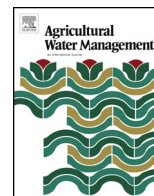




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## Property rights and sustainable irrigation: A developing country perspective

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### ARTICLE INFO

Article history:  
Available online xxx

Keywords:  
Bundles of rights  
Collective action  
Customary tenure  
Legal pluralism  
Water rights  
Water tenure

### ABSTRACT

While the role of secure property rights contributing to sustainable natural resource management is increasingly recognized, translating that into practice is more challenging, especially in developing countries. This article presents a framework for understanding the role of property rights for effective irrigation systems and then explores the complexity of property rights to land, water, and infrastructure and their underlying institutions. Understanding property rights in practice requires acknowledging legal pluralism—the coexistence of many types and sources of law, which can be used as the basis for claiming rights over the resources. Property rights do not necessarily imply full ownership, but are composed of different bundles of rights that may be held by different claimants—the state, user groups, families, or individuals. These rights are critical for the authority, incentives, and resources for irrigation operation and maintenance. As resources become more scarce, property rights systems need to adapt to reduce conflict and provide incentives for saving water. However, efforts to improve irrigation by changing property rights systems have often failed because they have not recognized the difficulty of transplanting property rights systems from one place to another. Institutional change needs to be seen as an organic process, building on existing norms and practices, rather than as an exercise in social engineering.

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### 1. Introduction

Experience with the past 30 years of irrigation has shown that technology alone is not sufficient to ensure productivity gains, let alone sustainability. In many cases, the technologies were not adopted or maintained, or the poor, women, and other marginalized groups were excluded from the benefits of technologies. Appropriate institutions are needed to accompany technologies for sustainable irrigation.

Among these key institutions, property rights play a particularly important role. When resources are abundant, there is little need to define property rights, but as the resource becomes more scarce, users of the resource compete and even come into conflict. In such contexts, there is pressure to define property rights over the resource, to clarify expectations, and assign both rights and duties (Otsuka and Place, 2001; Young, *in press*).

While the contribution of secure property rights to sustainable natural resource management is increasingly recognized in calls for policy reforms, translating that into practice is more challenging (Deininger, 2003). This applies to almost all natural resources,

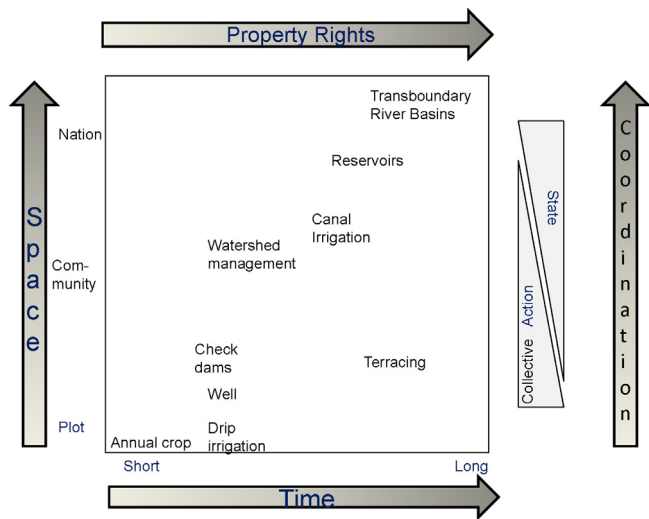
including land, forests, and fisheries, but even more so to water, which is a mobile and often fugitive resource, difficult to measure or control, with many different uses and values, both economic and noneconomic (Rogers et al., 1995). Efforts to “improve” irrigation by changing property rights systems have often failed because they have not recognized the difficulties involved in institutional change, especially of property rights.<sup>1</sup>

While water rights, and especially water rights reforms, are complex in any context, the challenges are particularly severe in developing countries.<sup>2</sup> A major reason for this is the frequent lack of state capacity to carry out the reforms as envisaged (as described by Garduno, 2005 for Mexico or Schreiner, 2013 for South Africa). However, customary water rights are also likely to be particularly strong in developing countries, often varying from one context to another, and differing from state law (von Benda-Beckmann et al., 1998). Moreover, as North (1990) notes, institutional change is path dependent: it is inherently shaped by the history of a particular place. This means that transplanting property rights systems from

<sup>1</sup> For a review of some of these challenges in property rights change, see Libecap (1998).

<sup>2</sup> See cases in Boelens and Hoogendam (2002), Bruns et al. (2005), Ingram and Brown (1998).

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**Fig. 1.** The role of property rights and coordination institutions for sustainable irrigation.

one place to another will not yield the same results, as shown by Solanes (2013) in his analysis of efforts in the 1990s to pass a water law in Peru that was modeled after Chile’s legal framework of highly privatized water resources.

Thus while property rights can play a crucial role in sustainable irrigation in developing countries, any reforms to achieve this aim need to be based on a sound understanding of property rights to land, water, and infrastructure and their underlying institutions. Of these, land rights have been dealt with most extensively, both in scholarship and in policy (see, for example, Deininger, 2003 or FAO, 2012). The focus of this article is therefore on rights to water and secondarily irrigation infrastructure. However, rights to all three of these key resources are inextricably intertwined (see Hodgson, 2004).

This article presents a framework for understanding the role of property rights for effective irrigation systems and then explores the complexity of these property rights, with particular reference to conditions in developing countries. Applying the framework helps to identify the situations in which institutional issues of coordination and property rights are likely to be important for sustainable irrigation (and where, conversely, they are less likely to require much attention). Subsequent sections of the article discuss some of the institutional complexities, particularly of property rights, and their implications for programs seeking to improve the sustainability of irrigation systems.

**2. Key institutions for sustainable irrigation**

Institutions are the “rules of the game” that govern behavior in society (North, 1990:1). Fig. 1 illustrates the importance of two types of key institutions for irrigation and agricultural water management: those that provide coordination and property rights. The vertical axis illustrates the spatial scale of a technology, from an individual plot, through a whole farm, to one that covers several farms, a village, to a region. All approaches that are above the scale of the individual farm require some form of coordination—either by local organizations, the state, or the market. For example, a drip irrigation kit may be adopted by an individual small farmer, by his or her self. Even a well may serve just one farm, but where holdings are very small and tubewells have large capacity, farmers may join together to buy and operate a tubewell, or the state may install and operate it, or one farmer can install it and sell water to neighbors. As we move up the spatial scale, a small check dam may serve a group of farmers. A watershed management program may serve

several communities. Canal irrigation systems and reservoirs can serve up to thousands of farmers, and even cross provincial lines. Finally, transboundary river basins cross national boundaries. In each case, some form of coordination is required to govern provision and expropriation: to ensure that the infrastructure is built and maintained, and to allocate and distribute the water among users of the same source, and settle disputes. The greater the spatial scale, the higher the level of coordination that is needed, as indicated by the corresponding arrow on the right side, to balance the spatial arrow on the left. That coordination may be provided by the state or by collective action (or, in some cases, even by the market).

Similarly, the lower horizontal axis indicates the permanence of a technology or approach, or the time frame between when an investment is made and its returns are realized. The longer the temporal scale, the greater the need for property rights to provide authorization and incentive to make the investment (Knox et al., 2002). Even a tenant or a wife without independent land rights can install a drip kit, but may not be allowed to install a treadle pump or tubewell, because she does not have the decision-making (management) rights over that land, and she may not have the incentive to install and maintain terracing or drainage systems for salinity control. The arrow on the upper horizontal axis indicates that secure property rights become more important as the time frame of irrigation practices increase. Even those with decision-making rights may not have the incentive to make long-term investments unless they have secure tenure, to know that they will benefit from the investment. Although security of tenure is often thought of in terms of rights to the land, people may not be willing to invest in irrigation systems if they do not also have secure rights to the water that will give them the returns. This has been the problem with many irrigation management transfer systems, where farmers were expected to bear the costs, without secure rights to the water from the systems.

While the exact location of any type of irrigation on Fig. 1 would depend on the size of the farms and the scale, as well as the cost/return ratio, of the particular technology, this framework provides a useful starting point to ask which institutions are likely to be critical. As water uses increase, even seemingly “independent” water users will be affected by, and have an impact on, other water uses and users. For example, Asquith (2006) describes how immigration and more intensive land use upstream had impacts downstream in the Los Negros Valley of Bolivia. This increasing interaction between uses within basins calls for better institutional arrangements to coordinate water uses (as described by Asquith, 2006). Property rights are important in this regard because they clarify who can use and manage the land, water, or infrastructure, and what responsibilities they have toward the resource and toward others. Coordination institutions help to set and enforce those rules about the allocation of water and responsibilities. These issues are most apparent in surface water flows and irrigation, but also applies to groundwater irrigation. The following sections provide more details on the institutions for coordination and property rights, with special attention to their implications for sustainable irrigation.

**3. Coordination institutions**

The example of the tubewell cited above illustrates that coordination functions can be provided by the state (a public tubewell that supplies many farms), collective action (farmer group) or markets (farmer selling, buying or trading water). How well each of those institutions functions will determine whether farmers receive adequate and timely water supplies. For example, in the 1970s and 1980s there were numerous state-run tubewells in India, Bangladesh, and Pakistan that should have allowed economies

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