Better management of common watershed infrastructure

Experimental games help communities explore solutions

Research Output

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Photo: ICRISAT

A game session in one of the communities.

Background

Recognizing the close links between poverty and natural resource degradation, India invested more than US$ 500 million during the 1990s (Farrington et al., 1999) and more than US$ 1 billion the following decade (Deshingkar and Farrington, 2006) in participatory watershed development. There is strong evidence that various interventions have the potential to achieve a wide range of societal goals such as food security, soil protection and efficient water use (Wani et al. 2008; Rockström et al. 2010; Garg et al. 2011; Garg et al. 2013; Singh et al. 2014; Karlberg et al. 2015). However, despite this obvious potential, many communities fail to sustain the benefits over time as they struggle to cooperate in the joint effort to run and maintain the structures (Wani et al. 2008; Joshi et al. 2005). Even though watershed projects use participatory approaches, little attention is paid to the capacities of communities to design or change rules or by-laws and enforce them to ensure sustainability of infrastructure investments. Once projects are completed it is very common that infrastructure quickly erodes losing its capacity to consistently generate benefits.

A survey to assess the general state of water infrastructure and community attitude towards their maintenance was conducted between April to June 2017 in 90 communities in Mandla district in Madhya Pradesh. The results confirm that most communities cannot report

Key recommendations derived from the study:

1. Communities need locally adapted rules for water and water infrastructure management to effectively manage water in smarter ways.
2. So far, institutional capacity development in the context of watershed projects focuses mainly on administrative and facilitation skills. Low-cost capacity development approaches which focus on a participatory formulation of water and water infrastructure management rules need to be developed and applied. Small-scale water infrastructure provides benefits beyond the community level. This can justify continuous government support to community infrastructure maintenance. Currently support mainly focuses on labor (through MNREGA). Communities are, however, more easily able to mobilize labor but struggle to collect funds for buying materials.

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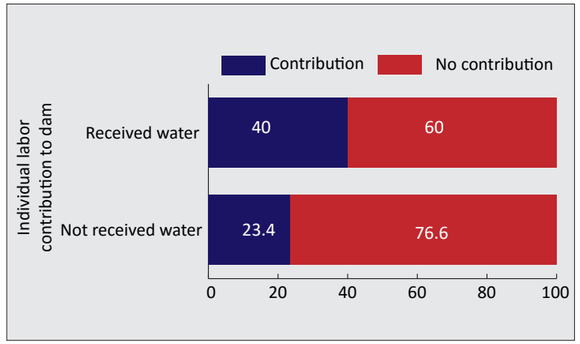

Figure 1: Labor contribution to dam maintenance in study villages of Madhya Pradesh.

effective maintenance rules. Hardly any respondent reported financial contributions to the maintenance of dams while one quarter said they contributed labor. Labor contributions were higher if people received irrigation water from the dam (Figure 1). In general, the water infrastructure in most of the communities was in a poor state (Figure 2).

Study methodology

Based on these observations we conducted a study exploring how the institutional capacity of communities to manage and maintain water infrastructure can be improved. More specifically, we studied the potential of using experimental games for facilitating social learning and innovation. Experimental games are known to have the potential to support stakeholders in their decision making (Barreteau et al. 2001; Barreteau 2003; Gurung et al. 2006; Guyot and Honiden 2006; Becu et al. 2008; Meinzen-Dick et al. 2016). They can facilitate dialogue, shared learning, collective decision making, and strengthen the adaptive management capacity of local communities (Gurung et al. 2006; Falk et al. 2016). The game setting allows to experiment with rules and strategies. It limits the costs of trial and error methods and shifts the approach from costly 'learning by doing' towards 'learning by simulating' (Barreteau et al. 2001).

The experimental games of our study were carried out in 60 communities together with the NGO Foundation for Ecological Security and in coordination with the respective *panchayats* (village council) and watershed committees. The games are based on a Common Pool Resource experiment where players first jointly invest into a resource from which they can extract benefits in a second step. An important element of our game design was the possibility of players to engage in discussions and to observe each other's decisions. Communication allows players to negotiate strategies and propose rules, strengthen group values and norms, and voice commitment. The combination of transparent decisions and the possibility to communicate directly addresses social norms and shared values which are strong vehicles for collective learning (Bravo and Marelli, 2008a). For the detailed game design see http://gamesforsustainability.org/2017/12/21/game-managing-stop-dams-practitioners/.

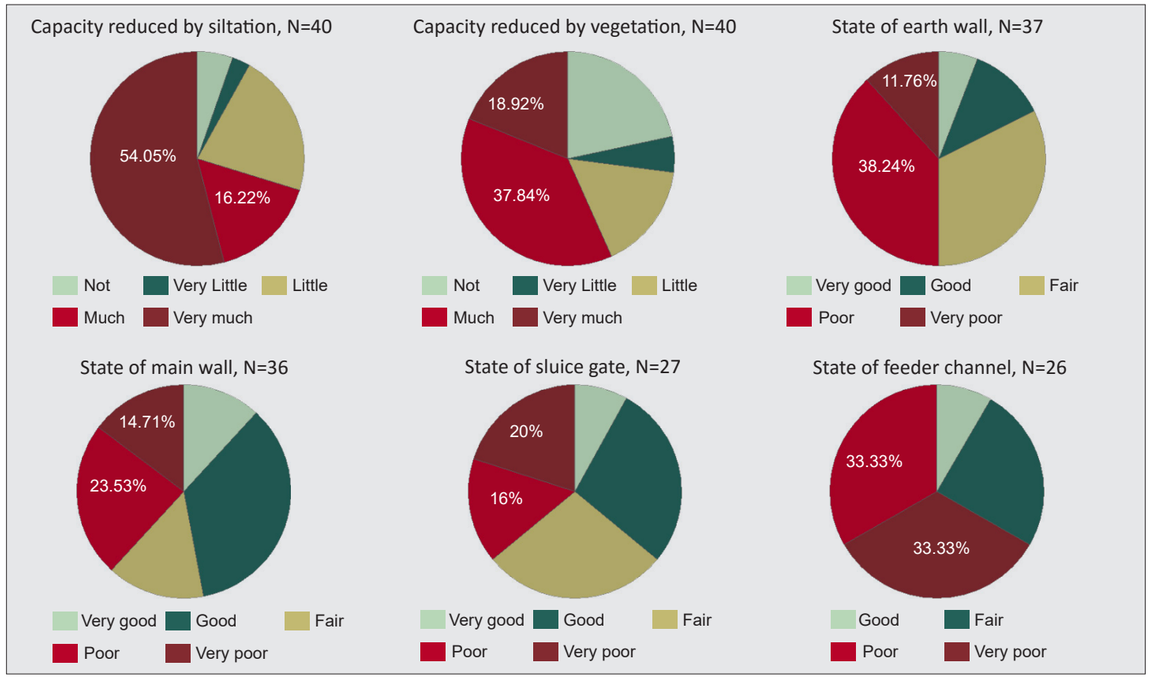

Figure 2: State of water infrastructure in survey villages in Madhya Pradesh.

Study results

The results of our games show that farmers act less selfish than theory predicts. Nevertheless, even in the presence of transparent decisions and repeated possibilities to discuss, groups manage to produce enough water for everyone to grow crops only in approximately 50% of the played rounds. The red line in Figure 3 indicates the social optimal investment level in our game. At this level, all players of a particular group could grow the water-efficient *rabi (*postrainy) crop (chickpea). Still, in 15% of the crop decisions in the game, players decided to grow the water-intensive crop (wheat). It was very transparent in the design of our game that this was an uncooperative action.

Players actively discussed the game dynamics such as possible responses whenever anybody failed to comply with rules agreed upon in the discussion. The natural first response was to try to persuade the person. If this did not work, some fellow players adjusted their behavior and adopted a rather non-cooperative strategy either by reducing their investment levels or by choosing the water-intensive crop. This can be interpreted as a kind of punishment. Others threatened to exclude defectors from the group, which was not a credible threat as the game design did not accommodate such decisions. Our game design did not allow to place any sanctions. The general discussion revealed, however, that groups have instruments to incentivize cooperation. Interestingly, the ultimate sanction is typically not a fine or exclusion from dam benefits but staying away from social events. We observe that different communities have different perceptions regarding what efficiently can encourage cooperation. Some groups argued that persuasion is sufficient and any threats of sanctions might even have negative effects. Other groups believed that charging defectors with a fee is appropriate. Water and water infrastructure governance is more likely to be effective if community-specific rules receive space.

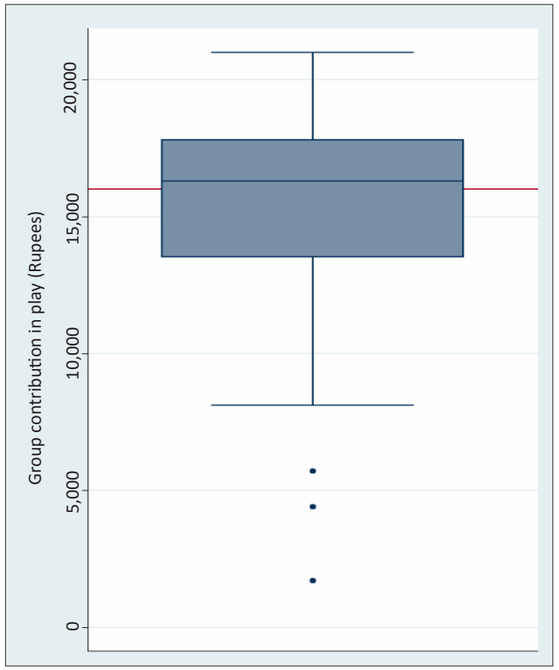

Figure 3: Boxplot of group investments to dam maintenance in the game.

The main objective of designing and playing this game was to develop the capacity of the players to negotiate and formulate water management rules. The feedback and the content of the discussions showed us that our approach is indeed a suitable tool to reach these objectives. Players commonly expressed that the game experience made them aware of multiple cooperation challenges in the community. They discussed plans to take the related issues to the next *gram panchayat* meetings.

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