

WATERSHED MANAGEMENT: EXAMPLES AND LESSONS FROM COMMON PROPERTY THEORY

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Abstract: *Watershed development is an important component of rural development and natural resource management strategies in many countries. A watershed is a special kind of common pool resource, an area defined by hydrological linkages where optimal management requires coordinated use of natural resources by all users. Management is difficult because watershed systems have multiple, conflicting uses. Theories from commons research predict great difficulty in managing complex watersheds and explain why success has been limited to isolated, actively facilitated micro watershed projects with a focus on social organization. Encouraging collective action is easiest at the micro watershed level but optimal hydrological management requires working at the macro watershed level. This paper will give ideas of Watershed management in Developed country and India with the support of peoples. This paper also introduces critical challenges to making watershed development, Work and presents lessons from research on watersheds and theories about managing the commons.*

Keywords: Watershed Management, Common Property, Socioeconomic Challenges

Introduction

A watershed or catchment is an area that drains to a common point, and watershed development seeks to manage hydrological relationships to optimize the use of natural resources for conservation, productivity, and poverty alleviation. Achieving this requires the coordinated management of multiple resources within a watershed, including forests, pastures, agricultural land, surface water and groundwater, all linked through hydrology. Watershed development is an important component of many countries' rural development and natural resource management strategies. The World Bank, for example, invested \$1.73 billion in watershed development from 1990-2004 (World Bank 2007), and the Government of India spent over \$6 billion from 1996-2004 (World Resources Institute 2005). Commons theories do not predict that watershed management can be widely successful, and they explain why most projects operate at as village micro watershed scale. The successful collective action versus a large, macro watershed scale that is more suitable from a hydrological perspective and it suggests some lessons for policy and practice. The empirical focus is mainly on India but findings are more broadly applicable. Many watershed resources are characterized by high exclusion costs and subtract ability, the two main attributes of common pool resources. Many natural resources in a watershed are often held in common, such as pastures, forests, ponds, and groundwater. Other resources tend to be managed individually, especially agricultural land, but also some patches of pasture, forest, and captured runoff water etc.

Benefits of Watershed Project

Water harvesting involves building small dams to capture runoff from upper watersheds after heavy rains. Reducing erosion reduces silt in runoff water and in water harvesting ponds, thus lengthening their lifespan. Water harvesting in turn benefits farms further down the slope by providing irrigation, either via surface water or by recharging groundwater. These interventions can be designed to eventually raise the productivity of all natural resources in the watershed. Soil becomes more productive for agriculture, water is captured for irrigation, and pastures and forests yield more biomass. All livelihood activities that depend on these resources may be enhanced, and

employment may increase as agriculture becomes more productive and additional labor is needed for harvesting and other operations. One important point is that improvements in different natural resources have different durations.

SUCCESSFUL WATERSHED DEVELOPMENT

Socioeconomic Challenges

Various challenges make watershed management more complicated statistics from successful projects. Many success stories, for example, are found in hilly, bowl-shaped micro watersheds with very favorable conditions for water harvesting. In more typical cases, benefits are incremental and gradual. With a less visible connection between investments made and benefits realized, organizational challenges become more apparent (Kerr 2002). One of the biggest challenges to watershed management is that its costs and benefits are distributed unevenly, yet cooperation is required to make it work. Uneven impacts result from spatial variation and multiple, conflicting uses of natural resources. Even in higher rainfall areas of India vegetative regeneration takes about three years too long to ask poor people to refrain from using resources they need. Accordingly, watershed projects need to create mechanisms to encourage natural resource utilization consistent with the common good. This is a simpler task in village-level micro watersheds with discernable hydrological linkages and established social relationships than in macro watersheds spanning multiple villages.

Technical Challenges

In India, recent hydrological research suggests that watershed projects may be exacerbating precisely the water shortages they aim to overcome. At the macro watershed level (covering many villages), Batchelor et al. (2003) document cases where water harvesting in upper watersheds reduced water availability downstream. Calder et al. (2006) refers to this as 'catchment closure,' whereby water harvesting upstream concentrates groundwater locally and then intensive pumping exhausts the shallow aquifer. In this case watershed development prevents both surface runoff and groundwater from moving naturally downstream. It suggests two perverse project outcomes: first, what is good for one micro watershed can be bad for others downstream, and second, what is good for a watershed in the short term can be bad in the long term. Recent literature presents additional cases detailing inaccurate understanding of technical relationships in watersheds. All over India and elsewhere, Trees are planted in watershed projects with the stated objective of promoting Groundwater recharge. A motto of the Tamil Nadu Forest Department is 'Save Trees to Save Water.' Some farmers actually benefit from soil erosion through silt deposition on their land and even actively encourage erosion to move soil to where it can be most productive. Rhoades (1999) raised this question regarding participatory watershed approaches and discussed many of the challenges. He suggested the need for more empirical analysis of whether participatory approaches can really be replicated widely, and he argued that project workers need better science, better methods, and better organizational skills along with donor money and patience. The absence of measures to manage groundwater demand contributes to this problem in India. Electricity to run pumps is free in some states and subject to a low, flat fee in others, allowing pump owners to draw unlimited water without affecting their costs. In addition, whoever pumps water first owns it (Singh 1992) and this encourages over pumping. Sheds. Most evaluations still cover the small success stories and it remains unclear whether watershed management can succeed beyond a few small exceptions.

Successful Management of the Commons

There are so many literatures on conditions that encourage successful commons management. Wade (1988) and Ostrom (1990) offered sets of favorable conditions, and Baland and Platteau (1996) updated them. Agrawal (2001) synthesized and revised these factors, focusing on those that enable sustainable governance of the commons. For watershed projects, the key issue is a group's ability to establish new governance system to effectively manage the watershed commons. It draws on Agrawal's (2001) synthesis but includes only those factors likely to be important for establishing a new, successful management system. Many factors in Agrawal's synthesis draw

from Wade (1988), and Baland and Platteau (1996). Watershed characteristics correspond poorly to the list of enabling conditions. This provides many clues about why watersheds are difficult to manage and why projects might work better in a village-based micro watershed than a much larger area. Eight favorable buttes are listed: small size, well-defined boundaries, low mobility, possible storage of benefits, predictability, feasibility of improving the resource, traceability of benefits to a management intervention, and availability of indicators of the resource condition. Almost all of these attribute present problems because they rarely characterize watershed management.

Platforms for Managing the Commons

'Platforms' for analysis and negotiation have been discussed in the literature as a means to promote collective action on the commons. Steins and Edwards (1999a, 1999b) drew on this idea in an effort to move away from theoretical discussions about people's propensity to work collectively and toward discussions of approaches to help them do so. They concluded that platforms have great potential to improve commons management, listing several factors that help them work. Very few watershed programs in India operate this way

Factors associated with Effectiveness Common Pool Resources

1. It is important that nested platforms correspond with the resource system level that is at stake in ecological, economic, and social terms and that they are stakeholder-based, rather than user-based.
2. The empowerment of platform participants to elicit their views is important to challenge inequalities (in terms of gender, ethnicity, education, and skills) and dominant power relations, and to create a situation in which communication is as open (and voluntary) as possible.
3. Stakeholders' priorities, as well as the resource system, are dynamic and are constantly being reshaped.
4. Platforms for resource use negotiation are always nested within other decision-making structures.
5. There is good reason to believe that the presence of a third party is beneficial to the performance of nested platforms.

Evaluations of Indian Watershed Projects

There have been a number of evaluations of Indian watershed projects over the years but very few compared different approaches or tried to correct for selection bias. Among the individual evaluations there appears to be an over representation of well-known, highly supervised projects known to be successful. This was the case for a special edition of the Indian Journal of Agricultural Economics (1991) and a set of self-evaluations of participatory projects reported in Hinchcliffe et al. (1999), for example. Over representation of successful cases often stems from implementing agencies aiming to promote their work and data sets being more available for heavily supervised projects with large budgets. Joshi et al. (2005) conducted a Meta analysis of 311 evaluations that estimated benefit-cost ratios of watershed projects, based on all available studies. Presumably the success stories are also overrepresented in this work. Kerr et al. (2002) randomly selected 86 villages in Maharashtra and Andhra Pradesh to compare the performance of first-generation government watershed projects with a technical orientation, NGO projects focusing on social organization, and the two NGO-government collaborative projects. Bachelor et al. (2003) found that successful water harvesting in upper watersheds came at the expense of lower watershed areas due to catchment closure after heavy pumping in upper watersheds. Most evaluations are favorable. The successes by the projects with an NGO component came in the form of reduced soil erosion, higher crop income, improved management of common pastures, more employment, and increased irrigation. The authors cautioned that the successful cases were consistently in small micro watersheds and did not operate widely, with any evidence they could replicate substantially or operate in higher scale watersheds.

Lesson Learn

Indian watershed projects evolved from the mid-1980s to the present by gradually intensifying their focus on participation and social organization while also reducing their size. These shifts resulted mainly from the demonstration effects of early NGO projects but in some cases with influence from the literature on community-based natural resource management. In many respects the changes from large to small and from technocratic to participatory reflect the factors believed to facilitate the emergence of local institutions to manage the commons. It is more likely that the experience of the Indian watershed projects helps to validate those factors, and less likely that the literature guided the Indian projects, with perhaps some iteration between the two. The NGOs likely identified the advantages of a participatory approach simply through their experiences on the ground. Based on previous experience and literature on collective action, the CIAT team chose to work with small groups of 30-40 families covering about 200 ha sub watersheds to address natural resource management problems. Through a long process, the sub watershed groups gradually developed platforms for diverse stakeholders to jointly analyze and negotiate diverse interests and develop action plans to manage natural resources. CIAT acted as facilitator (Ransburg and Guerrero 1999). However, such an approach is incompatible with the strategy made successful by the IGWDP of investing exclusively in separate micro watersheds where water harvesting potential is high and communities have demonstrated the ability to work collectively.

Implications for Policy and Practice

The best watershed management approach certainly depends upon the situation and objectives. Some possibilities are; a.) stay small and give up on complex, higher scale watershed management; b) build capacity for higher scale watershed management through improved institutional arrangements and improved technologies. Theory and experience have shown that collective action is more likely in small, village-level watersheds, and that project agencies can best facilitate watershed management if they work in a small number of locations. The IGWDP follows these principles, working only where it perceives a high probability of success. First, being by passed by a project that would not work is no great loss, and second, rural areas of developing countries have many other needs besides watershed development. For example, survey respondents in India expressed strong preference for investments in medical facilities, roads, latrines and other infrastructure as opposed to watershed development (Kerr et al. 2002). In an era of decentralization, people should be able to choose between watershed and other investments like infrastructure and government services.

Research has shown that the micro watershed approach may be creating hydrological problems that would be best addressed by operating at a macro watershed scale. This would require working simultaneously to promote watershed governance capacity both within and between micro watersheds. Within micro watersheds, this calls for continuing to build organizational, administrative, and governance skills at local levels as mentioned above. Such capacity is needed to bring together stakeholders with conflicting interests, design workable compromises, and put them to work. Better governance may help in enforcing whatever agreements can be developed. At the macro watershed scale, new institutional arrangements are needed to promote interaction among micro watershed groups within large macro watersheds, this would involve developing something like a 'nested platforms' approach at a macro watershed scale. It could involve specific mechanisms to facilitate the interaction such as new legislation or new arrangements for sharing upstream-downstream costs and benefits. Macro watershed management could also benefit from improved technology to understand and track upstream-downstream relationships. Technologies that could track hydrological relationships and trace impacts of natural resource use in one location on another would open new possibilities for developing indicators and monitoring systems to facilitate management.

Conclusion

Commons research emerged in the 1980s in response to the incorrect presumption that the tragedy of the commons was inevitable. Commons researchers do not imagine that all commons

can be well-managed, yet watershed projects are organized as if this were so, with most watershed agencies aiming to spread their projects as widely as possible despite unfavorable conditions for collective action. It is as useful for commons research to point out the limits of common property resource management as to highlight its potential.

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