actions affect the continuity and quality of their products.

Watershed-management programs are a reflection of a broader policy movement toward integrated water resource management (IWRM),[1] which has been espoused by many countries and international organizations, including a commitment at the World Summit on Sustainable Development for all countries to develop IWRM plans (Global Water Partnership, 2000). Integration refers to integrating management of resources: land and water, surface water and groundwater, water in inland and coastal areas, and giving balanced attention to water quantity and quality. In IWRM approaches, the catchment or river basin becomes the basic unit for watershed management, implying the need for management systems that link local levels up to whole basin levels, even where river basins span national boundaries. Integrated management calls for coordination across all water uses and users, including supplies for domestic uses, agriculture, industry and maintenance of environmental function. IWRM approaches also imply the need for coordination across government agencies and stakeholder participation at all levels. To achieve the goals of more efficient and equitable use of water resources, IWRM programs should include technical interventions, reforms of water rights legislation and institutional structures that coordinate uses and users at the different nested levels, from subcatchment to river basin. The Global Water Partnership and Cap-Net are international networks that promote IWRM (www.gwpforum.org; www.cap-net.org).

Integrating water resource management requires a high degree of collective action—individuals or groups working together toward common objectives—across many different levels of social-spatial aggregation. Although some components of watershed management, such as contour plowing or vegetative barriers, can be applied by individuals on single farms, most operate across individual units, requiring some form of

1 This is similar to what Hooper et al. (1999) refer to as integrated resource and environmental management (IREM); Hooper (2005) uses the term integrated river basin governance (IRBG).

collective action. This can include: small groups of households coming together to manage water points or control localized erosion; communities developing domestic water-supply systems or enforcing restrictions on grazing or forest extraction; and intra-community cooperation on sharing stream flows or restricting pesticide use to protect water quality. IWRM also calls for collective action among different actors and interests occupying different regions in the watershed, given that water and soil flows mean that the actions of one group of users may have consequences for other users living in different zones, typically downstream. Coordination is necessary among different entities of the state that have policymaking, planning and authority functions, and ultimately, IWRM of trans-boundary river basins even calls for collective action among countries. Many facets of IWRM also call for cooperation between farmers and outside government or nongovernmental organizations.

This greater commitment to collective action is driven partly by (i) failures of more top-down unilateral approaches, (ii) the attention given to successful cases, and (iii) trends toward decentralization of administration and devolution of authority for natural resource management. Experience shows, however, that inclusive, multi-scale, collective action for watershed management is an illusive goal. Biggs (2001), who studied watershed management in the wheat-sheep belt of New South Wales (Australia), concluded that there was very little effective coordination between regional-level planning of catchment resources and local-level implementation by individual farmers and landcare groups. She traces the problem to lack of the following: inter-scale connections, understanding of hydrologic connections, and investment in appropriate human and financial resources. "The most urgent need is for a structure, involving people, to link catchment management with on-ground rehabilitation at the scales at which landscape processes, biota and humans operate" (p. 32).

Wester et al. (2003) suggest that these challenges are greater in developing countries where public sector resources are more constraining and differences in power are often deeply ingrained. "For countries where implementing even local-level reforms strains the financial and implementation capacities, trying to reform river-basin management is difficult indeed. The political economy of such reforms is daunting, with strong vested interests and weak institutions affecting the capacity of urban and rural poor and small-scale farmers to gain a voice in water management" (p. 798). Studies of concerted efforts to institute multi-scale watershed management in Mexico and South Africa indicate that imbalances in power and histories of social exclusion can be addressed only through explicit and sustained efforts to redistribute power and resources to disadvantaged groups within the basins. A major challenge for cross-scale collective action in the developing world is the gap that often exists between statutory water laws and customary institutions (see van Koppen, forthcoming).

Most watershed management in developing countries has stated objectives to enhance collective action and reduce poverty, however, experience shows that collective action in water resource and watershed management among particular groups in a watershed may or may not support the goals of poverty reduction and social inclusion across the entirety of a watershed. Water-user groups may give privilege to particular subgroups of users or particular types of water use. Indeed, in some circumstances high apparent success by a water-users' association may obscure or even exacerbate exclusion of women and other marginalized social groups such as pastoralists (Ahluwalia, 1997; Kerr, 2002). Multi-stakeholder water-management authorities may enhance the power and influence of principal interest groups. Poorer groups may lack the resources, knowledge or individual incentives to participate in those authorities. Local authorities responsible for different parts of a catchment or river basin may have different incentives, values, capabilities and accountability to engage with watershed-management institutions. Political factors and competing objectives may also obscure incentives away from poverty reduction and environmental goals toward productive uses that primarily benefit the interests of wealthier groups. Programs designed to promote resource conservation may be based on misunderstandings in temporal and spatial relations between land use and hydrology.

This paper explores the ambiguous relations between collective action, poverty and scale in watershed management in developing countries. A

conceptual framework is presented for analyzing inclusive multilevel collective action in watersheds. It lays out the key factors and interrelationships in a manner that can bring together people with diverse perspectives (research and practice, as well as different disciplines). There are many studies that address or model the biophysical relationships in watersheds (e.g. Schreier and Brown 2001; Beven et al. 1995; Boll et al. 1998; Lyon et al. 2004); many others examine the organizational arrangements, especially for public participation and collaboration with government agencies (e.g. Born and Genskow 1999; Hooper 2005; Hooper et al. 1999; Imperial 2004). Sabatier et al. (2005) present a framework that includes ecological, socioeconomic, and government conditions as an explanatory factor in the outcomes of collaborative watershed processes in the United States, but does not deal explicitly with scale issues, Hooper's (2005) study of basin governance organizations in the South and North lays out differences at the macro, meso, and micro levels, and discusses "best practice" in basin governance in terms of the enabling environment, institutions and capacity building, and management instruments. Our purpose here is not to replicate these types of studies, but rather to provide a conceptual framework to bridge the gap between the biophysical and institutional, with explicit links between different scales and parts of watersheds. Because of our concern within the context of developing countries, particular attention is given to the implications of watershed management processes for poverty reduction and the inclusion of marginalized groups.

The framework can be useful to: researchers and research analysts who want to inform policy and program design; to reviewers who are undertaking assessments of watershed-management policies and institutions; and to those involved in the design and implementation of both pilot projects and larger scale programs. The framework is inspired by developing-country watershed contexts such as those commonly found in South and Southeast Asia, East Africa, and Central and South America, although it may also be relevant to some developed-country situations. The framework will be useful for guiding research on collective action in watershed management and for suggesting principles for the design or reform of watershed-management institutions.

The remainder of this paper is comprised of three main sections. Section 2 presents a new model of multi-scale collective action in watersheds that highlights key issues affecting collective action within and across scales. Section 3 uses the framework in an analysis of the links between water and poverty in a watershed context, while Section 4 uses the framework to discuss multi-scale collective action. Section 5 concludes with recommendations for researchers and practitioners.

Conceptual framework for analyzing collective action across scales in watersheds

General model of biophysical and social interactions in watershed

Figure 1 presents a conceptual model of multi-scale interactions in upper watersheds. Loosely following Molden et al. (2001), the watershed is divided into five hydronomic zones: headwater ecosystems, uplands, midlands, lowlands and lowland ecosystem. It is assumed that people live, interact and earn livelihoods in three of the zones– the upland, midland and lowland zones, while the other two zones are ecosystems that affect and are affected by water use in the other zones. Each of the human-dominated zones is described as a primary node: the upland, the midland and the lowland primary nodes. Each node is a locus of individual and collective actions that produces outcomes defined in terms of human welfare and modifications to water resources flowing to lower zones. Within each node, the interaction of technologies (including water storage), water, action resources (defined in Section 2.2 below) and institutions determines the combination of livelihood strategies pursued by individuals and households. An inclusive definition of institutions is used, including formal and informal rules, norms and trust relations that structure social interactions.

Besides the primary nodes of land and water users, the model also depicts secondary nodes that link the upland/midland and midland/lowland nodes. These secondary nodes represent arenas of negotiation, conflict and/or collective action among adjacent water users. Spanning these primary and secondary nodes are basin, national and international institutions governing

water, land and forest management. These institutions condition the nature of activity within each node as well as the upward and downward flows between zones. Together, these interactions determine the level and distribution of welfare across individuals in the three zones, as well as the environmental outcomes in the headwater and lowland ecosystems.

The relationships depicted in Figure 1 may be found at multiple levels of social-spatial aggregation in watersheds; from large transnational river basins on the one hand to small subcatchments on the other. Direct interactions are likely to be more important in the catchments of first order streams and smaller basins, while secondary and tertiary nodes are likely to be more important in the basins of higher order streams. Larger watersheds are likely to be comprised of a nested hierarchy of overland flow areas, first order stream catchments and higher order stream catchments. Through the lens of this conceptual framework, basins for higher order streams can also be thought of as comprising multiple watershed units that overlap in midland and/or lowland primary nodes.

The way that water is managed—defined as the deliberate manipulation of quantity, quality and timing of water—by individuals and groups in a given zone directly affects welfare in that zone. The direct links between water and welfare in different parts of watershed units are described in Section 3.1 below. Water management within a zone also influences livelihood options in lower zones indirectly through its effect on water 'transitions,' defined as changes in the quantity, quality or timing of water flows between hydronomic zones/nodes. Water transitions depend on water use and the biophysical characteristics of the catchments, as well as on technology and management practices of people in upland nodes.

Sources, sinks, lateral flows and filters are watershed components that may be small in terms of area but that have a disproportionate impact on water transitions (Van Noordwijk et al., 1998; Swallow et al., 2001). Sources are parts of a catchment that produce net amounts of water or soil that move around a landscape. Water sources are usually upland farming or forest areas that receive relatively large amounts of rainfall. Springs are point sources of water. Sediment and pollution sources may be relatively large farming areas (nonpoint sources) or particular point sources such as gulleys or industries. Sinks are parts of a catchment that accumulate net amounts of water, sediments or nutrients. Typical sinks are upland or lowland wetlands,

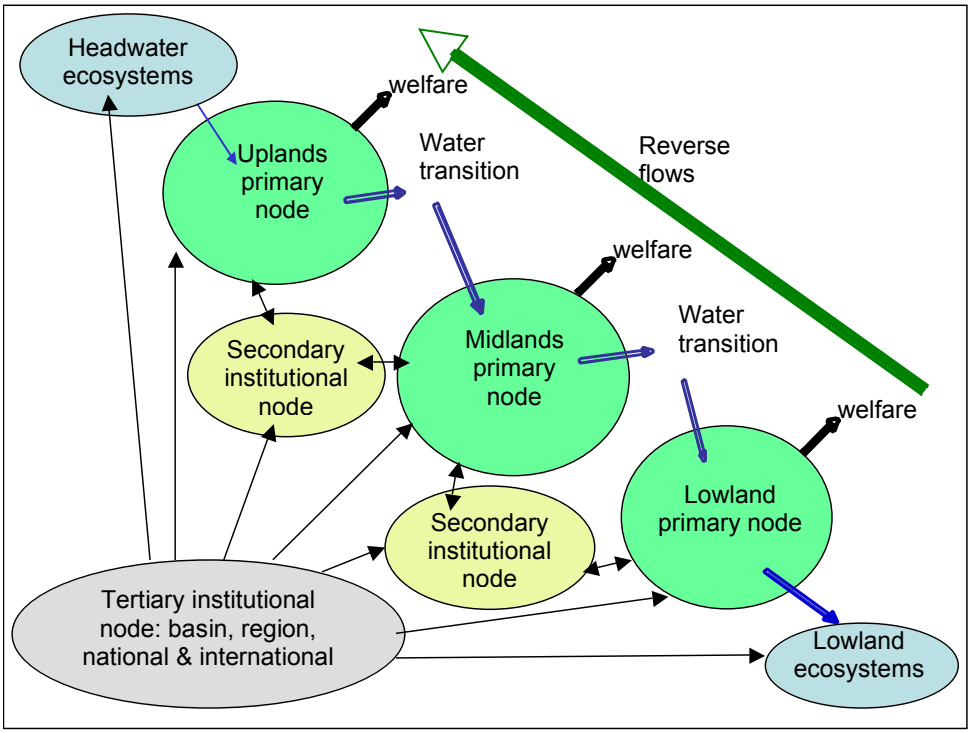

Figure 1. Conceptual model of multiscale interactions in watershed units.

forests, lakes and lowland paddy fields. Lateral flows describe the movements of water, organisms, smoke, nutrients and sediment across landscape units within a catchment. Some lateral flows; for example, water and soluble nutrients, may move relatively quickly; while others such as soil move slowly. Lateral flows tie landscape units and users together. Filters are landscape units that intercept or reduce the velocity of lateral flows; examples in watersheds are shelterbelts, fences, riparian areas and water pans. Filter elements can be easily overlooked because they typically occupy a small fraction of a watershed although they can have large impacts per unit area. Conserving or establishing filters to intervene in lateral flows may provide attractive options to mitigate the impacts of local decisions, compared with elimination of the 'root cause.'

The water transition from an upper to a lower node may have impacts on downstream water users, considered either positive (positive externalities) or negative (negative externalities) by downstream users. Individuals, groups and public agencies representing the interests of downstream residents may then take action to try to reduce or mitigate some types of water transitions or increase others. For example, downstream residents can negotiate directly with upstream residents to change their actions or make investments in upstream areas that affect the way land and water are used. Alternatively they can pressure the government to change land or water use regulations, or to invest in water-management infrastructure upstream. These actions on the part of downstream residents in response to water transitions can, in a sense, reverse some of the impacts of flows back upstream. These reverse flows can take a variety of forms, involving economic, social or political resources. Direct flows can range from cooperation and negotiation among upstream and downstream stakeholders to conflict and use of force. Reverse flows can also be mediated by some public agency as in the case of regulations, subsidies, taxes or public investments in water infrastructure.

Analyzing individual and collective action in a watershed context

Water transitions and reverse flows reflect the outcomes, intentional or not, of individual and collective decisions. Therefore, understanding the factors that shape those decisions is fundamental for watershed management. Any decision takes place in an action arena—a socially defined space composed of actors, action resources, institutions and actions (di Gregorio et al., 2004; Ostrom, 2005). A hydronomic zone may constitute an action arena, but there are many other action arenas in which decisions are made that are relevant to the water transitions and reverse flows in the watershed, ranging from a farmer's field to a government ministry. Action arenas may correspond loosely to hydrological scales, but are likely to overlap. Figure 2 presents a graphic depiction of the action arena within a primary watershed node. Action arenas also prevail at the levels of secondary and tertiary institutional nodes.

In a watershed context, actors are those who make decisions or take specific actions on water- or landscape-resource management such as farmers, livestock keepers, mining companies, municipal land-use planners, urban water suppliers or forest departments. Not all watershed stakeholders who are affected by the action are actors in that particular action arena. Indeed, an important aspect of watershed-management analysis is to consider which stakeholders are actors and which are not.

Action resources are the assets and personal characteristics that give actors the capability to take action or to influence the decisions of others. Assets include actors' rights to natural, physical and financial capital, as well as the social and human capital that they are able to draw upon. Personal characteristics such as leadership ability, charisma, ethnic origin, ideology or value systems are related to human and social capital, but are worth identifying separately because they go beyond the instrumental way in which assets are normally regarded; e.g., an ideology can influence one's own behavior or be used to create legitimacy or solidarity around a cause. It has been found, for example, that members of Protestant churches in Haiti were more likely than others to participate in watershed-management activities, even if they did not own land that would benefit, because of their notions of social solidarity and doing what is right.

Institutions, as defined previously, are "the decision-making arrangements (rules) or authority

relationships that specify *who* decides *what* in relation to *whom"* (Oakerson, 1992, emphasis in the original). The institutional structures, particularly the rules that come into play, shape the outcome of interactions. For example, land-use planning decisions made in a public meeting may be very different from those that must be passed by closed-ballot referendum.

Poverty and inclusion in a watershed context

The framework described above highlights different aspects of what it means to be poor. One aspect of poverty is clearly the lack of action resources, not just the tangible resources such as land and other physical assets, but also the less tangible human or social capacities that are particularly important for effective engagement with other actors in collective action. Exclusion from a particular action arena may also limit one's ability to exert influence over one's own destiny and hence would constitute the powerlessness dimension of poverty. The institutional arrangements that govern interactions within action arenas favor certain action resources over others. This section examines some of the implications of the framework for equity in watershed management.

Water-welfare links across watershed units

The links between water and poverty are widely recognized. Improving access to drinking water is one of the Millenium Development Goals: Target 10 is to halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation (www.unmilleniumproject.org). The Millenium Task Force report on water and sanitation identifies linkages among domestic water, water resource management and poverty, hunger, primary education, gender equality, child mortality, maternal mortality, major diseases and environmental sustainability goals (Millenium Project, 2005, pp. 19-20).

In their publication, *Beyond Domestic*, Moriarty et al. (2004) argue that significant impacts on the welfare of the poor can be achieved through the provision of relatively small quantities of water: 100-200 liters of water per capita per day. Improved access to good-quality drinking water can improve family health and free up time that can be diverted to more productive, less onerous activities. Small amounts of water put to productive use can greatly enhance livestock production, horticulture and some small-scale industry within the homestead. Outside the homestead, supplemental irrigation and improved water management can contribute to major improvements in crop production over dryland agriculture (Fox et

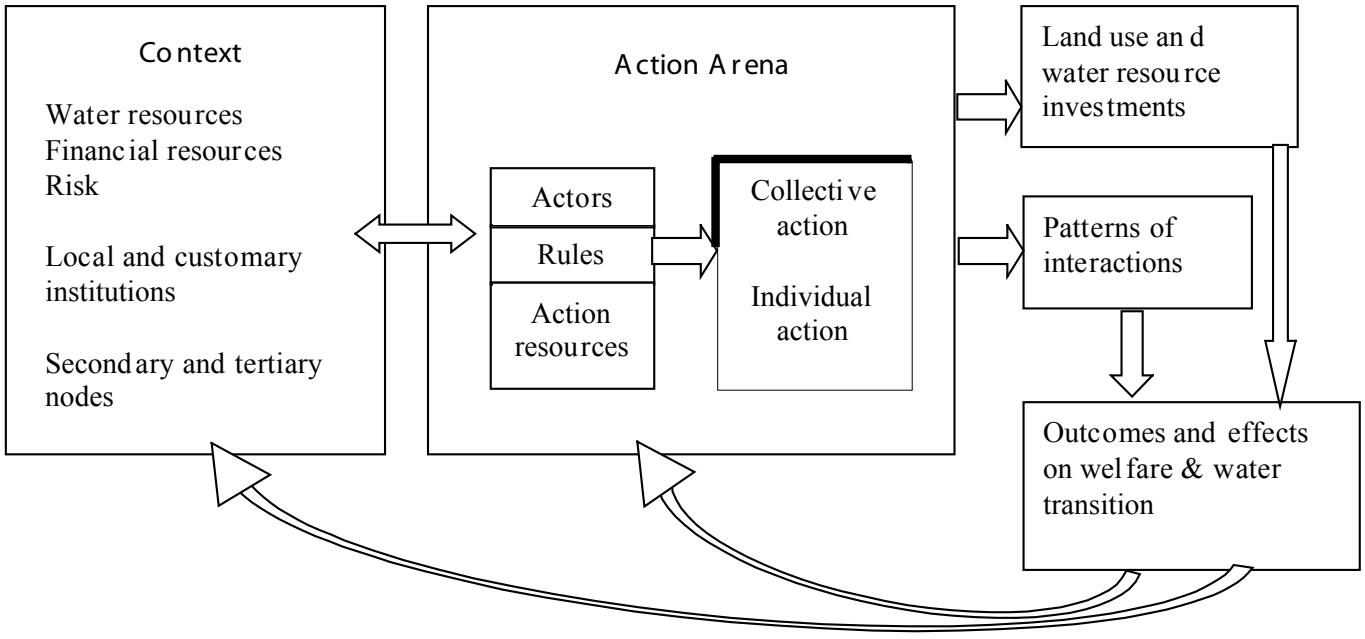

Figure 2. Actors, action resources, collective action and outcomes in a watershed unit.

al., 2005). Larger amounts of water can be used for irrigated production of a variety of crops. These various productive and reproductive uses of water require different attributes of water and thus have different implications for water demand and supply. They also have implications for the distribution of water use within the watershed. Upland and midland areas are traditionally thought of as suppliers of water, however significant welfare improvement may be possible by increasing consumption in these areas.

Poverty and position in watersheds

The amount or quality of land owned or operated by a person or household is often used as an indicator of welfare. In a watershed context, however, the extent to which land can be an effective action resource also depends on where it is located. Downhill and downstream flows of water, soil and pollutants mean that the actions of people living in upland areas will affect those downstream far more than those downstream can directly affect those upstream. Following our conceptual model, these downward flows may or may not be counterbalanced by reverse flows of commodities, money, regulation or influence.

Where relatively wealthy and powerful people live in upland areas, it is unlikely, though not impossible (eg Lam, 1998), that the water transitions they generate will be counterbalanced by reverse flows. In fact, where upstream actors, such as commercial farms or mines, are important sources of employment, as well as pollution, for people living downstream, the upstream flow of labor can magnify rather than offset the water transition.

Alternatively, where relatively poor and powerless people live in upland areas, it is more likely that reverse flows will include regulations to constrain water transitions with negative consequences for downstream populations. With the advent of environmental service mechanisms for watershed services, there is now a greater possibility for reverse flows to take the form of positive incentives (in terms of finance, public services, more secure property rights) for upstream land users to undertake actions with beneficial effects on water transitions (Pagiola et al., 2005).

A frequent generalization is that the poor are located in remote areas of upper watersheds, and that their land uses there generate externalities. In fact, there is considerable variation in where the poor can be found in watersheds. For example, in East Africa the upland parts of the so-called water towers have the highest development and agricultural potential and the lowest rates of livestock and human disease. The smallholder farmers and pastoralists who reside in lower parts of the towers tend to be poorer. Similarly, in some parts of the Andes, potatoes are cultivated in *paramo* areas by wealthier farmers, and livestock are raised in the lower areas, with the poor cultivating in the middle part of the watershed.

The extent to which a particular unit of land will generate significant water transitions also depends on where it is located in relation to sinks and filters-those components of the watershed that can mitigate lateral flows and therefore reduce both the potential for water transitions and the need for compensatory reverse flows. Where sinks and filters have important implications for water transitions, conflict may arise over who controls these resources and who decides how they can and cannot be used.

In such situations, it is important to recognize that the poor tend to depend proportionately more than the non-poor on common lands such as forests, pastures, wetlands, riverine areas or interstitial areas like borders or buffer zones that often play the role of sources, sinks or filters (Jodha, 1986; Rocheleau and Edmunds, 1997). Thus the poor may suffer disproportionately from the degradation of those resources. Similarly, changes in how these resources are managed—e.g. closing forests or limiting grazing—will have a proportionately larger impact on the poor (Kerr, 2002). Imbalances occur in many watersheds, with the poor people who rely on these resources excluded from their management.

Cross-scale linkages among water, watershed management and poverty

The conceptual framework presented in Section 2 can also help to clarify the cross-scale linkages in watersheds that can constrain or facilitate development within watersheds. Here we particularly focus on the papers by Grey and Sadoff (2002) and Barrett and Swallow (2005, 2006).

Grey and Sadoff (2002) proposed that water-poverty traps in Africa arise because of the high

variability of water resources in time and space, and because most of the important river basins cut across national boundaries, subject to numerous political and institutional risks. These serve to reduce returns and increase costs associated with water investment. Poor credit facilities and low self-financing capacity further constrain investments in water, which in turn translate into low water-storage capacity and poor water-supply infrastructure. Overall, the result is water supplies that are high cost, poor quality and variable in time and space. Poor water supplies in turn translate into limited production and ill health.

Barrett and Swallow (2005; 2006) argue that poverty traps may result from key thresholds in the relationships between effort, assets and returns. While investments below the threshold point perpetuate the vicious cycle described by Grey and Sadoff (2002), investments that surmount those thresholds may stimulate a virtuous cycle of higher water storage, higher returns to water use, lower environmental risk and again, higher investment. Thus under relatively similar circumstances some areas can be caught in a trap of low water use, investment and return, while other areas escape that trap. Such poverty traps are manifest at multiple scales, from individuals to communities to nations. There are thresholds associated with water-management infrastructure at the household level (e.g. the cost of metal roofs, eave troughs and storage tanks for rooftop catchment), at the community level (e.g. spring protection and pipes), subbasin and basin level (e.g. construction of dams, water-treatment facilities and irrigation canals). In terms of the conceptual framework presented in Section 2, there may be water-poverty traps within primary nodes in the lowlands, midlands and uplands. There may also be water-poverty traps at higher levels of social-spatial aggregation; e.g. at secondary or tertiary nodes, for example, when neighboring communities or basin-level watershed institutions are unable to resolve upstream-downstream conflicts, leading to investments with high risk of failure and thus, under-investment.

Barrett and Swallow (2006) further hypothesize that many poverty traps are fractal in nature: failure to surmount thresholds at one scale reduces returns to investments at other scales, while success at one scale increases return to investment at other scales. The conceptual framework illustrates how this occurs in a watershed context. Effective collective action in community-level water management can help individuals and households meet thresholds constraining individual production (e.g. household water taps used to irrigate tea seedlings) and at the subbasin level where communities interact (e.g. elected officials negotiating with up- and downstream communities to improve water quality).

Inclusion and exclusion in watershed-management institutions

In examining the institutional framework governing watershed interactions within each node, it is essential to consider what kinds of action resources are likely to be valuable at each scale, who has or does not have those resources, and the likely consequences for the outcomes of the decision-making and implementation. In particular, do poor people, women or other marginalized groups have those resources? We may hypothesize that at local levels, experiential knowledge of hydrologic processes and customary or local law will be more important as action resources than for higher level interaction, in which scientific knowledge and statutory law hold greater influence. The latter is likely to favor those with more formal education and knowledge of outside systems, including government processes.

Within a community, negotiations over rules governing land and water use or other forms of collective action could draw upon a wide range of local knowledge and custom, as well as shared religious principles, organizational rules or bylaws that are developed, and any state regulations of which local people are aware. As negotiations move to higher levels, spanning communities that do not share common customs, there is likely to be less scope for reference to customary rules and more reliance on those established by the state or even by international bodies. The overlapping nature of different action arenas means that well-connected actors have the opportunity to "forum-shop"; that is, to select the arena that they feel is mostly likely to provide them with a favorable outcome.

The resources which are most valuable in different arenas are likely to depend upon the extent of

common ethnic or religious identity. For example, in the Bhavani basin of South India, common caste identity was appealed to by upstream farmers when a farmers' organization downstream filed a legal petition to have more water released at the expense of upstream farmers' water rights. By contrast, even within a village, there may be little common identity in settlement schemes. Thus people in settlement schemes in Western Kenya would be more likely to default to the use of state rules, compared to people in former native reserves, who are more ethnically homogeneous (Onyango et al., forthcoming).

IWRM approaches call for all stakeholders to participate and for their interests to be negotiated. In practice, however, there may be many obstacles constraining participation by poor and marginalized actors. Makurira and Mugumo (2005) describe how difficult it was for poor farmers to participate effectively in new participatory water-management institutions in Zimbabwe. Those who do the 'inviting' in multi-stakeholder negotiations and other policy spaces have a considerable advantage in shaping their content and outcomes because they are able to set the agenda and rules (Brock et al., 2001). Locations and technology are equally important. Facilitated discussions held within communities are more likely to evoke active participation by the poor than structured presentations in conference halls (Brock et al., 2001).

Most participatory watershed management initiatives adopt a community-structured approach: erroneously assuming that people living within a particular geographic region will have strong shared common interests. It is important to consider the different interests that clusters of people share, as well as their relative power to assert those interests. Efforts to promote greater equity will have to identify and prioritize the interests of those most marginalized by stronger interest groups and particular processes.

Knowledge and information are important resources that shape people's participation in watershed institutions and negotiation processes. Poor people frequently lack knowledge about their rights and the legal avenues for defending them, and for demanding public accountability. Edmunds and Wollenberg (2001) stress that the formation of strategic approaches and alliances are critical for poor people to contest the status quo effectively in multi-stakeholder platforms, arguing that consensus-seeking approaches are likely to disadvantage poor people further. Born and Genskow (1999) also caution that consensus approaches can prevent contentious but critical issues from being addressed. Negotiation requires a high degree of participation and collaboration among interest groups, as well as trust in one's representatives.[2] Balancing out knowledge and information differences in the watershed context is complicated by the fact that knowledge about watershed function often differs significantly among stakeholders. Farmers and other land and water users who reside in a watershed tend to have knowledge of cause-effect processes at the local level; these differ across the various resource users who reside in the watershed. Policymakers tend to have more categorical knowledge systems compatible with the enforcement of laws and rules. An example of categorical knowledge is that forests preserve watershed function, while agriculture disturbs watershed function. In reality, however, much of the categorical knowledge that underlies watershed policy is more myth than reality; stylized facts about water, land and forestry relations have been repeatedly used to justify all kinds of discrimination and misguided investments (van Noordwijk et al., forthcoming). In fact, the relationships among water, trees and land use tend to rely upon highly variable soil and climatic conditions.

Conclusions and implications

Conclusions and implications for research

Most collective-action studies in watershed management can be grouped into two categories:

- One considers social phenomena to be highly context and site specific. The implication is that the best we can do as researchers is identify good approaches of participatory action research that can support local participatory processes.
- The other category seeks to establish generalizations and empirical regularities about factors linked to successful collective action. A problem with

[2] Sabatier et al. (2005) found that, in the United States, higher levels of trust could actually lead to lower direct participation rates, because when people trusted that their inteests would be represented, they did not need to engage directly.

these studies is that both the hydrologic and social processes that play out in watershed contexts vary from one place to another.

The conceptual framework laid out in this paper offers a new way to frame analyses of collective action at the community scale and to link it to higher scale processes, and to highlight the connections among institutions and hydrologic units. The framework will have particular application in developing countries where watersheds are likely to include people with very different resource endowments and socio-political power.

Poverty profiles and dynamics in watersheds

This paper follows contemporary trends in the literature in considering poverty to be a multidimensional phenomena including low consumption, lack of livelihood resources, vulnerability to shocks and, especially, exclusion from political and social decision-making structures. As such, it is important that analysts help communities to specify their own concepts of what it means to be poor and then relate those concepts to water and land management, to links with neighboring communities and to higher scale social processes. Poverty processes may be subject to key thresholds in asset accumulation and collective action, which may in turn be related to property rights to watershed resources.

Action arenas and action resources

The language of action arenas and action resources should help move research beyond fairly simple correlations to more insightful studies of the dynamics of negotiations that underlie collective action (or the lack thereof). Researchers have a role in identifying direct and indirect stakeholders, for understanding the knowledge systems and action resources of different stakeholders, for helping to communicate information about inter-linkages in watersheds, and for providing insights and tools to support negotiation. Researchers also need to understand specific and general conditions regarding the interactions among authority systems: customary, local versus multiple statutory institutions.

Multiple-scale analysis

Researchers seek to understand appropriate roles for external organizations, basin-level institutions and local water-user groups for inclusive and effective collective action in watersheds. This includes their roles in addressing such issues as customary law, the inclusiveness or exclusiveness of local organizations, critical knowledge resources and capacities of poor people, coordination of environmental services and fostering stronger institutional leadership, capacity, integrity and coordination in the public sector.

The conceptual framework will help researchers and planners to think about water management at different scales. For example, one option for managing water within a zone is to manage demand via technologies and local institutions for water allocation. Another is to influence the supply of water via interzone transfers or reverse flows. Assessing the potential efficiency and equity impacts of such transfers requires looking at their implications for local welfare, as well as water transitions and reverse flows.

Rules or relationships tend to be scale-specific. Resource management practices identified at one scale of investigation will often be location- and time-specific. The dynamics associated with single scales of investigation and the additional feedbacks and interactions that develop on increasing scales pose serious challenges for natural resource research.

Understanding and facilitating basin-level collective action and multi-scale learning processes call for a deeper appreciation of the power and influence that the various actors bring to the table, as well as their varying knowledge and perspectives. Lack of attention to the action resources available to the different actors in participatory forums runs the risk of legitimizing and reinforcing the status quo. Support for leveling the playing field so that poor people can engage in and even initiate social change processes holds promise for making equitable human well-being a cornerstone for sound watershed management.

Conclusions and implications for supporting trans-scale collective action in watersheds

The framework highlights the importance of fostering collective action at multiple scales, recognizing that there may be important negative or positive spillovers between scales.

Different types of collective action emerge as important in a watershed context: collective investment in community water management, joint agreements to terrace on steep hillsides to reduce soil erosion, and mutual respect for and enforcement of rules for protecting riverine and wetland areas. Development efforts need to evaluate who is included and excluded from different types of local collective action, as well as who appropriates the benefits and who bears the costs.

In addition, it is important to consider how collective action within a particular node or action arena may facilitate or hamper collective action between that node and adjacent up- or downstream nodes. Some types of local water storage, for example, may be largely beneficial to downstream neighbors, while others may be largely detrimental. Similarly, local collective action may be a boost or bane to the goals of basin-level collective action. Most obviously, the leaders of local water-users' associations may be good local representatives for basin-scale dialogs and decision-making. Less obviously, groups able to mobilize effective local collective action and attend basin-scale meetings are likely to be relatively wealthy, already well-endowed with water resources and unrepresentative of the interests of the poor. Watershed development efforts and basin authorities need to go out of their way to identify, reach and empower the poor, including those without effective local organizations.

This framework highlights the importance of lateral flows of water, soil and pollutants, as well as flows of political influence, economic power and conflict. In watersheds with the prototypical distribution of poor people in upland areas and more wealthy people in downstream areas, the flows of economic and political power may well balance the flows of water. Pro-poor, inclusive watershed development will generally need to give attention to empowering the upland poor and countering watershed myths that discriminate against them. In other watersheds, such as those around the water towers of East Africa, the lowland poor may have little recourse against wealthy upstream water users: Water and power flow in the same direction. Pro-poor-inclusive watershed development needs to enhance reverse flows, at least those of communication. Basin-level dialog that includes and empowers all relevant stakeholders may forestall or prevent more violent conflict.

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