



Tropentag, September 16-18, 2015, Berlin, Germany

“Management of land use systems for enhanced food security:
conflicts, controversies and resolutions”

Incorporating Local Institutions in Irrigation Experiments - Evidence from Rural Communities in Pakistan

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Abstract

Many irrigation systems are special cases of common-pool resources (CPRs) where some users have preferential access to the resource which in theory aggravates collective action challenges, such as the under-provision of necessary infrastructure as a result of unequal appropriation of water resources.

We present experimental evidence based on irrigation games played in communities which are dependent on one of the largest contiguous irrigation network — the Indus basin irrigation system in Punjab, Pakistan. Furthermore we simulate, amongst others, two institutional mechanisms which are neglected in experimental studies despite their importance in many CPR governance systems: a) traditional authorities and b) legal pluralism.

In our experiments, Punjabi farmers (n=160) managed to provide the CPR at a level close to the social optimum, even without communication or enforcement opportunities. The equal investment in water infrastructure seems to be a strong social norm, even though those in disadvantageous positions (tail-users) earn less than those who have preferential access (head-users). At the same time, head-users restrain themselves from maximum resource extraction, which could be interpreted either as a norm or a stationary bandit strategy. In contrast to one of the most consistent findings of experimental studies, the participants in our experiment increased their earnings over the experimental rounds by using the available resources in a more efficient manner. One explanation for this behaviour could be the availability of social information in our game.

Starting from a high level of cooperation during baseline rounds, the treatments did not change the group investment significantly. The introduction of external sanctions created additional coordination problems which lead to a decrease in the level of group welfare. More specifically head-users reduced their water extraction in the face of possible external sanctions to a level that the remaining water could not be used productively anymore by tail-users.

Keywords: Asymmetric access, common-pool resources, field experiments, irrigation management, Pakistan