

Water Rights System as a Demand Management Option: Potentials, Constraints and Prospects

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Introduction

This paper examines the potential, problems and prospects of introducing a water rights system as an option for managing irrigation demand. The paper is divided into six broad sections. Section 1 introduces the concept of a water rights system as an option for managing irrigation demand. Different conceptual perspectives on water rights are briefly reviewed and their implications for the introduction of a water rights system are examined. Section two describes various forms of water rights that have existed in different parts of India with some illustrations. Section three examines the rationale for the introduction of a property rights structure, in surface irrigation and as well as groundwater irrigation that has formed the basis of proposals for the introduction of a property rights structure. In addition, the public trust doctrine is also briefly reviewed. Section four reviews the international experience with the introduction of a property rights structure and its efficacy as a tool for demand management. Section five provides a review of the conditions—hydrological, technological as well as institutional—which are needed for the introduction of a water rights system and its smooth functioning. In the light of these conditions, section six examines the specific contexts in which the introduction of such a system might be feasible in the Indian context as a tool for demand management, and concludes with a summary of the main messages of the paper.

Conceptual Approaches to Analysis of Water Rights

Three distinct approaches that have influenced the analysis of water rights can be discerned. These approaches, which have specific bearing on how we approach the subject of a water rights structure from an analytic as well as public policy perspective, are the new institutional economics approach, legal pluralism perspectives, and the socio-technical approach.

New Institutional Economics Perspectives on Water Rights

In the New Institutional Economics, institutions are defined as rules of the game that structure human interaction (North 1990); they could be formal as well as informal. Institutions include law, property rights, social relationships, values and belief systems. They are distinguished from organizations - that are defined as bodies of individuals with a specified common objective. For example, organizations could be political organizations (political parties, governments,

ministries), economic organizations (federations of industry), social organizations (NGOs and self-help groups) or religious organizations (church and religious trusts)—(North 1990; 1986; 2006).

Institutions such as property rights are seen as a way of structuring human interaction of a repeated nature. They are seen as a way of reducing transaction costs inherent in human exchange. Transaction costs are the costs of dealing with the market – the costs of information, contracting and enforcement. By providing a structure and predictability to human interaction, institutions reduce the inherent transaction costs. Some economies are understood to perform better than others because they have property rights structures and legal systems that are efficient and, as such, keep transaction costs low (North 2005; 2006).

When this understanding of institutions and property rights is applied in the context of natural resources such as water, the reference is to conventions and practices that structure human interaction with such resources. Agarwal (1999) defines institutions as sets of formal and informal rules and norms that shape the interaction of humans with each other and with nature (without them social interaction would not be possible). Institutional arrangements could thus be defined as rules and conventions, which establish people's relationships to resources such as water, translating interests into claims and claims into property rights. More specifically, water institutions can be defined as rules that together describe action situations, delineate action sets, provide incentives and determine outcomes both in individual and collective decisions related to water development, allocation, use and management (Saleth and Dinar 2005).¹

From a New Institutional Economics Perspective, thus, property rights in water are seen as an institution that serve as a source of incentives for individual and group behavior governing water use. They serve as a mechanism for avoiding externalities in the use of water and averting what is popularly called the tragedy of the commons (Hardin 1968). They generate incentives for efficient resource use and for avoiding depletion and overexploitation. Thus, they are seen as a means of addressing what is called the 'incentive gap' in Indian irrigation (Saleth 1996; 2005).

Fluid Boundaries: Varying Property Right Regimes

A fourfold classification of property rights is generally understood as: i) distinguishing state property; ii) common property; iii) private property; and iv) open access. Sweeping statements regarding the property rights status of water, however, though often made, are best avoided, as it is the specific context of water use that defines the property rights regime; the property rights regime may change as water flows from one point to another. For instance, in India, water in a river, large dam or reservoir is State Property, by virtue of the Easement Act of 1882. However, when it flows past an outlet on a watercourse serving a group of farmers it is accepted that those farmers have a defined right to use it and, as such, it becomes their common property. But, when it reaches the fields of individual farmers and given the way the farmer's access is defined, it acquires the status of a private property.

A Legal Pluralistic Perspective on Water Rights

As against new institutionalist perspectives, legal anthropological approaches view property rights from a perspective of how different sources of property rights co-exist at the same time

¹ A detailed analysis of institutions, in general, and water institutions, in particular, is provided by Saleth and Dinar (2004).

or confront the same user, as well as the relationship among them. In legal anthropological approaches, property rights are approached from a perspective of legal pluralism. Benda Beckmann F von (1988) reserves the concept of legal pluralism to denote the “duplicate nature of institutions, rules, and processes, as also the relationship between different normative systems.” Legal pluralism is an umbrella concept indicating the condition that more than one legal system or institution co-exists with respect to the same set of activities (Benda Beckmann F von 1999). For instance, statutory law may co-exist along with customary law and socially accepted conventions and practices.²

Several points merit attention when we approach water rights from a perspective of legal pluralism. First, the premise of legal pluralism shifts focus from the legal or property rights system to the individual. Thus, the focus is not the legal system or property rights system per se, but the individual, who is confronted with different legal or normative systems pertaining to the use of water. Second, a legal pluralistic premise requires the recognition of different bases of legitimacy. State law and property rights emanating from the state have their legitimacy in the state; customary law, conventions and practices, have their legitimacy in a system of social sanction. Essentially, a perspective of legal pluralism sensitizes us to the fact that there may be more than one source of water rights.³ Customary rights are often found to co-exist along with rights sanctioned by the state. This can, and has often been, a cause of conflict over water. Furthermore, legal pluralism helps us question the premise that no property rights exist. A situation where there are no state sanctioned rights could be interpreted to be a situation of ‘no property rights existing’, when in practice, there may be a system of rights and mutually constitutive obligations devised and followed by the community, as often observed in community-based systems of irrigation management.⁴ Finally, legal pluralism can be applied to a gendered analysis of property rights, in how men’s and women’s access to water may be socially differentiated.

While new institutionalist perspectives emphasize the need for creating a property rights structure in order to correct the incentive structure facing water users, legal pluralistic perspectives sensitize us to the fact that more than one set of property rights might co-exist. Therefore, any effort at creating a new property rights structure must be cognizant of how it will articulate pre-existing notions of property rights. In this context, there is a need to distinguish between water allocation and distribution, or between concretized rights and materialization of rights. Statutory rights may be granted by the state. However, individuals may mobilize social relationships in order to make these rights more effective. Water rights may be defined by state

² Three major ideas run in the writings on legal pluralism. First, there is a questioning of legal centrism, namely, that all legal ordering is rooted in state law (Merry 1988; Griffiths 1986; Spiertz and Wiber 1996). Furthermore, what is considered to be a legal system is hardly a system because it is not coherent or complete (Spiertz and Wiber 1996). The second idea, which is related to the first, is that of the co-existence of several normative orders. An individual finds himself at the converging point of multiple regulatory orders (Vanderlinden 1989). There is an interplay of plural normative frameworks in society; rules, law and institutional frameworks are independent social resources that actors mobilize to accomplish their ends (Spiertz and de Jong 1992). Third, there is recognition that legal pluralism is all pervasive (Merry 1988; Griffiths 1986). Legal pluralism is present in all societies; the difference being only a matter of degree.

³ A good synthesis of cases analyzing water rights from this perspective is provided in Bruns and Meinzen-Dick (2000).

⁴ Specific instance of water rights systems in community-managed irrigation systems in India are presented later in this paper.

law, but realized through another normative system, based on social relationships. This has been observed, for instance, in the warabandi system of irrigation prevalent in the Northwest Indian state of Haryana (Narain 2003), as also revealed by similar studies in Pakistan (Merry 1986a and b; Meinzen-Dick 2000).

Rights by Prescription and Rights by Negotiation

A useful distinction is provided in this context by Molle (2004), who distinguishes between rights by prescription and rights by negotiation. The definition of water rights by prescription is an approach whereby the state defines the priorities to be given to different uses, while users are considered the recipients of the formalization process. These rights may be permanent, or granted for a number of years; they may be conditional upon productive use or be inalienable. Another alternative is to conceive water rights from the bottom-end users. Because many local, formal or informal rights pre-exist, it would be more apt to construct rights gradually, through step by step negotiation between those parties concerned with the management and use of water. It is important to bear in mind that water rights are not static entities, but are in a constant state of flux. There are several contexts in which water rights are negotiated and renegotiated, and water users deploy a wide range of strategies to extend their water rights or make them more effective. These include political pressure, persuasion, petitions and written applications (see Box 1.) They also include tampering with outlets such as breaking outlet locks and gates (Mollinga 1998).

Box 1. Renegotiation of Water Rights on the Sitapur Minor

The members of the Sitapur Village exercise different forms of power to justify their claim over water. This includes going up the minor head, and making appeals to political and administrative authority. On April 16, 2000, when I arrived in the Sitapur Village, I learnt that a group of village folks had gone up the minor to ask the beldaar to release more water. The water supply at the tail of the minor was only 1 foot, way below the authorized discharge. There was an acute scarcity of water and the farmers complained that their johads (village ponds) were dry and the livestock was dying. I learnt that at that point of time, farmers had inserted siphons at four places along the minor. This had disrupted the supply of water to the village. There was some negotiation with the 'Regulation Beldaa'r who relented to remove one more kadhi; this released enough water to fill one johad.

The farmers in the Sitapur Village also turn to different levels of administrative and political authority to justify their claim over water, though, with little sustained corrective response. They have written and sent petitions to the SDO, XEN and JE (position holders in the Irrigation Department). They have also made representations to the present and previous chief ministers of the state. In September 2000, the Chief Minister of Haryana, O P Chautala, was passing by the village on one of his 'sarkaar aap ke dwaar' (government at your door-step) program tours. A large group of farmers assembled along the minor to stop his fleet of cars and to draw their attention. The usual response of the farmers to how effective this strategy is thus: "for some days, water flows as per the desired standard, then it is back to normal."

Source: Narain (2003)

Socio-technical Perspectives on Water Rights

The socio-technical approach to irrigation developed at the Wageningen University, in the Netherlands (Kloezen and Mollinga 1992). This approach essentially sees water management and distribution practices as socio-technical constructs and phenomena, shaped by the interface of technology and institutions. There are three premises that support this theory — that technology has social requirements for use; technology is socially constructed; and that technology has social effects. This approach has been applied to, among other subjects, situations of irrigation management transfer (Narain 2003; Khanal 2003); analysis of market-oriented reforms in irrigation (Kloezen 2002); the social construction of tank irrigation technologies (Shah 2003); and of canal irrigation technology (Mollinga 1998).

When viewed from this perspective, water rights are seen essentially as a certain configuration of technology or the design of canal irrigation and concomitant social infrastructure and relationships. The relevance of socio-technical perspectives on water rights is that they sensitize us to the fact that water rights do not exist in isolation, but instead are embedded in technology and social relationships. For instance, water rights in the warabandi irrigation system of Northwest India, defined in terms of the time for taking water, are the result of a certain technology for water distribution that seeks to ration out scarce water supplies among a large number of farmers in proportion to the size of their landholding (Malhotra 1998; Narain 2003; Narain, forthcoming). Once a water right is defined in this sense in terms of a time for taking water as laid out in the warabandi schedule, farmers deviate from it by exchanging turns, on the basis of informal relationships (see Box 2).

Box 2. Visit to Kishan's Fields

While I was sipping my tea at the dhaaba (road-side eating joint), a man called Kishan introduced himself. He had 5 kilas (acres) of his own land and had taken 16 kilas of land on contract. We then reached his fields at about 10.45 a.m and started walking towards the point where his field channel took off. His awsara (turn for taking water) started at 10.50 a.m. When we reached the head of his field channel, he showed water flowing to his neighbor's fields. A small embankment of mud lay across the head of his field channel. All he had to do was to break that embankment and insert that mud over the head of his neighbor's field channel so that water would start flowing to his fields instead. They conversed with each other and I started inspecting his fields. Kishan said then that we should go back. I was surprised, I looked at my watch and said "but your awsara (turn for taking water) has started. It is past 10.50. I have come to see you irrigate." "No," he said, pointing to his neighbor, "he is taking my share of 50 minutes today." At this point in time, his neighbor intervened, "next time, I will give him my 50 minutes. Then, he will have a total of 1 hour and 40 minutes to irrigate." I was quite impressed. The entire transaction had taken place in front of my eyes with great felicity and smoothness and I was amazed at how little effort was involved in it.

Source: Narain (2003).

This could be contrasted with water rights in the shejpal system of western India, where farmers apply for irrigation water in each cropping season, and these applications are

granted by the irrigation department based on the availability of water stored in the reservoirs.⁵ Water rights in these systems take the form of irrigation passes that are sanctioned by the Irrigation Department in response to applications for water received and the availability of water stored in the reservoir. Thus, water rights in the warabandi and shejpali systems take a different form in response to the differing types of irrigation systems, namely the design and characteristics of the irrigation infrastructure, and the concomitant institutional framework for water delivery.

The relevance of these approaches to the analyses of public policy interventions for creating a water rights structure needs to be appreciated. While new institutionalist perspectives that have dominated the current thinking on water rights in India emphasize the creation of a water rights structure to ameliorate the incentive structure facing water users, and have formed the basis of much of the policy prescription in favor of instituting a water rights structure through public policy intervention, socio-technical and legal pluralistic perspectives urge us to be cognizant of existing notions of water rights as embedded in technology and social relationships. Proposals for water rights reform and market creation need to take into account existing notions of property rights, rather than start from a premise that no property rights exist, or that they are ill-defined or insecure. Any new system of water rights that is imposed will articulate with existing systems and notions of water rights. It is important to be conscious of how this articulation would take place, and what its effects would be.

The second significance of this analysis is that it may be in the long run, futile, and perhaps inappropriate to think of ‘a’ property rights structure for India; instead, it is more appropriate to think of differentiated property rights suited to different technological, social and hydrogeological conditions. Besides, given that property rights are not static entities, but constantly in flux, being negotiated and renegotiated, and that there is a discrepancy between the concretization (or definition) of water rights and their materialization (or realization), it questions the efficacy and potency of a property rights structure as a tool for accomplishing specific public policy goals, such as the management of irrigation demand.

The Indian Experience: Evidence of Water Rights Systems

Water rights systems of various kinds are known to have existed in India for a long period of time under various kinds of community-based and state-managed irrigation systems. These systems have emerged in response to different local, social and hydrogeological conditions, and have existed, in some cases, for centuries. It is important to note that in these systems, water rights are defined differently; this may be in terms of a time for taking water, on the basis of crop water requirements, or family size. Some of them have had an in-built element of flexibility to respond to seasonal variations in water supply, even as crop-water requirements are known to have been the basis for the determination of the water right. A case in point is the phad system, which is known to have existed in western Maharashtra for several centuries (Box 3). In other systems, water rights have been defined in terms of the time for taking water, in proportion to the size of landholdings, as seen in the warabandi system of irrigation prevalent in Northwest India (Box 4), and also referred to earlier in this paper.

⁵ A detailed discussion of this process is beyond the scope of this paper and can be found in WALMI (1998a, b), Narain (2003) and Lele and Patil (1994).

Box 3. Water Rights in the Phad System

The community-managed 'Phad Irrigation System', prevalent in northwestern Maharashtra, came into existence some 300-400 years ago. The system operates on three rivers in the Tapi Basin, Panjhra, Mosam and Aram – in Dhule and Nashik districts. A series of bandharas were built in these rivers to divert the water for agricultural use. Variations in the supply of water are managed annually by demarcating the command into two categories. Assured irrigation is so limited that in most years it can be irrigated without much difficulty. In years of water scarcity, irrigation is done by extending the rotation period in summer, with less strain on the system. Division of the command into phads and planting of only one crop in each phad helps in the management of irrigation application. The water requirements for a phad are the same, and the entire area in a phad can be treated uniformly for water application. Sharing of water among the phads can also be varied according to different water requirements for different crops. Thus, a phad with a wheat crop can be allotted a higher share of water (per hectare) than a phad with a sorghum crop. The sequence of irrigation in a phad is from head to tail. At the head, farmers receive irrigation water first, and the water application is relatively high. When the upper farmers irrigate, excess flows reach the lower farms. To ensure adequate supply of water to the tail reaches, a second watering to the farmers at the top is not allowed until all farmers along the canal have received irrigation water.

Source: Agarwal and Narain (1997)

Box 4. Water Rights in the Warabandi System of Northwest India

Warabandi, prevalent in Northwest India and Pakistan, is a system of water distribution that is designed so that every farmer is entitled to receive a pre-determined share of water in proportion to the size of his landholding. 'Wara' means turn and 'bandi' means fixation. Thus, warabandi means fixation of turns. It implies a rotational method of water distribution. The cardinal principle underlying the warabandi system of irrigation management is that the available water, whatever its quantum, is intended to be allocated to cultivators in equal proportion to their Culturable Command Area (CCA), and not to meet their total demand. This imposes water scarcity conditions in the command area. The theory of the warabandi arrangement is that each cultivator is assigned a turn, represented by the specific period of time--a time share--and the volume of water available during that slice of time is his to use. This time share becomes a property right legitimized by the state through the creation of a formal and legal warabandi roster for the delivery channel in question. The warabandi share, as a property right, then serves to organize the social relations of irrigation among the cultivators and between them and the irrigation agency.

Sources: Coward 1986; Malhotra 1998; Narain 2003

An alternative basis of allocating water rights has been on the basis of the size of the family, as seen in the Pani Panchayats of western India. An important feature of this experiment was the separation of rights in water from rights in land; the agreed principle was that water

sharing would be on the basis of the number of members in each family. Each member would be entitled to half an acre of irrigation with an upper ceiling of two and a half acres for a household. The water rights would not be attached to land. The Pani Panchayats have existed outside a statutory organizational set-up, based on locally evolved norms and regulations regarding water use. Thus, they are essentially self-governing institutions formed to govern water management based on mutually agreed norms. They have existed for sharing water mainly among small and medium farmers belonging to a single caste. Thus, they have been characterized by an element of social and economic homogeneity among their members.

The failure of the Pani Panchayats to define a family or household resulted in making the water distribution rule more favorable to farmers with large families (Keremane et al. 2006). There has been only scant evidence of any landless receiving water since the formation of the first Pani Panchayat in 1979, demonstrating the impracticability of the principle of separating rights in water from rights in landholdings. Furthermore, these Pani Panchayats have been on the decline on account of several factors such as the existence of internal disputes among members, absence of explicit conflict resolution mechanisms and the policies and the lack of support from the government.⁶ It is possible to locate many other systems of water rights in India.⁷ The existence of such systems is often used as a basis for evidence in favor of introducing and institutionalizing a property rights structure, on grounds that a water rights structure is compatible with the Indian ethos. However, it is important to bear in mind that they emerge in response to specific local social, hydrogeological and technological conditions and, as such, make much more a case for the existence of varying property rights regimes rather than 'a' property rights structure. Furthermore, the reason that they have existed is their compatibility with local conditions, and that does not in itself provide evidence that a property rights structure created through top-down, public policy intervention will meet with the same success and acceptability.

Rationale for a Property Rights Structure

Why is a property rights structure needed? The basic underlying rationale for the establishment of water rights, from a policy perspective, is that a clear definition of who is entitled to use a certain amount of water, with the specification on when and where this is possible, will reduce uncertainty and conflicts (Molle 2004). A water constraint experienced by individual users will compel them to use water more efficiently. And this practice will have a significant impetus when they have the option of an economic exchange for the water thus saved (Saleth 2005). In the Indian context, current debates on water rights in the context of groundwater revolve around addressing the incentive problem associated with overexploitation, the functioning and regulation of water markets and addressing equity issues, both at the intra-generational as well as inter-generational level. In surface water, too, rights in water have been tied to rights in landholdings, and the need to separate the two has been considered necessary from an equity perspective.

⁶ The separation of rights in water from rights in land has also been a subject of the agenda for several nongovernmental organizations, such as SOPPECOM in Maharashtra. The separation of rights in water from rights in land, nevertheless, is a subject that requires strong political will that is unlikely to be forthcoming.

⁷ A detailed listing is provided in Saleth (2005). See also Agarwal and Narain (1997) and WALMI (1998a, b).

Rationale for Water Rights in Irrigation Management

Though India does not have at present any explicit legal framework specifying water rights, various 'Acts' in existence have the basis of defining such rights (Saleth 2005). Early British legislations did recognize customary water rights of individuals. However, with the Easement Act of 1882 and the Madhya Pradesh Irrigation Act of 1931, the state's absolute rights over all rivers and lakes were firmly established. In surface irrigation, the case for a property rights structure as a tool for demand management has been linked closely to a case for market creation (Narain 2003). The premise is inspired by fundamental neo-classical economics: well-defined, secure property rights in water will, through an invisible hand, lead to a situation where water is allocated to the highest valued uses, and a price will emerge that is a market clearing equilibrium price. Furthermore, this price, when constituted through the interface of the forces of demand and supply, will convey the scarcity value of water (Rosegrant and Binswanger 1994; Meinzen-Dick and Mendoza 1996; Anderson and Snyder 1997). This, in turn, could serve as a potent tool for curtailing demand.

It is argued that excessive resource depletion and environmental degradation are the result of misleading price signals, which result from the absence of markets and secure property rights in resources and environmental assets. Establishment of secure property rights should lead to the emergence of markets and scarcity prices for the resource in question. With exclusive and secure property rights, resource depletion would be internalized (Panayotou 1994). Once the water rights systems are set up, water markets in water-scarce areas will establish the market value of water, which is also a reflection of the opportunity cost of water (Kemper and Olson 2000).

Second, secure property rights are advocated on grounds that they could empower users (Rosegrant and Binswanger 1994). Security of tenure could lead to long-term investments in water saving, cause users to consider the opportunity costs of water and to use it efficiently, and gain additional income from the sale of water and internalize externalities. It would be more responsive to changes in water values as demand patterns and comparative advantage change. Third, it is argued that when water can be made available to meet demand through water markets, it reduces the need for constructing costly supply-oriented infrastructure and leads to a more rational and economically viable allocation of water resources (Kemper and Olson 2000). Markets can allow rapid changes in allocation in response to changing demands for water and can stimulate investment and employment as investors are assured access to secure supplies of water (Thobani 1997).

Institutional Demand for Water Rights

Another reason that the subject of water rights in surface irrigation has acquired some prominence in recent years is in the context of debates on irrigation management transfer. Water rights have been identified as a subject that has been overlooked in the design and implementation of programs for irrigation management transfer (Mollinga 2001). On the other hand, water right is a subject that such programs need to explicitly address. A pertinent issue is: why would farmers come together to form a water users' association unless they see a perceptible difference in how water rights are defined (Narain 2000; 2003)? Does the formation of water users' associations strengthen farmers' claim over and access to water, or does it maintain the status quo?

The case for a property rights structure has been a prominent subject in debates in the realm of groundwater governance and policy for over two decades. Such authors as Shah and Raju (1988) have referred to the need for a well-defined rights structure in the interest of equity among users. Dhawan (1975) has argued for such a structure in the interest of sustainability. Similarly, Moench (1994) has argued for a similar system for the successful functioning of water markets and water user groups. A property rights structure has been seen as a viable alternative to other policy interventions for groundwater management, which have been unsuccessful in their impacts (Narain 1998, 2000; Kumar 2000; Saleth 1996, 2005). These measures have included licensing and credit or electricity restrictions for the construction of wells or spacing norms (Shah 1993). None of these measures have had a significant impact.

There has been a tendency to scuttle licenses issued by the state's groundwater departments for electricity connections by the rich and influential farmers. In the event of credit restrictions, the well-off farmers are known to have resorted to informal sources of credit or to even self-finance their structures. Similarly, when the water table is high enough, in the face of electricity restrictions, the affluent farmers have been known to get away with diesel connections. Besides, these measures have sought to regulate only the establishment of groundwater structures, rather than the quantum of water extracted. The policy and institutional framework for groundwater, then, has been considered not only peripheral to the sector but also regressive in its impact, favoring the pre-emption of the resource by the rural elite.

There are no *de jure* rights in groundwater; but *de facto*, all land-owners have the right to groundwater underlying their land. The Easement Act (1882) allows private usufructuary rights in groundwater by viewing it as an easement inseparably connected to land. The Transfer of Property Act 1882 provides that easements (in this case groundwater) can be given to one only if the dominant heritage (in this case land) is also transferred. Conversely, the Land Acquisition Act asserts that if some one is interested in getting rights over the groundwater, he would have to be interested in the land. Thus, groundwater is viewed essentially as a chattel attached to land. There exists, at the same time, no limit to how much water a landowner may draw, in contrast to a legal structure that specifies property rights setting absolute limits to collective and individual withdrawals. Once again, the legal framework is conducive neither to equity nor to sustainability.

Post-colonial efforts at legislation have been made through the Model Groundwater Bills of 1970 and 1992. The central focus of these bills has been in the creation of a groundwater authority comprising essentially representatives of the government and the technocracy for giving clearances for the installation of water extraction structures (Narain 1998, 2000; Kumar 2004). However, once again, they seek only to regulate the creation of water extraction mechanisms, rather than the quantum of water withdrawn. Besides, there has been opposition to the bills on the grounds that like the past record with the system of licensing, they would tend to breed corruption and inequity. It is also felt that such an approach ignores the possibility of successes through localized, participative approaches and adopts a simplistic, centralized approach that fails to consider the wide array of management options suited to diverse sociological as well as hydrogeological contexts (Narain 1998; Kumar 2004). While some states have made certain efforts to tinker with and to implement this legislation, it is felt that even if they would succeed, there would be no significant impact on promoting either sustainability or equity. In 1996, the Supreme Court of India declared the Central Groundwater Board as India's authority that would take custody of her groundwater resource and arrest

overexploitation of the resource. After as much as a decade, Shah (2008) notes the inability of the body to register, let alone regulate, the over 350,000 domestic wells scattered even through the capital city.

More recently, the subject of the need for a property rights structure in groundwater has acquired significance in the context of localized struggles for water rights and more so in rights to development. The pre-emption of scarce groundwater supplies for industrial use, such as for manufacturing beverages brought popular attention to the subject of use and ownership rights over water (Drew 2008). This has taken the form of public vs. private ownership of groundwater, as in the case of Plachimada, in Kerala, wherein the Perumatty Panchayat chose to support the tribal women who were conducting an infinite sit-in to stop the loss of an estimated 1.5 million liters of water a day. After filing a Public Interest Litigation in the Kerala High Court, the Kerala Chief Minister ordered the closure of the plant on February 17, 2004. The Perumatty Panchayat has continued to withhold permission of the company to resume operations (Ranjith 2004). Another context in which the subject of a property rights structure for groundwater will assume significance now is in terms of growing rural-urban conflicts over water. With the advent of urbanization, as water is diverted to urban uses, rural water supplies for agriculture will come increasingly under threat; conflicts and social and political unrest will intensify in the absence of well-defined rights to groundwater use.

Water Rights Structure: The Role of Public Trust Doctrine

Given the failure of past efforts to regulate groundwater withdrawals through a wide range of legislative and regulatory measures, and with growing struggles and pressures over groundwater use, a property rights structure has been seen as a viable alternative, for addressing equity, efficiency and sustainability concerns in groundwater use (Saleth 1996). Saleth (1996) advocates a water rights structure specifying individual and collective limits to water withdrawals under which water resources would be held by the state under the 'public trust doctrine'. Under such a structure, the state is seen as a trustee of the country's water resources under a premise of stewardship; equity can then be achieved at the stage of distributing individual and collective water rights, efficiency can be enhanced by permitting the exchange of water rights, and sustainability can be ensured by limiting overall water withdrawals by specifying absolute limits, collectively as well as individually. Under the public trust doctrine, the overall water allocation, regulation, and management are with the state, and community organizations under the influence of the public trust whereas field level water allocation and use are under private hands and market influence (Saleth 2005). The government at the appropriate level has the responsibility to establish the legal framework for the water rights system including formal mechanisms for conflict resolution at the regional level. According to Saleth (2005), a water rights structure could be a rare policy instrument that accomplishes the three policy goals — sustainability, efficiency and equity, simultaneously and effectively.

The International Experience: Some Evidence

Several countries have made a move towards market-based allocation of water based on a property rights structure, as against command and control measures in response to varying levels of physical, institutional and financial scarcity (Venkatachalam 2008). However, there

seems to be a difference in terms of the factors that have led to the movement towards an adoption of a property rights structure. In developed countries like USA and Australia, water scarcity is known to have led to its evolution. On the other hand, in developing countries like Chile, Mexico and Morocco, the move towards a property rights structure was part of overall economic reform processes.

On the whole, the experience of countries such as Australia, Chile, and the western parts of the US suggests that once the Water Rights System is established, economic incentives emerge for the development of more robust but less costly water measurement technologies (Saleth 2005). The experience with these countries also suggests that once the rights over most of the resources are already claimed, meeting the rights of new entrants is met by reallocating the existing rights mostly through markets or state-managed compensation procedures. As seen in Chile, these rights may not necessarily be ownership rights; they could as well be usufructuary rights.

Studies have shown that a move towards a property rights structure does result in increased water use efficiency and productivity and lower transaction costs, even as the outcomes depend on the political set-up, historical factors, institutional and policy aspects (Samad 2005). One critique of the limitation of the functioning of a property-rights based market structure, however, comes from questioning the functioning of property rights and water markets as purely economic phenomena. This is borne out, for instance, by the evidence of market-oriented reform policies in Mexico (Kloezen 2002). Kloezen argues that cost-recovery; financial autonomy and water pricing and marketing need to be seen as socio-political constructs. The behavior of actors in settings of market creation is not purely guided by conditions of economic rationality, but also shaped by social and political factors. In Chile, while formal water markets are known to have improved the economic efficiency of water use and stimulate investment as demonstrated by Thobani (1997), Bauer (1997) shows how sales in canal water tended to be limited on account of several geographical, local and cultural factors. In general, the Chilean model of water resource management shows the need for a more institutional and interdisciplinary approach to the economics of water (Bauer 2005).

Creating Water Rights: Opportunities and Constraints

Given a convincing rationale for creating a property rights system as a tool for demand management as well as the existence of water rights systems already in different parts of the country, and some evidence in support of a water rights structure from international experience, what supportive conditions are needed to institute such a system, and do these conditions exist in Indian settings? The issue of defining and enforcing such rights in the context of water with its fluid and fugitive characteristics requires indeed specific technical, organizational and infrastructural conditions (Saleth 2005). Reidinger (1994) argues that three conditions are essential— water rights must be clearly specified and legally enforceable, water supplies should be reliable and delivered on a volumetric basis and there must be some form of water user organization.

Hydrological Databases

To begin with, defining quantitative rights requires a very sound knowledge and control of the hydrology of the basin, its water balance and its surface and underground flows (Molle 2004). Data collection and processing must not only be of a high standard but also be made

transparent and accessible, so that users may make sense of the share of water that they are able to access. The most immediate technical requirement is to establish a water balance for each appropriately defined hydrogeological unit under use and source-wise disaggregated conditions as well as alternative scenarios. It is believed that meeting this requirement for most areas in India is not difficult, given the availability of information and technical expertise (Saleth 1996; 2005). While the establishment of the water rights system is likely to generate new demand for additional and more refined information, the existence of the necessary technical capacities and organizational preconditions can enable most states to meet such information needs. More than a decade ago, Saleth (1996) demonstrated that India indeed had the technical capability, institutional capacity and the adaptability to implement and monitor such a system and that the technical and institutional capacity would only further improve in the years to come.

Decentralized Organizational Arrangements

Enforcement of a property rights structure, monitoring and conflict resolution at the basin and local levels further require decentralized arrangements such as basin organization, local governments, community organizations and user-based arrangements. In India, there is evidence of local community-based institutions' involvement in allocating and managing water, as seen above. More promise on this is provided by recent efforts directed at management decentralization through water user associations. However, the validity of several of the other conditions that are necessary for the functioning of a property rights structure and the consequent emergence of water markets, as a potential tool for managing irrigation demand, has been widely challenged (Young 1986; Bolding, Mollinga and Straaten 1995; Moore 1989; Narain 2008). It is argued that water markets of the kind envisioned by neo-liberal enthusiasts based on a property rights structure would not emerge in Indian canal irrigation. Several factors are known to restrict trade in water. These inhibiting supply characteristics include mobility, economies of large size, uncertainty and variations in supply and availability of alternative sources of supply. Other factors include high costs of storage and conveyance and high transaction costs relative to likely gains from potential exchange.⁸

Stable, Volumetric Water Supplies

Important constraints emerge from the wide variations in the availability of the water supply in Indian irrigation systems. The definition of entitlements and allotments implies that the corresponding amount of water can be delivered during a specified period (Molle 2004). Depending upon the size of the basin and the degree of technical control on flows, this assumption may be too optimistic. Uncontrolled water pumping or diversion may affect flows; conveyance and control structures may be manual and rudimentary; low water levels and low heads in dams or canals may not allow managers to ensure planned discharges; rainfall and side flows permanently alter the effective flow at different points in the system; and conjunctive use of water blurs assessment of demand and contributes to the deregulating of cropping calendars by allowing farmers to be more flexible.

⁸ This should, however, be distinguished from sales of groundwater services to irrigators, as evidenced in the groundwater markets, for instance, in Gujarat. Groundwater markets have emerged as a response to the open access and fugitive nature of groundwater resource, causing farmers to pump large volumes of water for commercial purposes. See, for instance, Shah (1993) and Dubash (2002).

Redesigning Irrigation Systems

Under conditions of protective irrigation in India, where water is ‘scarce by design’, the possibilities of water markets emerging are very limited (Narain 2003; Narain 2008).⁹ In fieldwork in the warabandi system of irrigation in North-West India, for instance, it was found that while there were some sales of canal water among users, they were confined geographically, and were on a very small scale. The basis of a water sale is a surplus; a farmer would choose to sell his water right only after he had met his own requirements. When a farmer’s water right is inadequate relative to his requirement, as is the case here, there is no saleable surplus. Thus, the basis for the sale of a water right is limited. Where groundwater supplies are inadequate and/or of an inferior quality, as quite often they are, dependence on canal irrigation shall continue to be high. Thus, while theoretically the argument in favor of property rights reform and market creation may sound neat and appealing, this argument acquires a new dimension when placed in the context of the design characteristics of canal irrigation.

Social Values and Transaction Costs

Apart from economic values, communities associate a certain sense of security and control with water over and above its direct economic significance, which may cause the emergence of a market to be ‘sluggish’. Farmers have been found to have a psychological resistance to selling their water share (Narain 2003). It is something that is just ‘not done’. Narain found that when a farmer did not need his water share, he chose to lend it instead of selling it. This is because lending his water share created a basis for a future claim, since the borrower was obliged to return it.

The presence of many small farmers and political risks in creating the legal and organizational apparatus and conceptual or information problems in defining water rights in physical and legal terms constitute major challenges in moving to a property rights structure in water (Saleth 2005). Perhaps the most important constraint in this context is likely to be the high transaction costs of dealing with millions of farmers scattered geographically over large areas (Shah 2008). This is where the Indian conditions are most unique, particularly with regard to groundwater irrigation. Shah notes that India’s groundwater economy is characterized by some 20 million small well-owners, scattered over a vast countryside, supplying groundwater irrigation service to another 30-40 million marginal farmers. While the volume of groundwater India diverts every year is only a little over twice what the USA does, the number of independent users are over a 1,000 times the number in the western USA. Defining rights also means that there is a political will and a legal capacity to act against those who disregard them, to control new users and limit corruption (Molle 2004). Poor stakeholders may be unaware of their rights, unfamiliar with administrative or legal processes and have an instinctive (and understandable) reluctance to engage in them.

Concluding Remarks

Given that certain conditions are needed for the institutionalization of a property rights structure in water, are these conditions met to the extent that a water rights structure can be

⁹ Protective irrigation systems seek to divide a limited water supply over a large area in order to protect large numbers of farmers over large areas against droughts that would otherwise occur. See Mollinga (1998).

successfully instituted? The institutionalization of property rights structure is, in principle, very much possible at the level of user groups in the shejpali system of irrigation prevalent in western India (Gujarat and Maharashtra). The institution of property rights and creation of water markets is technically feasible at the collective or group level, given that it is possible to deliver volumetric supplies of water to farmers and to outlets, for instance on the basis of season-wise quotas; irrigation systems are fitted with volumetric devices such as the V-notch and standing wave flume. Indeed, volumetric water supplies have been tried in several experiments in Maharashtra as part of the programs for IMT (Irrigation Management Transfer).¹⁰ However, given that water rights at an individual level are defined in a strict sense only after the farmers have made applications and these have been sanctioned by the Irrigation Department, it is hard to think of a long-term institutionalization of water markets in these systems at the individual user level.

In the warabandi irrigation system that is prevalent in northwest India, (namely, Punjab, Uttar Pradesh and Haryana), water rights are already defined in terms of the time for taking water, and farmers exchange their time slots to suit their convenience. So, a water rights system is already in place, concomitant and in fit with the physical infrastructure (Narain forthcoming). One critique of this system, however, is that the rights are defined in terms of the time for taking water, rather than the volume, making the system inequitable across head and tail reaches. Thus, the system rations the time for taking water rather than water itself. Any effort at reforming this system from a rights perspective would be motivated more by considerations of equity, rather than those of demand management. Irrigation systems here are fitted with outlets such as the APM (adjustable proportionate module) and the open flume¹¹, wherein discharges vary with upstream water flows and, therefore, volumetric-based rights are a technical impossibility. In any case, since water rights are defined in terms of time for taking water, rather than volume, and users exchange their time slots to suit their convenience, it is hard to think of a water rights system as a potent tool for managing irrigation demand in these systems.

In South Indian canal irrigation systems, as in Karnataka, Tamil Nadu and Andhra Pradesh, the dominant practice is localization. Localization can be looked at as a rights system, wherein certain plots of cultivated land or farmers have the right to irrigation by virtue of an administrative order. However, that right tends to be rather weak, and not necessarily, actually, experienced as a right by farmers.¹² It is probably better seen as a regulation mechanism for the government, in which respect also it has tended to be weak.¹³ Essentially, the 'rights' that localization has established are not enforceable; neither for farmers, nor for the government. Therefore, actual practices take the form of some kind of anarchy at the field level.

Given this context, a study on the Tungabhadra Canal (Mollinga 1998) showed that in practice, there was extensive rule-making at all levels. These rules tended to create de facto rights. The process of negotiated rule-making emerged as the core process - that lead to rights, in whatever way they would be defined or understood. While it is true that rights principles were present in such negotiations, but so were location-based advantages, physical

¹⁰ See, for instance, Lele and Patil (1994) and Narain (2003).

¹¹ Technically speaking, these are semi-modular outlets, wherein the discharge varies with the upstream water levels.

¹² Personal communication with Peter Mollinga, May 15, 2008.

¹³ The exception perhaps would be the early days of localization when farmers actually went to court sometimes for not getting water.

force, management styles of bureaucrats and local relations of power. In these conditions, therefore, it is unrealistic to see 'rights' per se as an important factor organizing irrigation practices, or influencing irrigation demand. As regards groundwater, though the arguments in favor of a groundwater structure are quite convincing and several of the technical and institutional conditions are known to exist in the Indian settings, perhaps the most important constraint is likely to be the high transaction costs of dealing with millions of farmers scattered over large areas. Even as rights-based institutions for groundwater governance are known to have successfully existed in the west, the distinguishing characteristic of Indian settings is the large number of scattered users, extracting water over a large geographical area that is likely to make the introduction of a water rights structure problematic.

In conclusion, this paper has three main messages to articulate. First, that it is perhaps unrealistic to think of 'a' water rights structure in Indian settings, given the diversity of technological, social and hydrogeological conditions. On the other hand, there is merit in recognizing a differentiated rights structure in alliance with local conditions of the kind described in this paper. Second, a rights structure is likely to play a more important role in organizing access to water, namely, defining who gets water, and how much rather than as a means of managing or curtailing irrigation demand, as a top-down public policy measure.¹⁴ Third, the large number of groundwater users spread over large areas, making monitoring difficult, and the design characteristics of Indian canal irrigation systems as described in this paper are likely to pose significant constraints in introducing a water rights structure as a tool for managing irrigation demand.

¹⁴ Here, too, access is likely to be mediated by social relations and other factors, rather than being solely determined by rights themselves, as defined.

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