Chapter 10
Water Rights and Entitlements in India

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Abstract With increasing water scarcity in India, the need for establishing institutional mechanisms such as the water rights and entitlements (WR&E) system is widely recognized. But, there are many questions continue to persist as to the form and feasibility as well as the challenges and opportunities involved in establishing such a system in Indian context. This chapter tries to answer some of these questions by (a) discussing the legal, policy, and organizational aspects of WR&E system relevant for India; (b) tracing the evolution of informal and formal WR&E systems at various scales; (c) assessing the opportunity costs of missing or unclear WR&E system in terms of foregone benefits; (d) indicating the technical and institutional potentials as well as the political economy constraints for promoting the WR&E framework; (e) exploring how the WR&E framework can be introduced in areas with rudimentary water rights; and (f) Concluding with the identification of short and medium term options as well as paths and implementation strategies for promoting the WR&E framework for India.

Keywords Incentive gap in water use, India • Opportunity costs of missing water rights system • Rudimentary water rights • Water markets • Water rights system • Water sector reforms

10.1 Introduction

With increasing water scarcity and frequent occurrences of water-related conflicts at macro and micro levels, the institutional arrangements needed for orderly water allocation and efficient resource management are becoming more and more important. Allocation-oriented institutional arrangements require a formal system of water rights and entitlements (WR&E) applicable both at the macro level of regions

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and sectors as well as at the micro level of users and uses.[1] These rights and entitlements need not be ownership rights as they can be equally effective just as usufructuary (or, use) rights. Such institutional arrangements are obviously urgent for countries such as India where an overall supply gap is expected in the very near future. Already, the symptoms of supply–demand gap are already evident in many pockets in the country with serious livelihood threats and fierce political conflicts. The water demand of the country is growing fast due to population growth and economic expansion. As currently developed resources of 644 billion cubic meters or thousand million cubic meters (TMC) represent only 57 % of the utilizable potential (1122 TMC), certainly, there is a technical scope for supply augmentation. But, supply additions are getting increasingly constrained by investment bottlenecks, environmental concerns, and political and legal snags. Even if this potential is realized by overcoming the fiscal, environmental, and political challenges, the supply would still be inadequate as the total water needs of the country is projected to be in the range of 694–710 TMC by 2010, 784–850 TMC by 2025, and 973–1180 TMC by 2050 [Government of India (GOI) 2000]. Such a demand–supply gap can have devastating social, economic, and political consequences for a monsoon-dependent and rural-based economy such as India, unless remedial measures both on the demand and supply side are undertaken urgently.

The scenario facing Indian water economy is rather grave. As the diagnosis identifies institutional bottlenecks as the epicenter of most problems facing water sector, the policy prescription obviously calls for a radical change in development paradigm and urgent reforms in water institutions. Physical approaches based on supply augmentation and system improvement, though essential in certain contexts, cannot be the exclusive basis for water sector strategies. A paradigmatic shift is needed for seeking durable solutions rooted in economic and institutional approaches such as those based on a system of WR&E applicable both at the micro and macro levels. While there is consensus on the need developing the WR&E system, there is also a somewhat a distorted perception as to the technical and political feasibility of establishing such a system in the Indian context. Certainly, the introduction of the WR&E system will not be easy as it entails heavy financial, technical, and political costs. At that same time, it is also not that difficult or costly as it is often made out to be. WR&E are very much a reality as they exist in implicit and informal form both at the macro and micro levels.

The WR&E systems are implicitly recognized in a number of official documents, directly or indirectly formalized in various water allocation procedures such as *Shejpali* and *Warabandi*, and informally followed in many grassroots practices such as *Pani Panchayats* and groundwater markets. The real issue is essentially to formalize these implicit and informal WR&E and make them explicit and transpar-

[1] The terms ‘water rights’ and ‘water entitlements’ are used here interchangeably. Water entitlement, like water rights, is a legal right to access water. A water entitlement can be specified as a share of water from a consumptive pool of water as per a water plan or a fixed annual volume. But, there are subtle differences between the two as the water right can be legally obtained but water entitlement has both ethical and legal connotation.

ent. The prospects for making such changes are relatively high in many states in India given their legal and institutional scope, socio-economic and political benefits, and experimental possibilities. In many ways, the costs of establishing the WR&E system are, more or less, the same as those needed for undertaking any other reforms in the water sector. But, it is also true that the social benefits associated with WR&E system are not only far higher than these costs at present but also the net benefits from the system will be growing with the increasing scarcity of water in the future. This paper aims to precisely to establish this point based on a careful review of the legal, economic, and institutional issues and practices in the particular context of India.

10.2 Objectives and Scope

The overall objective of this paper is to demonstrate the rationale, feasibility, and options for establishing the WR&E system including how international funding organizations did or can support the efforts to promote such a system as a durable institutional solution for the water challenges of India. The specific objectives of this paper are to:

(a) Discuss the legal, policy, political, economic and organizational issues pertaining to the establishment of WR&E in India;
(b) Review the evolution of informal and formal WR&E in India at the national, inter-state, state, sectoral, and local levels and also indicate best practice cases at relevant levels;
(c) Assess the opportunity costs of missing or unclear WR&E at different levels in terms of foregone economic, social, and political benefits;
(d) Identify the technical and institutional potentials as well as the political economy constraints for promoting WR&E framework both at the local, sectoral, state, and inter-state levels;
(e) Examine how WR&E framework can be introduced in areas with rudimentary water rights and demonstrate how the framework can be applied to other contexts;
(f) Conclude by identifying short and medium term options as well as paths and implementation strategies for supporting the promoting of WR&E framework for India.

As to the scope, this paper is more eclectic rather than exhaustive in terms of its coverage of the legal, policy, and administrative or organizational aspects governing the water sector. The emphasis will be on the most important aspects of water institutions that are receiving considerable attention in the current debate on water sector reforms both in India and elsewhere. While informal institutions operating at the micro level will receive attention, the major focus will be on the formal institutional arrangements that are operating at the national and regional levels because they are more amenable for purposive reforms than their informal and local counterparts,

which are functioning sub-optimally due to the absence of macro level legal and organizational supports.

10.3 Water Rights and Entitlements: An Overview of Issues

For a monsoon-dependent country like India, water remains the dividing line between poverty and prosperity for millions of people. Efficient, equitable, and sustainable use of water requires the widespread adoption of desirable practices such as conjunctive use, supplemental irrigation, water-saving technologies, water transfers, and water recycling. But, this cannot happen in an economic and institutional vacuum. The WR&E system can fill this vacuum to alter the incentives and behaviors by setting the quantitative and qualitative limits for water availability for regions, sectors, and users as well as the economic and legal conditions for water sharing and allocation among these entities. If properly designed and implemented, the WR&E system can also be a policy instrument that can simultaneously address the goals of economic efficiency, social equity, and environmental security. Unfortunately, with narrow approaches, the WR&E system is often misconstrued as a prelude to water privatization and commercialization. Contrary to such a perception, it will be argued here that the WR&E system will be the cornerstone of a new governance structure that can permit social control and public decisions at the stage of allocating initial water rights and entitlements while allowing decentralized private decisions at the of stage of reallocation and actual use of water. The WR&E system is also essential for providing water security as well as generating food and livelihoods for the poor through an efficient and equitable allocation, use, and management of water resources. As a backdrop to the ensuing discussion, it is useful start here with a brief discussion on some of the legal, policy, economic, political, and organizational issues related to the kind of WR&E system to be developed for the specific conditions and requirements of India.

10.3.1 Incentive Issues

The rapidly approaching physical scarcity of water, which is already a reality in a growing number of basins in India, calls for far reaching changes in water resource allocation and radical improvements in water use efficiency. This applies particularly to the irrigation sub-sector with a dominant share in total water use. The persistence of the 'incentive gap' or the 'efficiency gap', i.e., the gap between the real economic value of water and the low value of water being perceived or assumed by users is a major threat to efficient water use in irrigated agriculture (see Box 10.1). The extensive damages of this incentive problem are already visible in the forms of aquifer depletion, water logging, and soil salinity. The incentive problem has legal roots in the colonial policy of separating resource ownership from resource usage and such policy has continued till today. The dichotomization of ownership and usage eliminates the incentives for resource use efficiency and conservation, as the users cannot claim the benefits from their efficient use. Unless this legal condition

Box 10.1 What Is Incentive Gap?
The 'incentive gap' or the 'efficiency gap' may be difficult to define in the absence of information on the real value or the opportunity cost of water. In simple terms and as lower bound values, it can, however, be approximated by the gap among water productivity, supply cost, and water rates.

In the context of canal regions, for instance, water productivity is reckoned in the range of Rs. 714–5812/hectare (ha) and supply cost is estimated to be in the range of Rs. 90–603/ha. But, water rates are in the range of Rs. 6–1000/ha) (GOI 1992b). While groundwater use is more efficient, it is not free the incentive problem as the groundwater rates of Rs. 3–48/h (Shah 1991) is far lower than both the supply costs and created benefits.

The incentive gap indicates not just an economic pricing but also the absence of the institutional conditions needed for volumetric allocation such as water rights and the organizations basis for their enforcement and cost recovery.

and its behavioral consequences are corrected, it will not be possible to influence resource use efficiency and conservation.

The failure of regulatory policies ranging from water pricing and user participation to well-spacing and power tariff demonstrates not only their poor design but also the institutional vacuum within which they are implemented. Unless some form of physical limits and use rules are set at the level of individual users, regions, and sectors to make the level and nature of access to water transparent and accountable, many of these regulations cannot be effective in achieving their goals. In the absence of such limits, emergent institutions such as groundwater markets with significant efficiency and equity benefits (Shah 1991; Saleth 1991) can degenerate into instruments for rent-seeking, water monopolies, and aquifer depletion (Janakarajan 1993; Saleth 1993). When individual users see their water constraint, they have the incentive to use water efficiently and such incentive will increase when they have the option for an economic exchange of the saved water. In view of this incentive effect and the equity and ecological safeguards possible when determining the overall allocation of rights and entitlements, the WR&E system will have inherent self-regulating properties. These properties have the potential to obviate the administrative pressures and regulatory failures associated with a plethora of ineffective regulations. The WR&E system can also fill the current legal and institutional vacuum surrounding groundwater markets, water user associations, and basin organizations.

10.3.2 Technical, Legal, and Organizational Issues

Complete physical control over an object is not at all necessary as it is rights never objects that are owned (see Coase 1937: 44; Dales 1968: 792). Although rights can imply physical aspects, they are a physical entity but a legal entity implying a

bundle of user rights with correlated duties. Similarly, as the experience in countries such Chile shows that these rights and entitlements need not be ownership rights and it is enough for them to be just as usufructuary (or, use) rights. However, the issues of defining and enforcing such rights in the context of water with its fluid and fugitive characteristics require additional technical, organizational, and infrastructural requirements. The most immediate technical requirement for a water rights system is to establish water balance for each appropriately defined hydro-geological unit under use and source-wise disaggregated conditions as well as alternative scenarios. Meeting this requirement is not difficult for most areas in India given the information availability and technical expertise (Pathak 1988; GOI 1988). While the establishment of the WR&E is also likely to generate new demand for additional and more refined information (World Bank 2004: 16), the existence of the necessary technical capacities and organizational preconditions can enable most states in India to meet such information needs.

The real challenges are in the definition, allocation, and enforcement of water rights. In this respect, the three issues need answers: unit of measurement, criterion for rights distribution, and enforcement and monitoring mechanisms. It is ideal to define WR&E in volumetric terms so that the same amount of water is implied across time and space. But, even this ideal measure faces problems due to return flows and changes in withdrawal point. Thus, volumetric measure, though useful is not an absolute necessity. What is needed is only a shared notion of quantity to an acceptable degree of approximation. In many cases, locally developed institutions are used as substitutes for sophisticated but economically infeasible measurement technologies.[2] But, precise quantification can be possible through water meters as in the case of groundwater and urban areas or advanced measurement structures as in the case of the Majalgaon Canal Project in Maharashtra (see Box 10.2). However, as the experience of other countries having a matured water rights system such as Australia, Chile, and the western parts of the US, once the WR&E system is established, with the development of strong legal and organizational structures for the operation of WR&E system, strong economic incentives would emerge for the development of more robust but less costly water measurement and application technologies.

The criteria for water rights allocation remain neutral for efficiency but are critical for equity.[3] While an open bidding procedure can be considered for rights allocation, other need-based criteria are better to avoid monopolization of rights and address special social concerns (see Box 10.3). It is very important from the equity perspective to ensure water entitlements also to landless groups and socially vulner-

[2] Instances for such substitutions include the use of watermen in many canals systems in Tamil Nadu, Andhra Pradesh, and Karnataka, and the reliance on timing procedures involving local priest and community elders in the irrigations of Canary Islands, Spain (Mass and Anderson 1978: 22–24).

[3] This is immediate from the familiar result of Coase (1937). That is when the rights are private and transferable (or, rentable), their reallocation will correct the inefficiencies associated with the initial distribution of rights. But, from an equity or income distribution viewpoint, the criterion matters as the allocation of rights amounts to asset transfers.

Box 10.2 Technical Scope for WR&E System: An Example from Maharashtra

Apart from its social and political acceptability, the WR&E also requires certain basic technical and design conditions needed for volumetric delivery of water. Such technical preconditions are present in Majalgaon Right Bank Canal where a remote controlled and computer-based dynamic regulation system has been installed under a World Bank assisted projects.

Briefly, dynamic regulation involves (i) 10 cross-regulators fitted with wireless remote transmission units; (ii) volume control structures at each of about 18 distributaries; and (iii) the control centre with a computer system that monitor and record water diversions via wireless networks. The volumetric distribution possible with the computer-based dynamic regulation system enhances the technical prospects of introducing an effective WR&E system in the Majalgaon canal regions.

Source: World Bank (1998a: 123).

able sections. A hybrid criterion is also possible where certain amount of water is allocated among landless persons using the *Pani Panchayat* criterion and the rest is allocated among land owners using the National Commission on Agriculture (NCA) criterion. The amount to be available for allocation to landless can be varied by using the following procedure. First, the total available water is theoretically distributed across the land owners via the NCA criterion. Then, as a form of progressive tax, the distributed water rights in the first stage are proportionately reduced to form a pool for its subsequent distribution among the landless. In this way, larger farms contribute more to the pool than small farms (Saleth 1996). Notably, the provision

Box 10.3 Criteria for Allocating Water Rights: Official Proposal and Local Practice

As per the NCA proposal (GOI 1976: 23), the available groundwater in a basin, after allowing for non-agricultural needs, will pertain to land and each land holding weighted in terms of its soil quality and access to surface water will have a legitimate right to a proportionate share of the groundwater. Apart from equity, this criterion also promotes an integrated use of land and water. But, it has the negative effect of reinforcing inequity in land ownership with the same on water.

This negative effect is avoided by the criterion actually used under the *Pani Panchayat* system being practiced in parts of Maharashtra where rain harvested water is allocated not in terms of land size but in terms of family size (Singh 1991: 35; Vani 1992: 9–10). Usually, about half an acre (0.20 ha) worth of irrigation water is allocated for each person in the family (Thakur and Pattnaik 2002).

of water rights to landless groups presumes transferability or rental possibility. Otherwise, there are no benefits from such rights for irrigation water. This shows that apart from the economic requirements, there are also social needs for the legal provision of transferable rights and entitlements.

Equity concerns and ecological needs remain the major concern also in countries both with a relatively a mature water rights systems such as Australia, Chile, and the western parts of the US as well as those with an evolving rights and entitlement system such as Mexico and South Africa. In all cases, since the rights over most of the resources are already claimed, meeting the rights of new entrants, including the environmental water needs are met with reallocation of existing rights mostly through markets or through state-managed compensation procedures. The latter is actually the practice both in South Africa where most of those requiring water rights are resource poor farmers as well as in Australia where the state support is needed to reallocate water to ecosystems. For countries such as India where there are implicit rights exists in terms of actual control and use (as in groundwater regions) and semi-formal rights exists due to water allocation procedures (as in canal regions), it is necessary to start with a gradual licensing of such implicit and semi-formal rights while working also to ensure new rights, especially to landless groups, urban and rural poor, and environment needs. Transitional licensing is one important means to ensure that the introduction of water rights does not disturb existing claims and informal rights (see Box 10.4). Such licenses can be converted into formal rights with desirable features such as transferability over time. In fact, the water rights system observed in all countries has actually evolved in this way through an interaction of hydrological, economic, and legal systems.

The enforcement and monitoring arrangements for WR&E system needs an enduring state-community-user partnership. The regulatory rights of the state, enforcement and monitoring responsibilities of local organizations, and the use

Box 10.4 Transitional Licenses for Protecting: Existing Rights: Country Experiences

In instituting a new water rights system, it is essential not to disturb established water usages and use patterns. In England and Wales, for instance, when the new legislation came into force, it protected existing users through the instrument of a "license of right", once the users apply, within a year, with proof of their water use over the previous 5 years. Similar provision can also be found in the water laws on countries as different as Italy, Jamaica, and Spain.

Another important feature of the licensing systems in effect in these and similar countries is that licensing is generally waived in respect of water abstractions for meeting immediate domestic and para-domestic uses. Such exemption is also made in the 1994 Water Law of South Africa. Similarly, shallow and low-yielding wells are exempted from licensing requirements.

Source: World Bank (1998b: 56).

rights of the users are to be hierarchically structured within a public trust framework (Singh 1991; Saleth 1996). The public trust framework is closely linked with the Gandhian notion of trusteeship. It provides a basis for linking social control of the state and community organizations with the decentralized decisions of private individuals and groups. In this new governance structure, the overall water allocation, regulation, and management are with the state and community organizations under as public trust whereas field level water allocation and use are under private hands and market influence. The government at the appropriate level has the responsibility to establish the overall legal framework for the water rights system including formal mechanisms for conflict resolution at the regional level. How WR&E are hierarchically structured in an operational context can be visualized in simple terms as follows. First, the total quantity of water and its priority for different sectors are established for a given area. Second, given the sectoral allocation, the amount and its priority are established for different sub-regions within the area. And, given the sectoral and regional allocations, the shares of individuals for different used are established using criteria discussed above. But, enforcement, monitoring, and conflict resolution at the basin and local levels require decentralized arrangements such as basin organizations, local governments, community organizations, and user-based arrangements. Given the existence of a fair amount of institutional potential at the grassroots level and farmers' familiarity with the turn-based water allocation, the task of developing flexible mechanisms for the enforcement of the WR&E system should not be that difficult in many areas in India. In fact, there are institutional and operational synergies between WR&E systems and user-based organizations as has been illustrated by the experience of Chile (see Box 10.5).

Box 10.5 Tradable Water Rights in Chile

The 1980 Water Code dissociated water use rights from the originally intended purpose, and redefined them as a real right (a property right), which could be sold, bought, rented, leased, mortgaged or inherited. A National Registry for Water Use Rights was established, kept alongside the National Real Estate Registry.

Given the water rights system, localized water markets evolved within watercourses or, occasionally, within the same hydraulic system. There is a market-clearing price, and transactions are effected through personal contacts, local newspapers, and water "realtors"--usually, real estate realtors or produce wholesalers. The most common transactions are: sale of the right or part thereof (water rights are fully divisible; its rent or lease for a cropping season or a fixed time span; and spot sale of a volume of water (in volumetric systems only).

The introduction of saleable water rights was facilitated by the dual facts that water use rights had already been granted on most waters and most watercourses were managed by water users associations.

Source: World Bank (1998c: 124).

10.3.3 Economic and Political Issues

From the perspective of efficient, equitable, and sustainable use and management of water resources, the private roles at the stage of water use is as important, if not more, as the public and community roles at the stage initial of water allocation and subsequent regulation and management. In order to enhance efficiency and conservation at the stage of water use, the WR&E regime should ensure private and transferable or, at least, rentable rights, where water entitlements can be temporarily transferred either in part or in full. These conditions are vital for WR&E system to perform its critical economic functions. Since these conditions provide incentives for efficiency and link use decisions with market conditions, they promote optimum use of the resource. Private nature and the scope for transfer or rental of rights are linked with resource values and pricing.[4] Transferability and exchangeability of water rights are crucial to capture and reflect the scarcity or use value of water through price signal and guide water allocation accordingly. Apart from their efficiency effects, transferable private rights also have a distribution function as they can apportion the joint benefits of water exchange among concerned parties. Although the ontological status and fugitive nature of water makes the rights as a legal fiction and allows only a *de facto* user rights (Singh 1992: 27), it is this *de facto* rights (or, actual use and control of water) that are economically more relevant as transferability becomes more important at the level of use than at the level of its ownership. The requirements of private and transferable rights need not contradict the rights of the state or community essential to ensure the ecological security and social equity. As noted already, when these rights are defined within the public trust framework, private and transferable rights are consistent with social control needed to ensure equity and sustainability.

Private and individual rights are also essential to ensure the two-way accountability, i.e., the accountability of individual users to each other and that between the individuals and the community (Singh 1992: 8).[5] Inter-personal accountability is economically very important as it provides a means to address the 'externality' problem that is pervasive in water use. This is because individual water rights do not just define the legal boundary but also demarcate the physical and economic boundaries of individual's actions and their effects. Thus, by relating rights with duties, such effects can be quantified and compensated. As a result, the potential for interpersonal conflicts are minimized. From a strict legal perspective, the transferability of water rights faces problems as they are considered as natural and fundamental rights (Singh 1992: 27). While water for drinking and domestic use can qualify to be a fundamental human right, the same for other economic uses need not have such an ethical qualification. In these cases, therefore, the legal conception of water rights should be such as to allow ownership rights and hence, transferability among

[4] For, what is not owned cannot be priced because prices are just the payments for property rights or, more specifically, for the rights to use an asset (Dales 1968: 792).

[5] Sometimes, communal and groups rights are also advocated (Devi 1991: 624). But, such rights can ensure only the accountability of the community/groups to the state but not that among individual members of the community/group.

legal persons. Otherwise, water rights will remain just a legal notion bereft of any economic and equity significance.

The WR&E system has clear economic and equity justifications. The technical, legal, and organizational feasibility of establishing this system is also bright given the information availability, planning capability, and institutional potential present at different levels. Legal experts have noted that water rights-based legal reform is part of the charter in the Indian Constitution (Singh 1991: 12–13). In fact, there are policy commitments for developing a WR&E as arrangement similar to that have been advocated by various government commissions, committees, and documents (see GOI 1970, 1976, 1992a, b) (see Box 10.6). There are also legal and organizational initiatives both at the national and state levels. Many states have amended past or created new water-related legislations for controlling groundwater over draft (World Bank 1998d). At the national level, the central Groundwater Authority was created for regulating groundwater withdrawals through an administratively managed licensing and permits system in areas with severe aquifer depletion.[6] Similar arrangements are also being created at the state level. More recently, the water resource management sector review undertaken jointly by the Ministry of Water Resources (MOWR) and the World Bank has agreed, in principle, to establish a WR&E framework (MOWR 1996;

Box 10.6 Water Rights in Official Documents and Initiatives

The NCA in its 1976 report postulated a correlative rights system—a land-based proportional allocation of groundwater (GOI 1976: 23). The Model Groundwater (Control and Regulation) Bill of 1992, which was originally formulated in 1970 and also got revised slightly in 1997, has postulated a kind of licensing and permit system, especially in areas experiencing severe aquifer depletion (GOI 1992b). The Bill provides for the mandatory installation of water meters, but has not specified any withdrawal limits. Although the Bill failed to evoke much interest among the states except for some marginal legal initiatives in Gujarat, Karnataka, Maharashtra, and Tamil Nadu, it led to the creation of the central Groundwater Authority in 1997. Similar arrangements at the state level are also being created.

Despite its bureaucratic nature and regulatory orientation, this arrangement provides a formal mechanism both for creating permit-based private groundwater rights as well as establishing public rights in their regulation. As this arrangement becomes more and more decentralized and participatory and when the private use rights are quantified and metered, the allocative role of this new arrangement can be enhanced to complement its regulatory functions (World Bank 1998d: 19–20).

[6] This authority was created in 1997 in response to a 1985 Supreme Court judgment (Supreme Court of India, Civil Original Jurisdiction, I.A. no. 32 IN W.P. (C) no. 4677 of 1985) in 1995 asking to control groundwater depletion. It was notified in gazette (Gazette of India: Extraordinary, part 11, sec. 3, subsec. ii, no. 30, New Delhi, Tuesday, January 14, 1997).

World Bank 1998b: 49–50). Paralleling the policy commitments, there is also a consensus within the research community on the need for such a system (e.g., Dhawan 1990; Jain 1976; Singh 1991, 1992; Shah 1993; Saleth 1996).

Despite the policy commitments and economic necessities, there is a political aversion towards the WR&E system. Many consider it to be an administrative nightmare and a political impossibility while others argue that it will lead to the commercialization of a life-supporting resource. But, these views are not based on full information as the WR&E system being proposed will have social and environmental safeguards and is subject to public regulation and control. It is not intended to reduce the water availability to any individuals or groups, but rather to ensure the tenure and certainty of already available water. As this system creates a basis for reallocating water through compensating current claimants, it does have scope for equity-oriented reallocation needed to empower poor users (Rosegrant and Binswanger 1994). As we will see later, the WR&E system is also not new for India as various forms of implicit, informal, and rudimentary system resembling water rights exists in different parts of the country. Thus, what this proposed system does is only to formalize such arrangements in the interest of all concerned. Such institutional potential reduces the costs of creating the WR&E system whereas growing scarcity and conflicts exacerbate the social costs of the institutional vacuum. The costs are also likely to decline further with the two important institutional initiatives: administrative decentralization through *panchayat* system and management decentralization through water user associations (World Bank 1998b: 29–30). As will be argued, in view of this transaction cost calculus, the political factors, though can delay the process, cannot block the creation of the WR&E system in India.

10.4 Evolution of Water Rights at Different Levels

India does not have any explicit legal framework specifying water rights, even though various acts have a basis for defining some form of such rights. However, additional changes are needed to move from the present conditions of informal, implicit, partial, and unclear arrangement to an improved legal and institutional framework for promoting the kind of WR&E system needed for meeting current and future requirements of the water management in the country. Both the nature and magnitude of these changes vary considerably across contexts, regions, and sectors. For understanding the existing potential and needed changes, it is necessary to see the evolution and status of water rights at the local, sectoral, state, regional, and national levels.

When revenue needs and technical possibilities allowed the colonial administration to develop and control water resources on a large scale, fundamental changes have occurred in the economic and legal basis of water allocation among users. A series of legislations were enacted to establish the state's right over water resources and to specify conditions for users to have access to them. Early British legislations did recognize the customary water rights of individual and groups. 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.[7] While state's absolute rights can affect the development and managerial aspects of water, from the perspective of water use, it is the *de facto* control over water by actual users at the micro level that is more important. For canal irrigation water, rights can be obtained only by express grant and on payment. Time and outlet-based turns (e.g., *Warabandi, Osarabandi, and Varvaram* systems) were developed to physically allocate the water rights. But, as these rights may have a legal sanction under the irrigation acts of concerned states, the neither involve any legal document nor specify the entitled quantity. As a result, users lack recourse to protection. Private rights to groundwater were recognized, but only through land rights.[8] As a result, from a strict legal sense, they cannot be transferred apart from land. While there is a legal security for groundwater rights, the entitled quantities implied by them are not specified, except for the stipulation of an obtuse concept of 'beneficial use'. This system of water rights developed and consolidated during the colonial has continued after independence. It is this system that exists today with some adjustments reflecting changing market and technology.

With the expansion of rural electrification programs, emergence of improved pumping technologies, and changing economic and resource realities, some notable changes have occurred in water rights and allocation both at the micro and macro levels. Although groundwater rights lack transferability in a legal sense, *de facto* water transfers have become extensive through groundwater markets in many regions in the country (Shah 1993). In view of this possibility, farmers are also able to establish *de facto* rights that are much larger than those implied by their farm size. The quantities of water implied by such rights are indirectly defined by the interactive effects of farm size, well depth, pumping capacity, and water selling possibilities (Saleth 1998). Notably, such rights have social recognition as they are often implicitly recognized by other farmers either willingly or otherwise and the governments are unable to regulate them for political reasons. In Gujarat, even farmer groups have also established such rights through more formal arrangements such as water companies and elaborate underground water conveyance networks (Singh and Bhallab 1996). In some cases, these *de facto* water rights are linked with land and labor contracts (Shah 1993; Janakarajan 1993; Saleth 1998). Box 10.7 provides few instances for these forms of group-based and linked water rights in groundwater regions.

In canal regions, the water rights, by law, are fixed-tenure in nature as they are restricted to groups having access to land in canal regions (Saleth 1996: 248). They are only 'access rights' and offer no guarantee for any quantity or its certainty. Due to the physical features distribution networks and spatial considerations in distribution rules, these rights are also biased against tail-end farmers. Moreover, these

[7] Notably, this position was also reflected even in the irrigation and water supply acts enacted after independence. But, the Madras High Court in 1936 and the Bombay High Court in 1979 have declared that the government's sovereign rights do not amount to absolute rights (Singh 1991: 30–34).

[8] As per the 'dominant heritage' principle implied in the Transfer of Property Act IV of 1882 and the Land Acquisition Act of 1894, a land owner can have a right to groundwater as it is considered an easement connected to the dominant heritage, i.e., land.

Box 10.7 Water Rights in Water Companies and in Other Rural Contracts: Few Instances

New forms of water rights have also emerged with changing organizational and contractual arrangements, especially in groundwater regions with severe water scarcity. For instance, in the case of water companies observed in Gujarat, there is an implicit form of group rights. These companies, which are formed both by a voluntary cooperation among farmers as well as by the turnover of the state-owned public tubewells, also sell water to non-members besides meeting members' water needs. In many cases, elaborate pipeline networks are also constructed to link many contiguous farmers.

In parts of Andhra Pradesh, Gujarat, and Tamil Nadu, the inter-linked nature of groundwater markets with other markets for land, labor, and farm inputs and outputs suggest that the *de facto* water rights of landowners has a leverage with other contractual arrangements involving land leasing, labor contracts, and agreements on input supply and output sales. There are also a water-based tenancy contracts based on different rules for sharing labor, other inputs, and outputs. In these cases, since water rights form an integral part of the whole arrangement, they have an effect far beyond the water resources.

Source: Shah (1993); Janakarajan (1993); Saleth (1998).

rights also lack transferability apart from land as canal water cannot be transferred to non-canal regions. But, there are some notable adjustments in canal water rights in recent years. Not only do farmers transfer their water and turns to others within the commands but also they move canal water to non-canal regions indirectly through groundwater withdrawals in canal regions. Originally, groundwater extraction in canal areas has emerged to supplement canal supply and meet irrigation needs during canal closure periods. But, in recent years, it is being increasingly used to transfer water through pipelines to non-canal regions.

Notably, some of these transfer projects are also funded by formal credit from rural commercial banks as observed in parts of Tamil Nadu (Dinar and Saleth 1997; Dinar et al. 1997). These transfers also redefine and create new sets of water rights (see Box 10.8). In Madhya Pradesh, an Asian Development Bank mission has observed the widespread practice of pumping water directly from canals for irrigating non-canal farms (Breckner and Saleth 2001). Although laws and administrative rules restrict canal water rights only to those paying water charges, such restrictions are not strictly enforced as indicated by the magnitude of water charge arrears in many states (see GOI 1992b). Water charges are, in fact, only small portion of the real values of canal water rights that are captured immediately by productivity and ultimately by capitalized land values. But, with irrigation management transfers, water allocation, cost recovery, and system maintenance have all improved (Vermillion 1997; Oblitas and Peter 1999; Joshi and Hooja 2000). With their greater involvement of water allocation and management, farmers have also begun to realize the value of having water rights. This, in fact, suggests the synergy effects between user organization and water rights.

Box 10.8 Private Water Transfer Networks and Informal Groundwater Rights in Canal Regions

In Periyar-Vaigai Basin, Tamil Nadu, farmers have constructed elaborate pipeline networks for transferring groundwater both from the canal commands as well as from the downstream of newly constructed small dams constructed across the Shanmuga River. The investment costs of pipelines with average length of 3–4 km range between Rs. 50,000 and 200,000.

What is notable of these privately initiated water transfer networks is the involvement of bank loans in the construction of some of them and the emergence of water markets and informal water rights system. With supply of water in a previously rainfed region, land productivity and farm income have increased up to 20 times creating economic and technical conditions for water markets. As the groundwater is moved from aquifers away from actual water use, an informal intra-regional water reallocation has occurred also with the creation of water rights disconnected with land.

Source: World Bank (1998c: 61–62).

At the macro level, there are also both implicit and explicit water rights. In this respect, the broadest form of rights is implied in the constitutional division of power between the central and state governments over water resources itself.[9] These are essentially legal rights to develop, regulate, and manage water resources. Although such rights heavily favor the states, the states' rights are under an increasing pressure in recent years. This is partly due to the emerging need to devolve water rights to the basin and local organizations and partly due to increasing rights and responsibilities of the central government in environmental protection, conflict resolution, and national coordination. As the country is approaching the physical barriers for freshwater expansion, these roles of the central government are bound to grow. It is these larger responsibilities of the central government that justify the need to move water resources from the state list to the concurrent list (Singh 1991; World Bank 1991, 1998c). At the same time, the devolution of rights and entitlements to basin and local levels are also essential to strengthen the regulatory rights of the states, but minimize their involvements in day-to-day water allocation and management functions. The initiatives of many states in creating basin organizations and water user association states are likely to redefine further the existing pattern of macro man-

[9] As per Entry 17 in the State List under the Seventh Schedule of the Constitution, it is the states that have jurisdiction over water resources within their borders. But, the powers of states are subject to Entry 56 in the Union List that allows the central government to regulate and develop interstate rivers and river valleys when this is declared by parliament as a matter of public interest. The central government also has regulatory roles in the water sector vide Article 252 related to interstate water projects as well as in terms of the Forest Conservation Act of 1980, which requires the states to get central clearance for executing ecologically sensitive water projects. The central government also has an important role in resolving inter-state water disputes as per the provisions under Article 262.

agement and regulatory rights over water. Thus, the new institutional paradigm or governance arrangement involves three key elements, i.e., water rights system, user organizations, and state and community regulations, all of which are indispensable both individually and collectively.

There are also some important developments in the evolution of water rights at the macro level. Explicit and implicit forms of water rights also exist at the macro level of sectors and regions. For instance, use prioritization specified in the National Water Policy of 2002 and the same implied in the Constitution[10] provide a basis for establishing the priority of sectoral rights and entitlements. But, these priority rights are not absolute in view of their correlated condition of respecting the individual and group rights over which they are defined. Similarly, they are also not to be misunderstood either as a basis for confiscating individual rights or as a basis for developing rights through state fiat within a command and control framework. Thus, the priority rights can only be a form of general guidelines for instilling social control over macro level water allocation but not a firm rule to obviate the role of economic conditions and market requirements.

On the other hand, the current sectoral pattern of water allocation at the national, state, and local levels can directly be interpreted as *de facto* rights as they represent the economically and socially accepted pattern of actually observed water use. In this sense, these allocations can be a basis for establishing more formal and flexible sectoral rights and entitlements at appropriate regional and resource contexts. In this respect, the most preferred arrangement requires both the physical context of river basins and the organizational framework involving the networks of stakeholders of those basins. For inter-state (or inter-regional) water rights, negotiated agreements on water sharing form a natural basis for developing regional and state water rights.[11] But, in other cases where negotiated settlements have been difficult, the awards given by concerned tribunals established by the central government under the provisions of the Inter-state Water Disputes Act of 1956 can be used as a starting point for developing water rights at the state level (see Box 10.9).[12] Although the tribunal awards settle the dispute by quantifying the water claims, they involve a lengthy process to reach a final settlement.[13] Besides, since the implementation of tribunal awards can be

[10] For instance, the constitutional provisions relating to the fundamental rights to life are used as a basis for assigning top priority for drinking and domestic uses as well as irrigation and ecological water needs.

[11] There are 58 independent water-related agreements among states concluded in the past—39 related to joint projects and 19 related to sharing of river waters—and all of these are under heavy pressure for renegotiation due to the increasing water requirements of concerned parties (World Bank 1998b). See Iyer (1999) for a review of some of these agreements.

[12] Under this Act, the central government has so far set up five tribunals and three of them have come out with amicable decisions (Krishna in 1976, Godavari in 1979, and Narmada in 1979). These include also the tribunal dealing with the politically most sensitive Cauvery River dispute where only an interim award was given and even that is strongly contested by one of the concerned states.

[13] Since the Act has failed to specify the authority to implement the decision as well as the time limit for tribunal decision, it was amended twice—first in 1980 for authorizing the central government to establish the implementation authority and then, in 2002 to specify a 6-year time limit for

Box 10.9 Basis for Developing Regional Water Rights: Practical Instances

The Upper Yamuna River Board provides an instance for developing regional water rights from negotiated agreements. This board allocates the Yamuna water among Haryana, Uttar Pradesh, Rajasthan, Himachal Pradesh, and the National Capital Territory of Delhi within the overall framework of the Memorandum of Understanding (MOU) singed by the Chief Ministers of the co-basin states.

In contrast, the 1976 award of the Krishna Water Dispute Tribunal provides an instance of settlement-based framework for developing regions water rights. The award, which is based on a 75 % dependable flow Krishna River and its distributaries, set quantified water entitlements of 560 TMC for Karnataka, 700 TMC for Maharashtra, and 800 TMC Andhra Pradesh.

Source: World Bank (1998c: 28–30).

contested in the Supreme Court, it is crucial to provide legal binding to final awards. New and more formal organizational arrangements are also being created to tackle inter-state water sharing issues.[14] While the tribunal awards can be a basis for developing regional water rights, they have a major limitation in view of their duration as set by the time period for the review of the award. In the case of Krishna Award, for instance, it is set as 25 years. This creates the undesirable effects of competition among the states with uncoordinated and disjointed investments for establishing claims before the award comes for review. To avoid this, it is essential that the award, once given, should be treated as final, but the concerned states should be encouraged to negotiate for reallocation based on market conditions. As we extend the regional rights to a still higher level, we can also find the basis for national water rights implied in international water treaties such as the treaty between India and Pakistan over the Indus and the same between India and Bangladesh over the Ganges.

While market or negotiation-based arrangements are not tried much in India, there are some evidences for their actual occurrences as well as indications of their future potential. Arguably, these arrangements can be a basis for developing mutually beneficial water rights systems at relevant contexts. For instance, the case of Krishna water transfer for Chennai (Madras) city can be considered as an implicit

tribunal decision (Salman 2002; Richards and Singh 2002). Many experts argue that even the 6-year time limit specified by the 2002 amendment is too long for resolving such a sensitive issue as water sharing.

[14] For instance, The Cauvery River Water Authority has been created to deal with the allocation conflict among the basin states. This entity—patterned after the Murray-Darling River Basin Organization of Australia—is unique in the Indian context as this is the first time that a basin organization is chaired by the Prime Minister with the chief ministers of all the concerned states as members.

inter-state water market. As Tamil Nadu has paid for the entire project costs that also has some significant benefits to Andhra Pradesh, the transfer implicitly involves a payment for the water. While this is a relevant instance for implicit regional water trade, it also shows how the operation of such markets is constrained by incomplete specification of the rights such as the lack of the time and the amount of water to be delivered and the liabilities and recourse to address the failure of meeting the obligations. The potential for similar forms of implicit and explicit inter-regional water markets is also vast in India as states can be encouraged to purchase and sell water either on a payment basis or on a barter basis (i.e., exchange of water for power or food grains). But, such potential exchanges remain dormant essentially due to the absence of a legalized system of inter-state water rights. There are also evidences for large scale intra-state and inter-sectoral water transfers that are mainly from agriculture to urban areas (e.g., Palanisami 1994; Briscoe 1997). Such transfers are undertaken not only by private water selling groups but even by state governments and municipal water supply agencies.[15] Although such transfers are beneficial to the middlemen, urban consumers, and water supply authority, the farmers of the urban fringe agriculture are the heavy losers as there are no water rights to enable them to claim economic compensation for their water.

Although there have been the rudiments of rights to water quality during the British period, these rights are implied mostly in terms of criminal and penal codes of that time. As these provisions are ineffective to control the quality and health impacts of an increasing magnitude of industrial pollution, urban sewerage, and agricultural chemicals, environmental laws and regulations have emerged since the 1980s to establish clearer rights over water quality. These rights are administered by the central and state pollution control boards through a system of pollution permits, penal actions, and treatment responsibilities. While precise legal specification and transferability are lacking, these rights are often judicially handled in terms of the fundamental rights to life and environment enshrined in the constitution. Such rights are, in fact, used in many public interest litigations filed against polluting industries along the Ganges.

10.5 Opportunity Costs of Missing Rights

The opportunity costs of missing or unclear water rights and entitlements at different levels can be reckoned in terms of the potential economic, social, and political benefits being foregone as well as the social and political costs being borne. The overall significance of a water rights system emerges from the following simple arithmetic of costs that can be saved and benefits that are forgone under the current

[15] For instance, in Chennai, in the mid-1960s, the then government bought water rights from ayacutdars of the Red Hills and Cholavaram tanks. In recent years, the city is also considering the transfer of groundwater from the Araniar-Kusaithaliayar aquifer area that holds an enormous promise for providing Chennai with a low-cost supply of high-quality water (Briscoe 1997).

system of water allocation. There is an increasing recognition of the socio-economic and political costs associated with water sector mismanagement. Such costs are attributable mainly to inappropriate water management institutions, especially the absence or lack of clarity on water rights and water entitlements at various levels. While it is difficult to estimate these costs in precise terms, it is certainly possible to indicate their magnitude indirectly through other economic and fiscal losses from different perspectives.

The opportunity costs of lack of water rights are rather serious given the high proportion of the investment being absorbed by water sector. While water sector used to account for about 6 % of the total plan expenditures, the subsidy for irrigation sector alone was nearly 0.30 % of GDP in 1994–1995 (World Bank 1996). This share should have increases still further. But, cost recovery is an endemic problem in the canal-based irrigation sector leading to a heavy financial loss to the tune of 22 billion rupees as of 1989–1990 (GOI 1992b). The percentage of the recovery of working expenses has improved in some states such as Gujarat (78 %), but continues to be still low in most states (about 5 %) [Central Water Commission (CWC) 2009]. Although there is no Delay in project implementation and resource utilization due to inefficient planning and lack of farmers' cooperation also causes severe erosions in the value and benefit of irrigation investment. For instance, India has spent some 325 billion rupees during the Eighth Plan on irrigation development. Even if as little as 10 % of this expenditure is subjected to the problem noted above, it can mean a loss of 32 billion rupees (World Bank 1997). With the creation of powerful incentive among farmers for an efficient water use through the institution of WR&E system and economic pricing procedure, even if we succeed in effecting just a 10 % improvement in water use efficiency, it is possible to add easily an additional 14 million hectare of irrigation potential. Notably, the additional irrigation potential emerging from water use efficiency is very close to what is achieved in an entire 5 year plan period with so much of investment of money and time.

The financial gap in the water sector can be approximated by the difference between the total investment costs and total revenue in the canal irrigation sector. The total investment in canal irrigation during 1951–2000 is estimated to be Rs. 790 billion at current prices (GOI 2000). As we assume even a simple rate of 8 % to account for both interest and depreciation, the annual financial cost of canal irrigation provision comes to about Rs. 63 billion. Although we do not have published information on the revenue from the canal sector, going by the estimate of the Committee on Pricing Irrigation water (GOI 1992b), we can reckon that the total revenue at present can be in the range of about Rs. 3–5 billion. Such a huge financial gap clearly shows that the institutional aspects such as the water pricing policies and organizational mechanisms involved in water-charge collection are performing rather poorly. From an institutional perspective, poor pricing policies and weak organizations can be directly attributed to the absence of a WR&E system essential to provide both a technical basis for volumetric water pricing and an organizational basis for linking user groups.

Considering some of the fiscal, health, output, and resource impacts under existing institutional arrangements governing water allocation, use, and management of

Table 10.1 Opportunity costs estimates for inappropriate water institutions

Item	Problem	Impact (Year)	Average cost (Billion US$)	% of GDP
1	Urban and rural water pollution	Health impacts (1991–1992)	6.60	3.00
2	Soil degradation	Loss of farm output (1991–1992)	1.90	1.00
3	Fiscal costs	Revenue deficit, poor services, and use inefficiency (1994–1995)	0.70	0.30
4	Fiscal costs	Power subsidy, groundwater depletion, and pollution impact farm output (1994–1995)	4.10	1.50
	Total		**15.9**[a]	**4.8**[b]

Source: Brandon and Hommann (1995); World Bank (1996)

[a]1991–1992 figures for items 1 and 2 were converted to 1994–1995 prices using the India GDP deflator (World Bank 1997), and added to the 1994–1995 figures for items 3 and 4. The relevant exchange rate or these periods has been US$ ≈ Rs. 36

[b]All the figures in the column were added to give a ballpark lower bound, abstracting from likely changes in percentage shares between 1991–1992 and 1994–1995

water resources, there are some rough and ballpark estimates both for the aggregate and problem-specific magnitudes of the opportunity costs of inappropriate water institutions in India. Table 10.1 gives these estimates, which are obviously partial and also pertain to the early-1990s. Although these costs relate to the inappropriateness of entire water management institutions, a major part of them can be attributed—both directly and indirectly—to the lack of WR&E system. On the surface, while this looks a too big of stretch of argument, the fact still remains as the WR&E, with its intricate structural and functional linkages with all key legal, policy, and organization components, is the central part of the structure of the whole water institutional arrangements (see Saleth and Dinar 2004). As a result, the costs associated with inefficient resource use and the health impacts of insufficient water provision are directly associated with the absence of WR&E to regulate water withdrawal and ensure water supply. While the creation of WR&E system involves both heavy capital investments and real political costs, the opportunity costs associated with their absence are far higher given its present magnitude and future growth. Although the estimated opportunity costs in Table 10.1 represent about 5 % of GDP in 1994–1995, their present reckoning can be still more alarming. If one considers the interest costs and accounts for the negative effects of urban water scarcity and groundwater depletion happened since 1994–1995, the costs of inaction can be as high as 10 % of current GDP. What is notable is the fact that these costs can be close to, if not higher than, the total water sector investment in India. Apart from their monetary component, the opportunity costs also have an unfathomable social and political component associated with water sharing conflicts that are now becoming an expanding phenomenon both at the local and regional levels. In some cases (e.g., Cauvery and Periyar water disputes), water conflicts have even created major political changes not to mention about the loss of life and property occurring regularly due to frequent local water conflicts and political protests.

10.6 Establishing Water Rights: Potential and Prospects

As shown in Sect. 10.3, implicit, informal, and *de facto* water rights and entitlements exist at all levels. From a strict technical perspective, the creation of the WR&E system is straight forward in many cases as what is required are only the legalization of existing informal rights and *de facto* rights of users, the established conventions on use priorities, and the water allocations implied by tribunal awards and inter-state agreements. From an institutional perspective, there is also a considerable potential exist for developing the WR&E system by building on the water allocation and distribution arrangements such as the *Warabandi*, *Shejpali*, and *Pani Panchayat* systems. The existence of informal rights and institutional mechanisms provides opportunities for creating the WR&E system for sectors, regions, and individual users. Interestingly, despite its informal and imprecise nature, the prevailing water rights system is able to even support the emergence and growth of local water markets, especially in the groundwater areas. There are also many contexts where the WR&E framework can be used to address pressing water problems.

While a user-managed water rights system is ideal for inducing efficient water use, promoting accountability, and resolving conflict, many would agree that its creation is not an easy task in the Indian context. The existence of many small farms, poor conveyance structures, political risks in creating the legal and organizational apparatus, and conceptual/information problems in defining water rights in physical and legal terms remain as major challenges. While the technical and investment needs are truly tremendous, one cannot underestimate the institutional potential for building more formal WR&E systems in many parts of India. Informal water rights--both individual and group—have existed in India since the ancient times (see Siddiqui 1992) and continues even today, albeit in a much weaker form, in many tank irrigation systems of South India (see Box 10.10). The existence of these implicit and informal water rights clearly suggests that the WR&E system is neither

Box 10.10 Instances of Water Rights

In the delta regions of the Gangetic and Mahanadhi in Orissa, West Bengal, Bihar, and Madhya Pradesh, there are officially granted non-transferable long-term water leases with the express purpose of encouraging farmers to use surface water (GOI 1976: 65).

In few South Indian irrigation systems, there are informal but prioritized rights for different distributaries (Vaidyanathan 1985: 63–64). Similar form of priority also exists in the case of water rights in Periyar-Vaigai basin where the water rights from Periyar are treated as senior over the same from Vaigai and separate records are kept for both in departmental office.

In the groundwater regions, it is well known that *de facto* individual water rights exist and also enjoy a large degree of social acceptance. The amount of water implied by them is determined by factors such as farm size, well yield, and pumping capacity. In canal regions, water rights take the form access rights under fixed tenure condition as they are limited to those owning land in canal regions.

Box 10.11 Cases of Rudimentary WR&E System

Two cases observed in Maharashtra have the rudiments for building formal WR&E systems. The *Pani Panchayat* is a user-managed system for sharing harvested water in terms of 'needs' as determined by family size than by farm size.

The *Shejpali* (water distribution roaster) system is a state-managed water allocation system where canal authorities issue "water passes" to farmers. These passes with duration varying from an irrigation season to 6 years have priority that varies directly with their duration. But, they lack quantification and transferability (Gandhi 1981; Rath and Mitra 1989).

There are also a variety of other forms of user and community-managed systems ranging from lift irrigation and water harvesting schemes (Datye and Patil 1987; Sengupta 1993; Singh and Bhallab 1996) having the social and organizational basis for developing decentralized and locally managed WR&E system.

new nor incompatible with Indian ethos. More importantly, there are also a variety of more formal and semi-formal water rights exist as part of formal institutional arrangements having the rudiments for developing formal and full-fledged WR&E systems (see Box 10.11). The *Pani Panchayat* is notable for its equity properties and land-water separation (Vani 1992: 9–10; Ahmed 1992: 271–276). Since water rights are provided to landless, there is an implicit recognition of transferability as the landless cannot benefit from such rights otherwise. This feature of water rights allocation in the *Pani Panchayat* system (also observed in the Sukhomajri system in Haryana), is very important for both equity and efficiency. On the other hand, the *Shejpali* system is designed to encourage efficient water use through an agreement with the farmers for secure water allocation for sanctioned area and crops.

Besides the institutional scope provided by the *Shejpali* and *Pani Panchayat* systems as well as myriad forms of local level arrangements, the currently practiced formal water allocation procedures in canal regions such as the *Warabandi*, *Osarabandi*, and *Varvaram* also offer additional possibilities for building the WR&E systems on a wider scale (see Box 10.12). Although *Warabandi* and its variants offer technical scope for creating a full fledged WR&E system, there is a need for major investments on the modernization of distribution networks, installation of water measuring devices, and creation of enforcement and management organizations. From a technical and organizational perspective, the need for developing new legal systems, additional organizations, and technical capacities is also extensive. New investments for the modernization of water delivery networks, installation and upgradations of water measuring and accounting systems, and the creation of organizations at various water allocation levels are all essential. However, the investment costs of upgrading the technical and organizational basis of the systems are likely to decline due to scale economies emerging from large area coverage.

Box 10.12 *Warabandi* **as a Basis for WR&E**
Warabandi, Osarabandi, and *Varvaram are all time-based* rotational water distribution procedures practiced in different parts of the country. They provide a basis for developing formal WR&E as the time or flow-based water entitlements allow the definition of water quantity. Besides their scope for quantifying water entitlements, these systems also assume significance in view of the long tradition, experience, and organizational capacity that the farmers have gained from the turn-based water allocation. These aspects assure the social and organizational conditions essential for the development of formal WR&E systems. However, the legal and technical conditions such as the volume-based rights, measurement systems, and the modernization of water delivery networks are yet to be satisfied in all contexts.

The informal but growing practice of groundwater trade among farmers widely observed across the country provides another more direct instance not only for the existence of *de facto* rights in groundwater but also for the emergence of markets for such rights. Although groundwater cannot be legally transferred apart from land, groundwater transfers do occur through the groundwater markets observed, at least, since 1920s. Despite their localized nature and uneven pattern across regions, groundwater markets are growing in magnitude. Their characteristic features are that they occur without any formal water rights system and involve no sacrifice of self-irrigation. While there is no systematic national-level study on the magnitude of water selling, based on his studies in Gujarat and Uttar Pradesh, Shah (1993) has projected the area irrigated through groundwater markets to be up to 50 % of the total gross irrigated area under private lift irrigation. This projection neither has any systematic basis nor allows disaggregation either by region, well type, or energy use. While there is no current data for this purpose, using the data from the national level sample surveys conducted by the National Sample Survey Organization (NSSO) during 1976–1977 and 1997–1998, Saleth (2012) has estimated that the extent of irrigated area benefiting from 'hired irrigation services' can be about 42 mha.[16]

Although groundwater markets have significant efficiency and equity benefits, they still remain sub-optimal essentially due to the legal and institutional vacuum, i.e., absence of legal status and quantity limits, within which they operate at present. A formal WR&E system that can legalize the existing *de facto* rights and set water quota for these rights could avoid the serious problems associated with the water markets such as water monopoly and aquifer depletion. Thus, a legally specified and organizationally enforced quota-based WR&E system can minimize the negative

[16] This may be an overestimate of the magnitude of water marketing since all these areas may not be using hired services on a regular basis and the hired services may not involve water selling in all cases due to pure pump set rentals.

effects such as aquifer depletion while magnifying the positive benefits of water markets such as allocation equity and use efficiency.

Maharashtra has taken some bold and innovative actions in 2002 and 2003 that have facilitated conditions for the introduction of a system of transferable water rights on state scale. Under the currently ongoing Maharashtra Irrigation Improvement Project supported by the World Bank, the state has displayed its commitment for sectoral restructuring and policy reforms with a series of far reaching legal, policy, and organizational changes. These include (a) adoption of a State Water Policy, (b) introduction of the Maharashtra Water Resources Regulatory Authority Act of 2003 that enabled the establishment of the Maharashtra Water Resources Regulatory Authority (MWRRA),[17] (c) introduction of the Farmer Management in Irrigation System (FMIS) Act that promoted the formation of Water User Associations (WUAs) and Upper Level Associations (ULAs) in all canal regions, (d) introduction of an Amendment Act to transform the Irrigation Development Corporations into River Basin Agencies. Notably, the FMIS Act mandates the transfer of operation and maintenance of minor canals and facilities to WUAs and the upper level canals and reservoirs to the ULAs that will administer the bulk water entitlements of WUAs.

The most fundamental element underlying the reform initiatives of Maharashtra is the creations of the basic legal and organizational preconditions for promoting a state-wide system of WR&E. The MWRRA Act provides for the creation of the WR&E system for all sectors and users, the arrangements for the administration and regulation of this system including dispute resolution, and the conditions for the development of market-based transfers of WR&E both on temporary and permanent basis. A noteworthy aspect of the new Authority is its comprehensive nature as it will have regulatory jurisdiction over water from both surface and subsurface sources and also be responsible for setting water tariffs and water quality standards as well as managing wastewater discharge permits. As per the draft that is being considered, the five irrigation development corporations will be transformed into River Basin Management Agencies with direct responsibilities for the issuance of water entitlements, enforcement of water charges, and the operation of river basin infrastructures. Although the legal, policy, and organizational initiatives undertaken in Maharashtra for creating the WR&E system are in a formative stage, they are truly remarkable and farsighted as they set example for other Indian states to emulate. Conditions that prompted these initiatives include the fiscal and economic implications of brewing water crisis, existence of considerable institutional potential (e.g., *Shejpali* and *Pani Panchayats* systems), and commitments of state leadership, and technical and funding support from the World Bank.

[17] It is important to note that this bill behind this act has been widely discussed and also approved by the state cabinet, but it still remains as a bill before the state assembly and has not yet been passed.

10.7 Concluding Remarks

As water resource development possibilities are becoming thinner and costlier, many countries including India are requiring strong institutional arrangements for the allocation and management of their limited water resources. At the same time, these countries also require to develop additional water resources, wherever it is possible. In line with this changing requirement, public investments have to be directed more towards institutional development projects with slower changes and gradual returns as well as water development works with more risk and high returns. As a result, the emphasis on political economy aspects and context-specific, prioritized, sequencing, and 'patient' approaches becomes indispensable. It is in this changing operational and strategic context that the options and strategies available for donor and development aid agencies to support national efforts in developing institutions such as the WR&E system are to be assessed.

The options available to support the development of WR&E in India are generic in the sense that the same options can be applied in a variety of other countries displaying similar economic, political, and resource realities. The past, ongoing, and future investments are the major tools for supporting state governments in creating WR&E systems at various levels. Investments can be an effective tool only when the political environment is propitious and technical support is available for developing the necessary legal and organizational arrangements for underpinning the new allocation mechanisms. Although the building of the political consensus is the task of the state undertaking the reforms, the donor and development agencies can play a catalytic role in mainstreaming the issues and promoting reform dialogues.

This Maharashtra case also illustrates the way the political economy aspects are strategically used to advance the reforms. Besides the use of the political context for reform provided by the fiscal crisis in the state, the creation of the WR&E system was also packaged as part of an investment program for improving and upgrading water storage and delivery networks in the state. Still broadly, it is also important to package water sector reforms itself within a still larger economic and infrastructural investment program. Packaging reforms with investment can provide political incentives and build political coalitions, both of which are critical from the political economy perspective of reforms. In this sense, the efforts to integrate water sector strategies within the larger ambit of the Country Assistance Strategy and Poverty Reduction Strategy are very appropriate both operationally and strategically. This kind of reform packaging advocated in the new water sector strategy of the country indicates further evolution of its strategy of moving from project to sector and, now to economy as a whole.

The case of WR&E reforms in Maharashtra shows only one of the options. It is applicable essentially to conditions that are ripe with felt demand for change. But, there are other options applicable to other states. The options involve a multi-track strategy with medium and long-term approaches. Thus, in states such as Tamil Nadu, Andhra Pradesh, Orissa, and Uttar Pradesh, the medium term option of creating the basic conditions needed for the WR&E system can be created gradually within a phased and sequential manner within a well-planned medium terms frame-

work. In fact, these states have undertaken significant organizational reforms, including the creation of outlet and basin level organizations. It is now time to consider the possibility of piloting the WR&E systems at the basin and local levels. Such pilot schemes can be a part of a larger water sector projects and can include not only irrigated areas but also urban areas.

While the multi-track options suggest different paths for different states, it is necessary to pursue them within the framework of area prioritization as determined by relative institutional potentials and political willingness for reforms. Although the strategy of working with 'focus states' is often criticized by the India media and academics as sidestepping the needs of other states [Operation and Evaluation Department (OED) 2001: 47], there are powerful arguments for concentrating the resources for attaining consistent progress in key areas (Pitman 2002: 30–32). The focused strategy is particularly relevant for promoting critical institutions such as the WR&E system that needs 5–10 year period for its creation and consolidation. This is particularly so as this institutional reform has to be sequenced with and packaged within a larger investment package for sectoral and state level development. It is necessary to reward the institutional reforms and consolidate the social gains rather than fritter away the limited resource and energy on a larger canvas.

From an overall perspective, the general approach is to follow a sequential strategy both in covering the states as well as in promoting institutional components necessary for the WR&E system within the state. Obviously, the states and areas with felt demand and expressed commitment for reform are to receive priority over others. Similarly, the reform components receiving top priority are the creation of the legal and organizational arrangements both at the macro and micro levels, the development of technical information, and system upgradation for volumetric water delivery. The establishment of bulk water rights for sectors and sub-regions has to precede that of the local and individual rights. In promoting the WR&E system in particular and water institutional reform in general, it is necessary to recognize some key rules (Briscoe 2002). The practice of picking the 'low-hanging fruits' is less costly and it provides more incentives for reforms, as 'nothing succeeds like success'. Similarly, the contextualization of reforms is important as there is no unique recipe for universal application. The new water sector strategy of the Bank, in fact, underlines these principles in terms of its emphasis on reform prioritization, sequencing, and principled pragmatism. A recent analysis of water institutional reforms across countries also provides empirical evidences for the way these reform design and implementation principles are actually used by countries to promote reforms (Saleth and Dinar 2004).

Finally, mainstreaming the issue of WR&E system involves more effective use of the policy, academic, and media community. There is also need for a change in the strategy to sell the idea to policy-makers and user community. There is a strategic error in overemphasizing use efficiency and market allocation to the point of eclipsing the very crucial equity and poverty alleviation effects of the WR&E system. In fact, the market allocation is easily distorted to project the system as a precursor to water privatization and commercialization. The media has to be involved in discussing the issue and in presenting why and how this is indispensable for the water future of the country.

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