FEDERAL REFORM STRATEGIES

Lessons from Asia and Australia

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OXFORD UNIVERSITY PRESS
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Nirvikar Singh

INTRODUCTION

As global water demand grows over the next two decades, India will be one of the most severely affected countries. Its potential supply shortfall could be 50 per cent of possible demand two decades from now (2030 Water Resources Group 2009). The reasons behind this severe probable shortfall include rapid economic growth, relatively low per capita water availability, and an underdeveloped infrastructure, both physical and organizational.

Absent mitigating responses, much of the projected shortfall will be manifested in agriculture. Traditional rain and river-fed agriculture has been supplemented by water storage, surface irrigation, and groundwater pumping. The resulting ability to use water in a more assured manner has combined with new seed varieties and use of chemical fertilizers and pesticides to increase yields. However, the current pattern of input use is not sustainable, not only because its use of water is inefficient, but also because of negative long-run environmental impacts.

Economic growth will also lead to changing demand patterns with respect to food, in addition to sheer increases in output. This can potentially increase water requirements, but as is discussed later, may also provide opportunities for shifting to more socially optimal water use practices. Increased industrial and urban residential demand for water will also need to be met with new infrastructure.

* I thank Stephen Howes for his detailed and cogent comments and suggestions which helped me in the revision of this essay. As always, I owe a special debt to M. Govinda Rao, for teaching me so much about Indian federalism. For this analysis, I have specifically benefited greatly from his work on environmental federalism in India. Any and shortcomings in this chapter are my responsibility.
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A further complicating factor in India's water future is the spectre of climate change. Climate change may affect patterns and levels of temperature and precipitation. In turn, these changes can affect groundwater recharge, productivity of prior investments in storing and channeling water, and other investments in agriculture that complement water as an input.1

Given these current and looming challenges, water management has assumed greater importance than ever before. Throughout history, agriculture has been a mainstay of India's economy, especially in providing employment to large sections of its population, and water has, therefore, been an important resource. Local and state level disputes over water allocation for agricultural use have been common in certain regions in particular. Nevertheless, the scale and complexity of issues revolving around water as an economic resource have increased very rapidly in just a few years.

A constant thread in discussions on water management in India has been the nature of the institutions of governance. At the local level, such institutions can be traditional panchayats, reflecting long-standing local power structures, or their modern elected counterparts. State-level institutions of governance include departments of water resources and of irrigation, and the occasional river basin organizations. These state institutions have often displaced traditional local management practices. At the national level, the central government has a Ministry of Water Resources, a Ministry of Agriculture, a Planning Commission, and several other organizations that can affect how water is managed. The centre has the constitutional authority to shape the management of river basins that encompass more than one state's territory, though its role in the past has often been little more than that of a referee or mediator in inter-state disputes as they have arisen. This role has evolved rapidly, as climate change and economic growth together increase the need for a more integrated and forward-looking policy towards water management.

This chapter, therefore, aims to summarize and assess the status of India's water management in the context of multiple layers of governance. These multiple layers are embedded in a formal constitutional framework of federalism, which has advantages in terms of public goods by better jurisdictions, as well as an inevitable tension in federal resolution. However, of a particular sector on possibilities for institutional potential Pareto improvements along those lines.

To set the stage, the stage-setting on the institution India's federal institution management. This section allows through existing federal themselves-to the special provides a selective review of management, drawing High and Alan Richards. More disputes, though the limits particular, this work make to dispute resolution provides an update, discuss innovations in managing them to consider micro games, so that the focus is

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1 A detailed analysis of the potential impacts of climate change on water resources in India can be found in Mujumdar (2011).

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2 An important comprehensive analysis by Mandal, of Indian environmental protection, the many aspects of water of authority and resulting issues brought out in that paper, judicial activism on environmental and implementation within
factor in India's water future is the spectre of change may affect patterns and levels of temperatures, in turn, these changes can affect groundwater. Prior investments in storing and channeling inputs in agriculture that complement water as forthcoming challenges, water management has than ever before. Throughout history, agriculture of India's economy, especially in providing needs of its population, and water has, therefore, Local and state level disputes over water have been common in certain regions in scale and complexity of issues revolving water resource have increased very rapidly in discussions on water management in India has institutions of governance. At the local level, traditional panchayats, reflecting long-standing their modern elected counterparts. State-level include departments of water resources and national river basin organizations. These state placed traditional local management practice the central government has a Ministry of Agriculture, a Planning Commission, functions that can affect how water is managed. national authority to shape the management more than one state's territory, though little more that of a referee or cases as they have arisen. This role has evolved economic growth together increase the forward-looking policy towards water

To summarize and assess the status of the context of multiple layers of governments embedded in a formal constitutional potential impacts of climate change on water An important precursor of the discussion in this chapter is the comprehensive analysis by Mandal and Rao (2005), which examines all the dimensions of Indian environmental policy, including air pollution and forests as well as the many aspects of water management in the context of federal assignments of authority and resulting implementation issues. One of the significant points brought out in that paper, which is not touched on here, is the substitution of judicial activism in environmental protection due to the failures of coordination and implementation within the executive branch of the government.
resolution. Thus, this section develops the idea of pursuing reforms in the water sector by reforming the federal structures within which water issues are addressed by policymakers. The next section provides a summary conclusion. The crux of the analysis and conclusion of this chapter is that India’s pressing water challenges can potentially be better addressed through more effective horizontal, as well as vertical, coordination among government institutions—the latter representing the federal dimension of government action.

WATER ISSUES

A good place to start in assessing India’s water situation is simply with the gross availability of water. India has 2.4 per cent of the world’s total area and 16 per cent of the world’s population, but only about 4 per cent of the total available fresh water. The Indian Planning Commission (Government of India 2008: Table 2.1) reports domestic estimates of 1,869 billion cubic metres (bcm) of total water resources, of which 1,123 bcm are utilizable. This latter figure includes 690 bcm of surface water, a figure which assumes that the requisite storage is built. On the other hand, the 2030 Water Resources Group (2009) reports current availability of only 740 bcm. In this context, the Planning Commission reports per capita storage of 213 cubic metres, less than one-fifth of China’s per capita figure, and an even smaller fraction of that in major developed countries.

On the demand side, the Planning Commission reports current requirements of 813 and 710 bcm from two different government sources, growing to 1,447 and 1,180 bcm respectively by 2050. The latter figure assumes substantial increases in irrigation efficiency. The 2030 Water Resources Group, assuming slower increases in such efficiency, estimates demand at about 1,500 bcm by 2030, or twenty years sooner than the higher Indian estimate. Both sources emphasize that the position is worse than what the aggregate figures indicate, since water availability is uneven. Close to half, or possibly more, of India’s twenty major river basins serve populations who are already, effectively facing water-stressed conditions.3

Within the context of numerous issues that cut across various dimensions of India’s water challenges, one can identify a number of particularly important supply and access issues:

Supply and Access

- Limited hours of water availability.
- Lack of regularity of water supply.
- Groundwater overexploitation in irrigated areas.

Irrigation

- Failure to correct over reliance on irrigation.
- Lack of maintenance of irrigation infrastructure.
- Irrigation dependence on the seasonal rains.

Floods

- Recurring floods and droughts.

Quality

- Pollution of water resources.
- Contamination due to sewage.

Conflicts

- Increasing water shortages due to competing demands.

Clearly these problems are not new. For example, the problem of water overexploitation is thought to have started in the 1970s, shortly after India had developed its first large-scale irrigation project.

3 An excellent survey of the statistics on water availability in India, including its distribution across the country, is provided by Gaur and Amerasinghe (2011).
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Develops the idea of pursuing reforms in federal structures within which water managers. The next section provides a summary of the analysis and conclusion of this paper challenges can potentially be viewed horizontal, as well as vertical, constitutions—the latter representing the section.

India’s water situation is simply with has 2.4 per cent of the world’s total water resources, of which 1123 billion cubic meters of surface water storage is built. On the other hand, the Planning Commission (2009) reports current availability, the Planning Commission reports area, less than one-fifth of India’s per capita fraction of that in major developed countries. The Planning Commission reports current resources from two different government sources, respectively by 2050. The latter figure is irrigation efficiency. The 2030 Water Plan increases in such efficiency, estimates future water resources, or twenty years sooner than the US emphasize that the position is worse since water availability is uneven. India’s twenty major river basins serve increasingly facing water-stressed conditions.

Studies on water availability in India, including those provided by Gaur and Amerasinghe (2011), within the context of aggregate and regional water scarcities, there are numerous issues that concern policymakers in India. For example, the Planning Commission (Government of India 2008: 43) lists ten manifestations of a perceived ‘water crisis’. These are, organized by category:

**Supply and Access**
- Limited hours of drinking water supply in almost all cities.
- Lack of progress, or even backsliding, in rural drinking water availability, with chemical contaminants an increasing problem.
- Groundwater declines, raising short-term access costs, and threatening long-term aquifer collapse.

**Irrigation**
- Failure to complete larger-scale irrigation projects, as well as cost overruns.
- Lack of maintenance eroding the capacity of existing systems.
- Irrigation investment not leading to commensurate increases in irrigated area.

**Floods**
- Recurring floods of increasing intensity due to changes in land use.

**Quality**
- Pollution of rivers and lakes from inadequately treated urban sewage.
- Contamination of surface and groundwater by industrial effluents.

**Conflicts**
- Increasing water conflicts of greater complexity, involving different types of uses and sources, as well as quality issues.

Clearly these problems can be dissected and expanded further. For example, the problem of industrial effluents is multi-dimensional,

4 A very recent—sweeping but heterogeneous—review of many dimensions of India’s water challenges is contained in the latest India Infrastructure Report (IDFC 2011). Various specific chapters of the report are referenced in the current analysis, but our scope is narrower in many ways.
reflecting a variety of activities and locations. Similarly, flooding is affected by changes in the hydrological cycle associated with climate change, as well as industrialization and increased agricultural use of land, so that many processes are at work. In other cases, multiple problems in the Planning Commission list are interrelated effects of what can be viewed as fundamentally the same cause. This is particularly true of the irrigation issues (numbers 4 through 6). The irrigation challenges are manifestations of deficiencies in the way that irrigation infrastructure is built and maintained, which are in turn traceable to deficiencies in the institutions of governance, including, but not limited to, corruption. In fact, an important cause of inefficiency is simply the lack of incentives for efficient actions, whether of design, maintenance, pricing, or other aspects of irrigation infrastructure. The problem of poor or missing incentives is also at the root of groundwater decline, with the common pool problem being compounded by subsidized, even free, electricity for pumping groundwater. Poor availability of drinking water in cities is connected to inappropriate pricing and lack of incentives for investment as well.

If we set aside conflicts, which are in some respects a symptom of the other nine issues, we can also separate them into problems of the provision of water infrastructure, maintenance of that infrastructure, efficient pricing, and the regulation of externalities. Looked at in this manner, the economics of water issues becomes somewhat clearer. This approach also indicates that the issues highlighted are themselves symptoms of a system that does not provide proper incentives, whether for construction, maintenance, usage, or externality control. In turn, the solutions

5 The critical problem of groundwater depletion is finally receiving some attention, though in the state of Punjab (by far the worst affected), action may come too late to prevent aquifer collapse. Gandhi and Bhamoriya (2011a) provide data and analysis on the state of groundwater resources in India, with additional data being referenced in Mandal and Rao (2005). Upadhyay (2011) discusses new legal frameworks, including a 'public trust' classification of groundwater to replace the traditional idea of land ownership providing an easement to all water under the land—this is, of course, what leads to the common pool problem. While other countries have successfully made this legal shift, it remains to be seen if India will accomplish it. As noted, there is a complex of political and economic institutions supporting the current short-run equilibrium.

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may need to be sought in doing more of the same, or through engineering solutions.

Before we turn to what the 'engineering approach' by this is technical solutions to not issues of costs and benefits Group (2009) report that cost-effective measures in the supply gap. Such changes in behavioural inertia and the usual 'technical' solution approaches ought to take do in weighing policy. In this context, Figure 7.1 is instructive.

Figure 7.1 shows an increase in water availability in Indian interventions that are on the right hand side of the cost curve, particularly these include large interlinking. Therefore incentive and issue, one on the challenges faced in that provided by the bodies.

The water marginal cost on its least-cost left-hand curve accounts for over industrialization will share not will fall significantly in the cost curve. In addition will continue to changing consumption and the most critical in agriculture. In brief, agriculture, as well as land-efficiency). Th
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and locations. Similarly, flooding is affected by the cycle associated with climate change, and increased agricultural use of land, so on. In other cases, multiple problems have interrelated effects of what can be termed as same cause. This is particularly true of the through 6). The irrigation challenges arise in the way that irrigation infrastructure is in turn traceable to deficiencies in the planning, but not limited to, corruption. In efficiency is simply the lack of incentives of design, maintenance, pricing, or otherwise. The problem of poor or missing groundwater decline, with the common practiced by subsidized, even free, electricity and the poor availability of drinking water in cities. Pricing and lack of incentives for investing which are in some respects a symptom of the separate them into problems of the provenance of that infrastructure, efficient maintenance and the externalities. Looked at in this manner, becomes somewhat clearer. This approach highlights that themselves symptoms of a lack of proper incentives, whether for constructing externality control. In turn, the solutions to groundwater depletion is finally receiving some Punjab (by far the worst affected), action may collapse. Gandhi and Bhamoriya (2011a) propose state of groundwater resources in India, with Mandal and Rao (2005). Upadhyay (2011) states, including a ‘public trust’ classification of additional idea of land ownership providing an idea—this is, of course, what leads to the correct countries have successfully made this legislation will accomplish it. As noted, there is a current short-run may need to be sought in redesigning the system rather than trying to do more of the same, or to spend more, or to try and increase supply through engineering solutions alone.

Before we turn to what system redesign might mean more concretely, the ‘engineering approach’ deserves further elucidation. What we mean by this is technical solutions that neglect issues of human behaviour, but not issues of costs and benefits. For example, the 2030 Water Resources Group (2009) report suggests that no-till farming is one of the most cost-effective measures for India to meet its projected future demand-supply gap. Such changes in farming practices may require overcoming behavioural inertia and inconsistencies—doing so would go beyond the usual ‘technical’ solution. At the same time, technical or engineering approaches ought to take account of costs and benefits—this is often not done in weighing policy alternatives with respect to water issues in India. In this context, Figure 7.1, reproduced from the 2030 WRG report, is instructive.

Figure 7.1 shows an estimated marginal cost ‘curve’ for increasing water availability in India. The left-hand part of the curve represents interventions that are the most cost-effective. On the other hand, the right-hand side of the curve has the costliest policies. Interestingly, these include large infrastructure, municipal dams, and river interlinking. Therefore, even without considering behavioural and incentive issues, one can come up with a very different perspective on the challenges faced by India in managing its water resources than that provided by the Planning Commission and other government bodies.

The water marginal cost curve and the set of policies and actions on its least-cost left-hand side raise another important point. Agriculture accounts for over 80 per cent of India’s water use. Even though industrialization will increase that sector’s demand for water, agriculture’s share will not fall significantly, absent the kind of changes incorporated in the cost curve. In fact, since agriculture’s absolute water consumption will continue to rise, driven by increasing demand for food and changing consumption patterns as incomes rise, the biggest challenge and the most critical solutions with respect to water management lie in agriculture. In brief, they all involve increasing the water-efficiency of agriculture, as well as overall productivity (conventionally equivalent to land-efficiency). This is very different from augmenting water supply
Figure 7.1 India—Water Availability Cost Curve

Source: 2050 Water Resources Group (2009)
through dams, canals, or pumps. This is not to say that supply-augmenting measures are useless or irrelevant, just that they will be insufficient on their own. In fact, some supply-augmentation may be in conjunction with, or complementary to, efficiency-increasing actions (for example, infrastructure rehabilitation reduces leakage as well as increases capacity).

The role of technical change also deserves further discussion. Possible actions across the water marginal cost curve include innovations ranging from drip irrigation towards the low-cost left of the curve, to desalination on the high-cost right. In specific circumstances, the latter option might well be worth considering due to local needs, risk mitigation concerns, or strategic concerns. Hence, the ranking of alternatives in Figure 7.1 is not the only guide to policy choices. However, where innovations are relatively low-cost, such as seems to be the case for drip irrigation, there is a strong case for giving them priority in policy thinking. To continue with this example, complementary institutional innovations may be required to enable adoption—farmers may need new types of financing that are tailored to the investment required for drip irrigation. This could require regulatory changes or additional public sector risk management to support new private sector financing. A federal dimension arises when the regulatory authority is dispersed across different levels of government, and there may also be multiple regulators at any given level. Much of this kind of institutional innovation is outside the scope of the current analysis but, at the same time, the focus is on potential changes in federal dimensions of governance structures as a specific form of institutional innovation, pushing technical innovation to the background, but not dismissing it as part of the solution.

From the perspective of the water marginal cost curve, we can see that system redesign essentially includes changing the nature of agriculture in much of India. Many of the measures on the left-hand side of Figure 7.1 involve process improvements. These changes in processes do not necessarily—or perhaps at all—increase overall labour intensity. This would, therefore, not be the source of barriers to adoption or innovation. Rather, the issue is presumably one of knowledge and training.

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6 It should be emphasized that dams and other measures may be appropriate for flood control. Also, water quality issues require quite a different set of policies, though better farming practices can also help control contamination through excessive or inappropriate fertilizer use.
These alternative or improved farming techniques have to be demonstrated and taught. In other words, the constraint is likely to be human capital rather than raw labour.\footnote{In this context it is worth mentioning, albeit just in passing, the deterioration of agricultural extension services at the level of state governments. Addressing this problem is yet another important item for the Indian economic reform agenda at the level of the states, but possibly with a role for the national government through its ability to incentivize state policies.}

All changes in operations can involve switching costs, which may act as barriers to adoption. If there is some randomness in outcomes, due to exogenous factors, it can be difficult for farmers to be convinced of the gains from switching.\footnote{To return to the point in the previous paragraph, an examination of the options on the left of Figure 7.1 suggests that they are all marked by some degree of complexity and the learning costs can be significant switching costs.} These problems are compounded if changes in cropping patterns or crop choices are also part of the shift in techniques. That can mean dealing with new kinds of market uncertainties, and new suppliers and buyers. Production choices (outputs, inputs, and processes) can also be affected by behavioural inconsistencies, particularly with respect to time. This phenomenon has recently been convincingly demonstrated for Kenyan farmers' fertilizer choices (Duffo et al. 2009). Policies must therefore be designed to overcome these behavioural phenomena\footnote{In the Kenyan experiment, farmers were given convincing demonstrations of the net gains of increased fertilizer use. However, many failed to follow through on fertilizer purchases, because they spent money on other things before the time came for applications. The experiment found that free delivery with an upfront commitment of funds was essentially as effective as a 50 per cent subsidy in overcoming the present-bias of the farmers' decision-making.}.

Another perspective on system redesign comes from noting that many of the issues with respect to water management, as well as the cost-effective solutions capable of improving coordination. Of course, it is not jurisdictions, making state management. In fact, a federal resource management and the potential common pool nature of local (community) management may be in favour decentralization as well.\footnote{In discussions, M. Govinda Rao made the important point that water is an emotional issue, and this alone is an enormous behavioural factor that must be incorporated in policy thinking. Several of the chapters in the India Infrastructure Report (IDFC 2011) seem to take the special nature of water for granted, but without necessarily understanding its implications. Rather than allowing emotions to govern or distort policy, Rao's point was that policy must ameliorate emotional affective factors. Thus education is critical in his view, and may need to be complemented by visible measures for supply-augmentation or risk mitigation as signals of government concern.}
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Farming techniques have to be demonstrated, the constraints likely to be human.

Cost-effective solutions captured in Figure 7.1, do not require inter-state coordination. Of course, many of the problems and solutions cross local jurisdictions, making state-local relations an important feature of water management. In fact, a recurring theme in general discussions on natural resource management (including forests as well as water and other potential common pool resources) is the relative merits of state versus local (community) management, with incentive efficiency seeming to favour decentralization as much as possible. On the other hand, at the level of centre-state relations, the federal aspect of water management is not trivial. To the extent that water basins, both surface and underground, cut across state boundaries, water management is irrevocably a centre-state issue. Ultimately, decisions about inter-state river basins and their like have ramifications for water availability and allocation at the local level. In fact, one of India’s policy challenges with respect to water has been coordinating across three levels of governance: central, state, and local. Examining these challenges is a major theme of this chapter.

One aspect of improved water management that favours higher-level governments is the informational requirements of innovation. State governments ought to be more efficient in trying, refining, and demonstrating new agricultural practices that improve water efficiency and overall agricultural productivity. There are successful precedents, through state-level agricultural extension services and agricultural universities. Unfortunately, the political economy of state policies towards agriculture has favoured subsidies that lead to inefficient and wasteful water use, distorting farmers’ incentives and locking the system into an equilibrium that cannot be sustained in the face of economic growth. In this case, it is possible to make an argument for central policies that improve water management. However, these must be considered in the context of India’s federal assignments of authority, and we return to these later in the chapter, after describing India’s federal framework and considering how it has worked in the past, with special reference to water management.

Federal Institutions

India became an independent democratic nation in August 1947 and a constitutional republic in January 1950. The constitution explicitly incorporated a federal structure, with states established as subnational
of the Consolidated Fund of the states, and the share of the Consolidated Fund in the mandated Finance Commis-

sioner of India every five years (if needed). This commission is formed to oversee the transfers.

In 1993, after decades of political amendments (the states have had the legal recognition to alter the financial responsibilities), amendments reduced the role of the central government in the allocation of water resources. This has shifted the responsibility to the states and local governments, which have since imposed their own solutions to the issue.

Inter-state water transfers have become a contentious issue, with the most recent ones involving the allocation of river waters among states. These transfers have been subject to various legal and constitutional debates, highlighting the complexity of water management in a federal system.

The first provision of the Indian constitution, Entry 56 in the union list, mandates inter-state river development and management under law. It grants parliament the right to enact laws in this area, but also gives it primacy over state governance.

In practice, the provision is often ambiguous, with different interpretations leading to conflicts between states. Various river boards have been established, or re-established, as bodies to oversee and manage river resources.
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of the Consolidated Fund. The share of the centre, the aggregate share of the states, and the shares of individual states in the aggregate state share of the Consolidated Fund are all determined by a constitutionally mandated Finance Commission. This commission is appointed by the President of India every five years (though this interval can be shortened if needed). This commission’s recommendations effectively govern the bulk of centre-state transfers.

In 1993, after decades of debate on decentralization, two constitutional amendments (the seventy-third and seventy-fourth) gave firmer legal recognition, enhanced political status, and potentially greater expenditure responsibilities to urban and rural local governments. The amendments reduced the state governments’ discretionary control over elections to rural local government bodies. Local government reforms also changed the nature of tax and expenditure assignments to local governments by specifying their authority and responsibilities more fully, and it instituted a system of formal state-local transfers modelled on the Finance Commission component of the existing centre-state system.

Inter-state river waters involve joint central and state responsibilities, while most other water issues are technically (according to constitutional assignments) state responsibilities. Local water infrastructure is now a local government responsibility, since the passage of the constitutional amendments in 1993. With respect to water, the main relevant provisions of the Indian constitution are:

- Entry 17 in the state list,
- Entry 56 in the union list, and
- Article 262.

The first provision makes water a state subject, but qualified by Entry 56 in the union list, which states: ‘Regulation and development of inter-state rivers and river valleys to the extent to which such regulation and development under the control of the Union is declared by parliament by law to be expedient in the public interest.’ Article 262 explicitly grants parliament the right to legislate over the matters in Entry 56, and also gives it primacy over the Supreme Court in such cases.

In practice, the parliament has not made much use of Entry 56. A River Boards Act was passed in 1956 to create river basin-level organizations. Various river authorities have been proposed, but not legislated or established as bodies vested with powers of management. Typically

...
instead, river boards with only advisory powers have been created. As a result of the centre’s forbearance in this arena, state governments have dominated the management of river waters. Since rivers cross state boundaries, disputes are inevitable. The Inter-State Water Disputes (ISWD) Act of 1956 was legislated to deal with such conflicts, and included provisions for the establishment of tribunals, to adjudicate where direct negotiations had failed. There have been over 100 documented inter-state river disputes in India (Radha Singh 2005), and only a handful have been referred to tribunals. However, these have involved several of the largest river basins, and have proved to be quite intractable, even after lengthy tribunals and supposedly final awards.

Details of the issues, prior recommendations, and recent developments are discussed in the next section.

Given the potential importance of innovations in agriculture for managing water resources more effectively, one must note that agriculture is also in the state list of the constitution. However, the separation of water issues from broader agricultural issues can present challenges at the state level. At the centre, the budget of the Ministry of Agriculture is about twenty times that of the Ministry of Water Resources. However,

13 River boards include the Tungabhadra Board, Bhakra Beas Management Board, Brahmaputra Board, Betwa River Board, Bansagar Control Board, Gangasagar Flood Control Commission, Narmada Control Authority, and the Upper Yamuna Board all formed by government notifications or resolutions.

14 While we focus here on the agriculture–water nexus, Mandal and Rao (2005: 23) bring out the complexities of horizontal coordination (something taken up in the section on current developments in this chapter): “The Water Resources Ministry has to coordinate with the Ministry of Agriculture for the development of watersheds and drip and sprinkler irrigation systems. The Central Water Commission in the Water Resources Ministry has to maintain close technical links with the Ministry of Power for the development of hydroelectricity. In matters related to water pollution, the Ministry has to coordinate with the Ministry of Environment & Forests and the Central Pollution Control Board since these organisations are responsible for maintaining the quality of water. The ministries of Rural Development and Environment and Forest also have programmes for watershed development. In addition, the Ministry of Rural Development is responsible for a “Million Wells Scheme”, under which development of ground water is taken up. The National Drinking Water Mission is also under the Ministry of Rural Development and it is responsible for developing the source of drinking water in rural areas. The Ministry of Industry

this situation is reversed at the state level. For example, in Andhra Pradesh, irrigation is about thirteen times as much as agriculture. To this extent, policy has to integrate agriculture in most states is being driven by chief ministers or ministries. Cropping patterns distortions are perpetuated by water-intensive crops such as rice.

Interestingly, if one examines the Government of India 2004 White Paper, the first chapter is concerned with the planning and organisation of irrigation, while the second chapter does not mention the tendency to treat water for large-scale irrigation works as a form of paper. This dichotomy between management prevents efficient use of water and resources for local water uses.

15 Mandal and Rao (2005) show how the Indian Council of Agricultural Research has encouraged use of the various job designations of staff in various states, such as those of technical assistants, to focus on construction and maintenance of irrigation infrastructure.
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This is reversed at the level of the states, where departments of water resources control large budgets for irrigation infrastructure. For example, in Andhra Pradesh, the budget for major and medium irrigation is about thirteen to fourteen times that of the entire Ministry of Agriculture. To the extent that changes in farming practices are required for cost-effective improvements in water efficiency, water policy has to integrate agriculture policymakers. Instead, agriculture in most states is being driven by extreme subsidies for water and electric power, which heavily distort water use (the latter by making it inefficiently cheap to pump groundwater). These pricing decisions are driven by chief ministers of states, rather than specialists in agriculture ministries. Cropping patterns are distorted as well in this situation, and distortions are perpetuated by the political power of downstream buyers of water-intensive crops such as sugarcane.

Interestingly, if one examines a document such as the Eleventh Plan (Government of India 2008), the first two chapters of the third volume deal with agriculture and water management and irrigation respectively. The first chapter on agriculture is replete with discussions of water management issues, including water user associations (WUAs) and other mechanisms for local governance of water resources. Yet the second chapter does not reference the earlier discussion at all, reflecting the tendency to treat water management effectively as the management of large-scale irrigation works or flood control schemes. It is possible that this dichotomy between approaches at different scales of water management prevents efficient strategies from being implemented. There is also a vertical dimension to this problem, since local governments are responsible for local water infrastructure, but this is not integrated well

is concerned with the planning and development of water resources for industrial use; Ministry of Urban Development for drinking water in urban areas, and the Indian Council of Agricultural Research is responsible for research on water management techniques.

15 Mandal and Rao (2005) provide very useful institutional detail on the internal organization of state and local-level irrigation management, including the various job designations and responsibilities. Shah (2011) argues that in Gujarat and other states, the political economy of irrigation management has led to a focus on construction, while maintenance is being neglected, leading to an attrition in the kind of traditional positions described by Mandal and Rao, but without any effective substitute.
with authority over other aspects of agriculture, which remains a state government responsibility.

In the broader arena of water management, the central government has been playing a greater role through its increased attention to rural development, climate change, and, especially, 'inclusive growth'. We now describe several aspects of central government policy that are shaping how lower-level governments can act. The central government has been asserting itself through national schemes and missions. There are, at any one time, over a hundred central or centrally sponsored schemes, and these are often fragmentary and poorly implemented. More recently, the central government has attempted to consolidate schemes, or create new ones that subsume, but also extend, older efforts. One example of a new national scheme is the National Rural Employment Guarantee Scheme (NREGS), introduced in 2005. Other important national-level efforts have been the Sarva Shiksha Abhiyan (SSA, Education for All Mission 2001), National Rural Health Mission (NRHM 2005) and Jawaharlal Nehru National Urban Renewal Mission (JNNURM 2005). In agriculture specifically, a National Policy for Farmers (NPF 2007) has been articulated, and a National Mission for Sustainable Agriculture (NMSA 2008) has been launched. The latter, together with a National Water Mission (NWM 2009), is also part of a National Action Plan on Climate Change (NAPCC 2008). These newer developments with respect to water and agriculture are discussed in the section on current developments.

Earlier too the central government made attempts to coordinate and guide water management, though they were somewhat less than successful. The central Ministry of Irrigation, the precursor of today's Ministry of Water Resources, outlined a proposed study of India's national water resources in 1980. This led to the formation of the National Water Development Agency (NWDA) in July 1982, to carry out the water balance

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16 In 2009, the scheme was renamed the Mahatma Gandhi National Rural Employment Guarantee Scheme. It provides funds for rural works programmes designed to provide income support through employment.

17 Education is a concurrent subject in India's constitution while health is a state subject, creating some tension with respect to federal assignments. In addition, local governments are a state subject, and technically transfers to local governments must be made by the states. Hence the JNNURM also skirts around these constitutional federal assignments.

18 Some states also created new agencies but there was no explicit call for federalization and decentralization.

19 Gundimeda and Heston (2010) and US experiences. See also...
and other studies ... for optimum utilization of water resources ....' This agency is a Government of India society in the Ministry of Water Resources, not a body with any statutory authority. Furthermore, its scope is technical and separate from the institutional realities of water allocation.

In 1983, the National Water Resources Council (NWRC) was created by a central government resolution. Its membership includes chief ministers of states, lieutenant governors of union territories, several central government ministers, and the Prime Minister as chairman. This group first met in October 1985, and adopted a National Water Policy (NWP) in 1987. This policy emphasized an integrated and environmentally sound basis for developing national water resources, but provided no specific recommendations for institutions to achieve it.

Though the council was created out of disenchantment with the adjudicatory process for inter-state river disputes, it did not provide concrete proposals to improve the process, nor did it become the useful alternative that was hoped for in its creation. NWP was updated in 2002 (Government of India 2002), and was scheduled for another revision by March 2012 (India Water Review 2011), but a draft for comments was released earlier, in January 2012. The 2002 NWP envisaged state water policies being drawn up as well, and several such documents do exist, though the status of their implementation is unclear. Again, these developments are examined in more detail in the section on current developments.

ANALYTICAL REVIEW

The traditional approach to analysing water rights and water disputes is based on legal philosophy and doctrines. More recently, economic arguments have featured more prominently, while behavioural factors such as identity and emotions (prominent in news accounts of conflicts and popularly viewed as giving water a special 'non-economic' status) have been incorporated in academic analysis (for example, Anand

18 Some states also created water policies after the NWP of 1987, although there was no explicit call for them in the earlier document.
19 Gundimeda and Howe (2008) is a recent example that compares Indian and US experiences. See also Gosain and Singh (2004) and Upadhyay (2011).
In a series of papers, Richards and Singh (1996, 1997, 2001, 2002) attempted to reconcile legal doctrines with economic analysis in order to examine the causes and consequences of water disputes. They applied the analysis to the Indian case, as well as to other countries. The discussion here draws on those papers.

Conceptually, there are perhaps three major positions on the principles by which property rights to water could be allocated. These positions have been characterized (Richards 1994) as 'Harmon, History, or Hobbes'. 'Harmon' refers to the Harmon Doctrine, widely used in the west of the US, in which the rights of those who own land at the source of the water (for example, where the rain falls, or upstream actors generally) take precedence over others. The polar opposite doctrine, 'History', refers to the position that the rights of historical users of water, wherever they may be located geographically, should take precedence over others.

Unsurprisingly, in the case of the Israeli–Palestinian water disputes, Israeli spokesmen often adopt such a position, arguing that since they made the investments and developed the water systems, their rights should come first. Needless to say, these principles of 'Harmon' and 'History' are diametrically opposed in many cases. The third allocation principle dispenses with any concept of prior rights to water. It says that rights to water are what the interested parties agree to: the allocation of water rights is the outcome of a negotiation, a bargain, in which, inevitably relative strengths will matter. This is the 'Hobbes' principle, which asserts that the only way to decide the allocation over property rights is to 'do a deal'.

The philosophy of the Hobbes principle is translated into the economics of the Coase theorem, which says that gains from trade can be realized through bargaining, once property rights are clearly established. Furthermore, the Coase theorem asserts that the efficient allocation of resources resulting from bargaining is, in certain circumstances, independent of the initial allocation of property rights. The two necessary conditions for the Coase theorem to hold are:

20 Behavioural factors also underpin views that the fundamental problem of disagreements is one of lack of 'goodwill' (for example, Iyer 1994; Mohan et al. 2007). Human rights-based approaches (Upadhyay 2011) also give water a special status not accorded to other goods—though food is now also being accorded this status in India. Issues of valuation can also incorporate ecological concerns (Ghosh and Rachuri 2011).

21 Note that even if the final allocation is independent, have income effects—the no allocational impact in social terms.
22 More broadly, when of agreement is often the seminal analysis of (1982) costs of delay against their lose more from delay will the smaller share of a given co.
23 The emphasis of the water rights. It is important that transaction costs may still come. For example, if the bargaining among them creation of resources that will markets and organizational transactions costs.
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Richards and Singh (1996, 1997, 2001), legal doctrines with economic analysis in mind, the consequences of water disputes. They, in turn, as well as to other countries. The papers.

Urban three major positions on the principle of water could be allocated. These positions (Richards 1994) as 'Harmon, History, or Market'. The Harmon Doctrine, widely used in the courts of those who own land at the source of the rain falls, or upstream actors generally. The polar opposite doctrine, 'History', rests on historical users of water, wherever they have taken precedence over others. The Israeli–Palestinian water disputes, is a position, arguing that since they made the water systems, their rights should stand. The third allocation principle, 'Harmon' and 'History' are cases. The third allocation principle assigns rights to water. It says that rights to water is not the allocation of water rights in a sense, in which, inevitably relative to other. This 'Hobbes' principle, which asserts that a bargain, in which, inevitably relative to other. Hobbes principle is translated into the Coase theorem, which says that gains from trade, once property rights are clear, gains from bargaining is, in certain circumstances allocation of property rights. The two main theorems to hold are:

- 'wealth effects' do not exist, and
- there are no transactions costs.

These conditions may well not be satisfied in practice, and Richards and Singh (2001) discuss at length the extent of deviation in the case of water disputes. The simple conclusion is that the initial allocation of property rights in water is what matters. The initial allocation of property rights themselves is not a situation of mutual gains from trade instead, it is a 'zero-sum game'. Good will cannot solve situations of pure conflict, and non-economic behavioural factors assume secondary importance in such 'zero-sum' contexts, unless these translate into pure altruism, which is unlikely, especially at a large scale. Therefore, the conclusion of Richards and Singh (2001) is that conflictual nature of disputes is central to the disputes. In the context of India's inter-state river disputes, for example, arguments that referring disputes to tribunals creates an adversarial situation miss the point that an inherent conflict exists in the allocation of property rights.

Given the zero-sum nature of bargaining over water rights, a further complication is that these rights have multiple layers. In the case of inter-state rivers, the focus has been on national and state rights over water, with the centre mostly playing a role in trying to resolve or mediate.

21 Note that even if the conditions for the Coase theorem hold, so that the final allocation is independent of the initial property rights, initial rights still have income effects—the theorem merely states that these income effects have no allocational impact in some circumstances.

22 More broadly, when there is a zero-sum bargaining situation, the driver of agreement is often the costs of delay in agreement, such as in Rubinstein's (1982) seminal analysis of non-cooperative bargaining. Both parties balance the costs of delay against their current best options. For example, the party that will lose more from delay will effectively have less bargaining power, and accept a smaller share of a given economic surplus.

23 The emphasis of the discussion is on the problems of allocating initial water rights. It is important to note that even when rights have been allocated, transaction costs may still be high, making it difficult to reach an efficient outcome. For example, if there are large numbers of rights-holders, coordinating bargaining among them can be costly, even to the point of preventing a reallocation of resources that would otherwise be efficiency-enhancing. The role of markets and organizations, such as water user associations, is precisely to reduce transactions costs.
disputes, rather than asserting rights. What is often neglected, except in a piecemeal or periodic manner, is that the users of water are individuals, organizations, or localities, and their rights are often ill-defined. Using the example of inter-state river disputes in India, Richards and Singh (1997) formally explore two-level bargaining games, and analyze conditions under which the sequence of bargaining matters. In the inter-state context, the two levels can be the states and localities within the states. This analysis shows that dealing with water rights at the sub-state level may lead to more efficient bargaining at the state level. This shifts the focus to intra-state water management as an important stepping stone to a more efficient resolution of inter-state disputes.

One of the practical problems thus highlighted by the theoretical analysis is the poor state of local water management. Individual states have not created institutions or policies for good water management practices. While there has been some work on water markets and water user associations in India (for example, Bhamoriya and Gandhi 2011; Jairath 2001; Saleth 1998; Shah 1993; Upadhyay 2010), and there is well-developed general theory on local management of natural resources (for example, Bardhan 1995; Ostrom and Gardner 1993), policy attention in India seems to still be in its infancy (Government of India 2008: chapter 1). Theoretical analyses focus on issues of monitoring, enforcement, equity and norms, and essentially on how to overcome free-rider problems inherent in these kinds of collective action situations. There are diseconomies of scale in such cases, reinforcing the need for microeconomic solutions as a basis for state-level dispute resolution. Richards and Singh (2001) point out some of the challenges for creating water markets, including the need to recognize the asset nature of water, and the fact that spot markets must be built on the foundation of asset rights. They discuss problems of information and uncertainty, and the need for regulation to create and enforce the rules of the game.24

24 An analogy comes from financial markets, where regulators such as the United States Securities and Exchange Commission and organizations such as the New York Stock Exchange, manage rules of participation, trading, disclosure, and so on. As noted in the previous footnote, markets and user associations can both be viewed as ways of reducing transaction costs, so that mutual gains from trade can be realized, starting from an initial assignment of property rights.

In addition to recognizing rights, as well as the misunderstanding the significance of water. These can include agricultural and supplying related to water that has uncertainty associated with. Distributions of inter-state water rights show that investments in productivity of water rights, water rights, even in the decisions on in investments and lack of efficient in investments.

Based on their case examined several of the distribution over the K. Disputes have been described to evolve in the last section. Here we First, Richards and Singh (1997) are on resolving inter-state disputes. There are several at too many stages of a more and more fully of a conflictual nature. The allocation mechanism be be taken. Another received any dispute to be resolved by negotiation before.

25 The analysis was consistent with the recommendations of the Commission’s 1988 report.
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Rights. What is often neglected, except in the case of water, is that the users of water are individuals, and thus their rights are often ill-defined. Using the model of disputes in India, Richards and Singh (1997) demonstrate how the water rights at the state level are the outcome of bargaining games, and analyse conditions under which water rights eventually emerge as a result of a series of bargaining matters. In the inter-state and inter-basin disputes, the states and localities within the states, as well as the farmers, disputes, and water rights at the sub-state level (as in the Cotia basin), are the outcome of bargaining at the state level. This shifts the focus of the policy debate from the allocation of water rights at the state level to the allocation of water rights at the state level. Several implications emerge from the analysis, including the benefits of agreement on the allocation of water rights, the benefits of cooperative decisions on investments even where there are not direct externalities, and low-level investment as an additional source of costs of delay.

Based on their conceptual framework, Richards and Singh (2002) examined several of the major inter-state river disputes in India, including those over the Krishna, Godavari, Cauvery, and Ravi-Beas. These disputes have been the subject of many other studies, and have continued to evolve in the last decade. While we discuss some of that evolution in this section, here we outline the recommendations based on the analysis. First, Richards and Singh emphasize that processes and institutions for resolving inter-state river disputes are not sufficiently well defined or workable. There are too many options, and there is too much discretion at too many stages of the process. They point out, however, that since water is being more and more fully utilized, there is an increased possibility of disputes over the proper use of water. They recommend that the dispute resolution mechanism be better defined in terms of the order of the steps to be taken. Another recommendation is the automatic and immediate referral of any dispute to a tribunal if requested by the centre or any party to the dispute, with the tribunal bound to ratify any agreement reached by negotiation before it had delivered its decision.

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...
A second point concerns the extreme delays that have been a very costly feature of the process of resolving inter-state water disputes in India. Richards and Singh identify three components or dimensions of delay: in constituting tribunals, in the time taken for tribunals to decide (including data gathering as well as hiatuses created by attempts at political solutions), and in notifying the orders of the tribunals in the Government of India's official Gazette. The third of these is a general problem with implementing laws as well as tribunal decisions. The first of these would be dealt with by Richards and Singh's first recommendation. The second source of delay has been addressed by previous bodies such as the Administrative Reforms Commission report of 1969, and the Sarkaria Commission in 1988, and the recommendation, repeated in Richards and Singh, for time-bound decisions was incorporated by amending the ISWD Act in 2002.

The ISWD Act was amended in another manner at the same time, to clarify that tribunal decisions have the same force as Supreme Court orders. Earlier this had not been explicit, although the original language proscribed the Supreme Court from overruling inter-state river tribunals (Richards and Singh 1996). The strengthening of the tribunals' legal standing was meant to address concerns raised by the Sarkaria Commission. The commission's report had suggested that the centre could not enforce the tribunal award if a state government refused to implement the award. It noted that an amendment of the ISWD Act in 1980, inserting a section that provided for an agency to implement a tribunal award, was not sufficient because such an agency could not function without the cooperation of the states concerned. Even with the 2002 amendment, however, it is not clear that enforcement is straightforward. The issue is one of how to ensure compliance in the absence of feasible penalties.27 The centre can theoretically deal with a recalcitrant state

27 State governments have sometimes rejected tribunal awards, as in the case of the Ravi-Beas tribunal and the Punjab government. In this case, the central government avoided notifying the tribunal's award to prevent further deterioration of a severely conflictual political situation in Punjab. In the case of the Cauvery dispute, the Karnataka government sought to nullify the tribunal's interim order through an ordinance. Though the Supreme Court pronounced that the ordinance was unconstitutional, the Karnataka government showed no inclination to implement the tribunal's interim order, until a compromise was reached through political negotiations. This would be impossible in such cases.
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extreme delays that have been a very common feature of resolving inter-state water disputes in India. Three components or dimensions of time are involved: the time taken for tribunals to decide cases, as well as hiccups created by attempts at appealing the orders of the tribunals in the judicial system. The third of these is a general observation as well as tribunal decisions. The first decision and Singh's first recommendations have been addressed by previous bodies such as the Khan Commission report of 1969, and Saksena Commission report of 1986, and the recommendation, repeated in the same manner at the same time, albeit in a different form, the same force as Supreme Court orders. While the original language today, in the overruling inter-state river tribunals and the strengthening of the tribunals' legal position are matters raised by the Sarkaria Commission, the commission did not go as far as to say that the centre could not enforce the ISWD Act in 1980, in that an agency to implement a tribunal's recommendations could not function in all states concerned. Even with the 2002 commencement of the enforcement of the ISWD Act, there was an incentive to implement a tribunal's recommendations for all states concerned. While enforcement is straightforward, the need to deal with a recalcitrant state such as Punjab was handled through political negotiations behind closed doors. These examples can be taken as supporting the position of Anand (2004) that depoliticization is impossible in such cases. However, we offer an alternative perspective in the next section.

CURRENT DEVELOPMENTS

Over time, water issues have become more important in the overall policy agenda, and feature in agricultural policy, urban policy, and climate change policy. The history of India's national approach to water policy was briefly reviewed in the section on federal institutions. Here we examine its recent evolution more closely. An overall comparison of recent government documents with those from the 1980s, for example, suggests a broader perspective on, and a more integrated approach to, water management. The NWP document of 1987, while quite broad in scope, gave a high-level view of the issues, expressed in eleven pages and less than 3,000 words. The updated NWP of 2002 followed essentially the same approach, albeit a little more detail, and some reworking of ideas to introduce or expand on concerns about issues such as institutional mechanisms from the national down to the local levels (including participatory management), water quality, and possible private sector roles in the sector. The 2002 policy also called for amending the ISWD Act of 1956 to ensure timely adjudication of water disputes that were
referred to tribunals under the act, and, as noted in the section on analytical review, this was accomplished in the same year.  

The draft NWP of 2012, made available in January of the same year, is marginally longer than its predecessor. However, it is structured in quite a different manner, reflecting a gradual change in thinking about water management challenges in India. It begins with a lengthier and more comprehensive statement of issues, including scarcity, quality, and variability of water resources; institutional problems of coordination and capacity; and the principles of use and allocation that should guide policymaking. Concepts of demand, pricing, and infrastructure maintenance also appear to be stated more clearly and saliently than in past documents. Of course, these are the impressionistic observations of a high-level document, and there are numerous questions of detail that have to be addressed through implementation, as we discuss further in this section. Not surprisingly, the latest NWP draft is quite in tune with the NWM, which was introduced in the earlier section on federal institutions, which will now be discussed more closely.

As noted in the section on federal institutions, the NWM of 2009 was conceived of as part of a larger, coordinated action plan for dealing with climate change. The 2009 NWM’s main document is several times the length of the earlier NWP statements, and is accompanied by appendices made up of several hundred pages of sub-committee reports on NWM’s specific aspects. In particular, NWM offers a comprehensive approach to water management issues in India, framed in the context of the challenges of climate change. The executive summary of the comprehensive mission document describes the goals as (Government of India 2009: iii):

The main objective of the National Water Mission is ‘conservation of water, minimizing wastage and ensuring its more equitable distribution both across and within States through integrated water resources development and management’. The five identified goals of the Mission are: (a) comprehensive

28 It is relevant to ask what happened between 1987 and 2002. Government accounts of the period between the two policies suggest that there were quite a few meetings and new committees were formed, but concrete changes in outcomes as a result are not apparent. One additional institution, designed to monitor NWP implementation, was the National Water Board created in 1990.

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water data base in particular; (b) large change on water resources conservation, augmented, and exploited areas; (c) increased basin level integrated...
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water data base in public domain and assessment of impact of climate change on water resource; (b) promotion of citizen and state action for water conservation, augmentation and preservation; (c) focused attention to over-exploited areas; (d) increasing water use efficiency by 20%, and (e) promotion of basin level integrated water resources management.

Overall, NWM’s projects are meant to be coordinated with the national and state planning effort, which amounts to an indicative exercise in defining priorities and budget allocations, though often without effective follow-through in implementation. NWM’s implementation strategy envisages the passage of state-level legislation, as well as capacity building at the level of local governments and local water user associations. Plans to improve data collection and national-level efforts in this respect through a dedicated mission secretariat are more likely to make progress than a top-down process of reaching down to the local level. This is simply because of an attenuation of incentives as national efforts move down the layers of elected governments and bureaucracies. However, a specific two-tier (national-state) coordinating mechanism has been proposed, with various new committees of politicians and bureaucrats (Figure 7.2) (Government of India 2009: 22, box 2).

As noted in the section on federal institutions, NWP of 2002 envisaged developing state water policies. Apparently, some states had drawn up such policies earlier as well. After the NWP of 2002, states either updated existing water policies or drew up new ones: eleven states currently have them. Several of these can be found on individual state government websites, and they bear dates ranging from 2003 to 2008, or later. In some cases, these documents are mostly just restatements of NWP, with a few state-specific policies or institutional features added in. In other cases, they are somewhat more detailed and state-specific. Surprisingly, the NWM document makes no mention of these existing documents, let alone providing any inventory or analysis of current state water policies. The only mention of state water policy is in chapter 3, on goals and strategies, where the fifth goal, promotion of basin level integrated water resources management, includes as one of six strategies that of ‘Review of State Water Policy’. This is the only one of the six strategies where no further detail is provided. The complete absence of any consideration of existing water policy approaches—whether articulated or implemented—at the level of the states, does not augur well for the proposed
Figure 7.2 Institutional Set-up for National Water Mission

two-tier coordinating mechanism illustrated in Figure 7.2, though it is entirely possible that new institutions of that sort may be precisely what is needed to fill NWM’s vacuum with respect to state-level policies.29

Turning from issues of vertical coordination to those of horizontal coordination, NWM itself is under the Ministry of Water Resources, but issues such as watershed development, micro-irrigation, and ‘water planning for agriculture’ come under the Ministry of Agriculture, so coordination across ministries is also necessary in NWM. Several other ministries also have charges that impinge upon water management (footnote 14). The NWM proposes incorporating representatives from the various ministries, as well as the Planning Commission, in a high-level steering committee. Whether this will lead to successful horizontal coordination remains to be seen, but at least there is proximity in status and physical space in the case of such committees.

Greater challenges may lie in the vertical aspects of coordination. The NWM document notes that much of the expenditure and management required will have to take place at the level of the states. One of the sub-committee’s reports (Government of India 2009, volume 2: 165) floats the idea of incentives to state and local governments for implementing reforms in water management, with a set of possible criteria for evaluation, including subsidy reduction and the creation of new regulatory institutions. Clearly, these ideas are mostly in a formative stage. A partial exception to this is the Accelerated Irrigation Benefit Programme (AIBP), which was modified in 2002 to provide incentives to reforming states.30 The programme itself involved central assistance for expedited

29 Warphade and Wagle (2011) offer a very critical review of both the national and state water policies, arguing that they have led to centralization and to policies that increase inequities in access to water. They are concerned about the process and content of new state-level laws that create regulatory agencies for water use: these are seen as promoting high tariffs for users as a result of external pressures from the World Bank. The draft 2012 NWP seems to make social justice and equity in water access and use a more salient concern as well, but it also highlights water pricing as an option for improving efficiency of use. It would be interesting to see proposals being developed for water tariffs that favour small users—clearly such pricing can address both efficiency and equity.

30 The AIBP is discussed in one of NWM’s sub-committee reports, but there is no linkage made to the discussion on the provision of incentives in the main document.
completion of irrigation projects that were behind schedule, and the incentive of greater central assistance was tied to operations and the maintenance cost recovery efforts of the states. However, as noted by Rao and Sen (2011), continued tinkering with the programme may have undermined the force of the intended incentive provision.

The main NWM document also makes a mention of engaging with local governments and water user associations, but the discussion is brief and general: 'The first and foremost action is to put in place appropriate mechanism for coordinated actions followed by intensive capacity building and awareness programme up to lower most level of management i.e., Panchayati Raj institutions, urban local bodies, Water User Associations etc.' (Government of India 2009, volume 1: iv). However, the sub-committee reports in volume 2 provide some more detail on local level participation and water user associations. The sub-committee on efficient use of water goes back to the exhortations of the National Water Policy of 2002 for 'effective and decisive involvement of stakeholders particularly Water Users Associations (WUAs), local bodies and gram Panchayats in various aspects of management of irrigation system', (p. V/18) and recommends funding for WUAs, as well as a discussion of operational models and supporting legislative changes. The sub-committee on groundwater management also emphasizes the importance of WUAs, and gives examples of successful cases, especially where canal irrigation is jointly managed for groundwater recharge. This integrated perspective on groundwater and surface water management is particularly relevant for India, which relies heavily on groundwater for irrigated agriculture.

31 According to this report, there were 41,200 WUAs in India covering 8.68 million hectares at the time of writing. However, the area covered is a relatively small fraction of India's total irrigated area. Other figures in the Ministry of Water Resources documents report almost 57,000 WUAs, covering about 13.5 million hectares (Bhamoriya and Gandhi 2011: table 9.3). Bhamoriya and Gandhi point out that the names of organizations may differ, and be called irrigation cooperatives or partnerships, for example. They situate all these types of organizations within the government-defined objective of 'participatory irrigation management' (PIM). Their analysis also brings out the variety of sizes and legal arrangements that come under the broad category of WUAs.

32 However, cooperative institutions for groundwater recharge do not have to be tied into more complex WUAs that also deal with canal irrigation. Gandhi and Bhamoriya (2011b) concentrate towards groundwater recharges where these institutions are uncommon. Some of the horizontal fixed costs, Shah (2011) makes the point that concern for recharge and the potential for better infrastructure.

33 The framework of this section on analytical tools and externalities in judgment is not the issue of how to analyse this. Instead, it is to say that sub-committee on ground one of the mechanisms from the state to organizations (Government...
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Bhamoriya and Gandhi (2011) provide a recent analysis of the efforts of a few states in creating WUAs. Andhra Pradesh has nominally made the irrigation department accountable to WUAs, which can have up to three tiers, depending on the size of an irrigation project. The higher tiers consist of committees made up of WUA representatives, and there are elections for WUA governance. Maharashtra's approach to WUAs has emphasized the operation and maintenance of irrigation canals at a smaller scale than in Andhra Pradesh. The authors of this study also surveyed perceptions of institutional characteristics and of performance in these two states, as well as in Gujarat. Their analysis indicates that there are identifiable features of structure, processes, and governance of institutions that lead to better performance, and institutional and legislative differences across states have measurable impacts on performance. They distill several institutional design principles: completeness of structure, openness of processes, autonomy and participation in governance, and training and institution building. Together these are seen as enhancing the adaptability and successful performance of WUAs.

One further weakness in discussions on NWM is the relative disconnect between national and state policies on the one hand, and local implementation on the other, particularly with respect to linking all the way down from river basin to local level management. Richards and Singh (1996, 2002) had specifically discussed the idea of delev

and Bhamoriya (2011b) examine the experience of water user groups that work towards groundwater recharge through building check dams. Interestingly, these institutions are under the Ministry of Rural Development, illustrating some of the horizontal fragmentation highlighted by Mandal and Rao (2005). Shah (2011) makes the point that individual groundwater extraction without concern for recharge and sustainability has undermined canal irrigation, and the potential for bureaucratic control as well as cooperative management of that infrastructure.

The framework of the authors is quite different from economic criteria (section on analytical review) which tend to focus on incentives, information, and externalities in judging institutional design. This gap is part of a much larger issue of how to analyze organizational design.

This is not to say that there is no attention to this issue. For example, the sub-committee on groundwater management explicitly recommends delegation mechanisms from state to district to local governments and water management organizations (Government of India 2009, volume 2: III/25).
oping a hierarchy of specialized water management associations. One justification they provided for improving water allocation at the local level before resolving inter-state disputes was the greater efficiency of the multi-level bargaining that would result because of this (see the section on analytical review). They also provided a second, separate justification, arguing that a key deficiency in water management institutions, especially at the river basin level, was the subsuming of inter-state water disputes into the general political process. They argued that in India, federalism, and perhaps the political economy in general, has been characterized by an over-reliance on discretionary allocation, and high influence costs as a result, with the pattern of inter-state water disputes as a prime example of this problem. The solution they proposed was the creation of specialized permanent institutions to regulate the allocation of water across states, including the resolution of water disputes. These institutions would respect the federal structure of the country, but with a greater degree of independence and transparency than the current situation.

Richards and Singh noted that the idea of creating a hierarchy of specialized water management associations had been developed in the context of local WUAs, and federations of such associations (for example, Meinzen-Dick et al. 1997). In such cases, the base level units are small groups of farmers, and the higher level is that of the shared water source. The higher level of such a federation of WUAs can provide coordination, dispute resolution, and training. The higher level can also act as a channel for communication and an aggregator of political voice for collections of units that would individually be too small. Meinzen-Dick et al. (1997) provide several examples of user federations, and note the variations in roles within and across levels. They do, however, emphasize the crucial role played by federations in giving WUAs effective organizational control of water resources at the system level. Similar issues are brought up in considering attempts to create federations of WUAs in India (Mollinga 2001; Narain 2003), in particular the need to federates in order to balance the power and control of government irrigation agencies.

Richards and Singh proposed state and national level institutions as linking up and continuing this kind of hierarchical, federated structure, with a national level institution providing an umbrella for actual river boards or river basin authorities. The legislative framework for such bodies exists, and NWM appears to provide policy thinking that can proceed along these lines. However, the ultimate solution should rest in the hands of governments that they work with, and indirectly coding to them. The proposed solution with respect to water sharing, for example, without tilting power toward management institutions, would work down from the national and state level. This multilayered approach incorporates the hierarchy in Figure 7.2, the political and technical decision making versus operational management.

Richards and Singh’s proposed institutions are still relevant today, as new river basins, and the disputes that may arise, continue to be managed. Imposing time limits and restrictions, as has been done in 2002, have not ended conflicts (for example, the dispute over the Krishna River). The idea here is separation of water management into technical and political elements. The political solutions (such as creating a centre–state transfers from lobbying and political influence technical approaches, independent decision making). The linkage to local measures is also a crucial consideration for management institutions. The political and technical decision making versus operational management institutions is crucial.

35 Another example at the international level is the Indo-Pakistan Treaty of 1960, which has been a subject of much discussion. The commission for the coordination and cooperation of joint river basins between the two countries.

36 A further idea, albeit in reducing transactions costs or trade or bargaining once price increases the impact of allocation.
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water management associations. One improving water allocation at the local disputes was the greater efficiency of the result because of this (see the section provided a second, separate justification). Water management institutions, especially subsuming of inter-state water disputes. They argued that in India, federalism, in general, has been characterized by allocation, and high influence costs as atate water disputes as a prime example proposed was the creation of special regulate the allocation of water across state disputes. These institutions are of the country, but with a greater transparency than the current situation. the idea of creating a hierarchy of associations had been developed in the water of such associations (for example, such cases, the base level units are higher level is that of the shared water federation of WUAs can provide containing. The higher level can also act as an aggregator of political voice for individually be too small. Meinzen-Dick of user federations, and note the levels. They do, however, emphasize in giving WUAs effective organizations at the system level. Similar issues are to create federations of WUAs in particular, the need to federate control of government irrigation.

For water and national level institutions as well as of hierarchical, federated structure, providing an umbrella for actual river system legislative framework for such provide policy thinking that can proceed along these lines. One challenge would be the concern of state governments that they would be ceding too much power to such bodies, and indirectly ceding control of their water resources to the centre. The proposed solution would uniformly remove a set of decisions with respect to water sharing and use outside the general political orbit, without tilting power towards the centre. Thus, the hierarchy of water management institutions, with river basin authorities being the next step down from the national commission, would continue down to WUAs. This multilayered approach can be contrasted with the two-level NWM hierarchy in Figure 7.2, though the purposes are different (roughly, planning versus operational management).

Richards and Singh’s proposals on national and river basin level institutions are still relevant today. Subsequent developments in the major river basins, and the disputes associated with them, have shown that imposing time limits and strengthening tribunals’ statutory authority, as was done in 2002, have not been enough to defuse the most contentious conflicts (for example, the Cauvery, Ravi-Beas, or the reopened Krishna disputes). The idea here is not one of complete depoliticization, but of separation of water management and allocation from broader political maneuvering. As an analogy, the Finance Commission which decides on centre-state transfers from the Consolidated Fund of India, is subject to lobbying and political influence, but also has a reputation for following technical approaches, independence, and creating and respecting precedents.35 The linkage to local user management and efficiency-increasing measures is also an important part of the potential reform of India’s water management institutions. In the context of the discussion of the Coase theorem in the section on analytical review, these ideas can be viewed as institutional mechanisms to reduce transaction costs.36

Another example at the international level is provided by the Indus Waters Treaty of 1960, which led to the formation of commissions in India and Pakistan. These commissions shared information and managed some degree of coordination and cooperation without being caught in the political tensions between the two countries.

A further idea, albeit speculative in terms of formal analysis, is that reducing transactions costs can increase the net gains from mutually beneficial trade or bargaining once property rights have been assigned. The possibility of larger gains increases the incentive to resolve the conflictual situation of rights allocation.
Some evidence for the possibilities and challenges for a federation of water management organizations comes from Narain (2003), who looks at examples from Maharashtra and Andhra Pradesh. He notes that individual WUAs have been unable to achieve much in a situation where state-level irrigation departments retain control of funding and essential allocation decisions. Federations of local user associations have been formed to be able to increase their voice, but otherwise lack explicit authority. Hooja (2003) notes that India’s relatively new rural local governments (panchayats) have been attempting to assert control over local WUAs, to solidify their role in the chain of governance institutions. However, the panchayats themselves are underfunded and lack capacity in other ways. In particular, they do not have appropriate expertise or incentives in the main concerns of WUAs.

Interestingly, in contrast to the case of WUAs, there is a three-tier chain of rural local governance, going up to the block and district levels, with the membership of state-level politicians at these higher levels also potentially connecting local and state government decision-making. This may not be the best model for federating WUAs, since it has tended to cement state-level control, rather than provide two-way communication in a more decentralized governance system. WUAs, on the other hand, have the potential to provide a more bottom-up structure. Another complication that works against aligning federations of WUAs with the tiers of local governance is, of course, that water system boundaries do not match the existing political boundaries. This discussion highlights the challenges of creating any new hierarchy of specialized water management institutions in India, in the context of existing and evolving governance structures. The precise way of overcoming these challenges is not mapped out here, but it is important to point out the gap in NWM’s analysis and institutional proposals in this regard. The contention in this chapter is that without some vertical coordination of water management efforts that includes the local level, NWM’s goals will not be achievable. At the same time, Bhamoriya and Gandhi’s (2011) analysis, summarized earlier in this section, reminds us of the importance of getting the institutional design details right for the WUAs themselves, before considering hierarchies of institutions.

As discussed earlier in this outcome, and it started (2011) consider AIBP in the state level had mixed success. The way forward no assessment of what truly projects, or to incentivize the
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Returning to the overall NWM report, water recycling, groundwater recharge, and rainwater harvesting all receive attention, as do river interlinking and desalination. At this stage, there does not appear to be any prioritization of these methods of water management based on the kinds of cost calculations performed by the 2030 Water Resources Group, or any other calculations for that matter. There are proposals for significant new research on technical options with respect to managing water resources and use (Government of India 2009: chapter 5). The additional funds estimated to be needed under NWMM during the eleventh Five Year Plan (2007–12) are approximately US$ 6.3 billion. Half of this amount is for ‘expeditious’ completion of irrigation projects, including extension, renovation, and modernization of existing irrigation infrastructure. To benchmark this figure, the five-year amount is about 2.5 per cent of the central government’s annual expenditure. Micro-irrigation would receive approximately an additional US$ 220 million under the NWMM scenario. Agricultural practices that make up almost the entire list discussed in the section on water issues are not part of the NWM funding framework, though they show up in the eleventh Plan as the Ministry of Agriculture’s efforts, albeit with relatively low allocations (Government of India 2008: appendix).

Turning to NPF (Government of India 2007) and NMSA, it is unsurprising that they both cover issues related to improved farming practices, including better water management. Again, there is little that seems to be concrete in terms of priorities, and unlike NWM, these documents do not provide any budgetary guidance, or much in the way of institutional responses, beyond noting the importance of local action. These two documents do not appear to be well-coordinated with the NWM document, illustrating some of the gaps in horizontal coordination that exist across central government ministries.

As discussed earlier in this section, AIBP has already attempted to achieve this outcome, and it started in 1996–97, well before NWM. Rao and Sen (2011) consider AIBP in the larger context of attempts by the centre to incentivize reforms at the state level. Their overall conclusion is that such efforts have had mixed success. The weakness of the NWM document is that it provides no assessment of what might be learnt from past efforts to accelerate irrigation projects, or to incentivize reforms in other sectors of the economy.
Perhaps the government proposal that has received the most attention and caused the most debate has been that for interlinking India’s rivers. The proposal in its best-known form involved two components; one linking the northern rivers flowing from the Himalayas, and the second linking southern, peninsular rivers. The entire plan was projected to cost US$ 125 billion, and was formulated under the NDA government in 2002, but received continued consideration under the UPA government that came to power in 2004 and was re-elected in 2009. While the plan in its full form has been dropped (Dancewithshadows.com 2009; Indianexpress.com 2009), the possibility of implementing some of the links remains alive. Specific river-linking projects in the south have been approved, and Tamil Nadu’s DMK, a key UPA constituent party, has argued in favour of river linking projects that would bring more water to that state. In keeping with our earlier discussion, it seems there are unanswered questions about the cost-benefit analysis of interlinking, even for the most water-stressed regions, especially without considering the alternative of conservation measures and measures for increased water efficiency. NWM is almost totally silent on river interlinking, apart from a single passing mention.

Finally, we briefly discuss urban water use and infrastructure. JNNURM is concerned with urban infrastructure generally, including roads, though excluding power and telecommunications. Through this effort, the central government is providing project-based assistance to cities. Again, this is technically through state governments, to respect the constitutional division of powers (local government being a state subject), but effectively another example of centralization in the working of the Indian federal system. General urban renewal also includes water supply and waste management infrastructure (Government of India 2005: 10):

(1) Urban renewal, that is, redevelopment of inner (old) city areas [including widening of narrow streets, shifting of industrial and commercial establishments from non-conforming (inner city) areas to conforming (outer city) areas to reduce congestion, replacement of old and worn out pipes by new and higher capacity ones, renewal of the sewerage, drainage, and solid waste disposal system etc.].

39 Several chapters of IDFC (2011) cover aspects of this topic in some detail.
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The mission also includes water and sewerage more specifically (Government of India 2005: 10):

(2) Water supply (including desalination plants) and sanitation.
(3) Sewerage and solid waste management.
(4) Construction and improvement of drains and storm water drains.

The mission also covers community baths and toilets in urban slums as these projects also have a water supply component.

In terms of mitigation options for India's potential water shortages, urban water supply and sewerage is a necessary corollary of growth, but at the same time is not a critical contributor to future potential shortfalls. Sanitation and waste management are vital needs in urban India, where access to water is below the levels available in cities in comparable developing countries. JNNURM channels funds to municipal governments that may not have adequate tax revenues of their own, and which are often not receiving adequate transfers from their respective state governments. Some of the larger cities are in a position to raise funds for investments through municipal bonds, but that channel is relatively underdeveloped in India. Overall, while measures that are enabled by JNNURM are not the most cost-effective in terms of India's aggregate water-marginal cost curve (Figure 7.1), they make sense based on a broader economic and social calculus. Finally, the driver of JNNURM is the need to prepare India's cities for continued urbanization of the country, and issues of water availability are peripheral from that perspective, though ultimately actions elsewhere in the economy will be required to release enough water for urban expansion.

While JNNURM has been in operation for several years, NWM and the broader action plan for climate change are very much at the stage of conceptualization and discussion. The Government of India approved the NWM charter in July 2011 (Government of India 2011). Meanwhile the Ministry of Water Resources unveiled a draft of a new NWP in January 2012. A series of consultations took place in 2010–11, eliciting a wide variety of suggestions. The background note for the consultations (Government of India 2010) provides useful perspectives from previous reports from academics and industry associations, as well as from a committee on centre–state relations that, reminiscent of the Richards and Singh ideas, recommended that 'a hierarchical but coordinated set of watershed agencies...
CONCLUSION

India faces severe but potentially manageable challenges with respect to water resources over the next two decades and beyond. In the section on water issues, we outlined the magnitude and multiple dimensions of the challenges. We also noted that relatively low-cost measures could provide significant benefits in terms of increasing effective water availability. Of course, aggregate water availability is just one aspect of the problem, with access, quality, and variability all being complex dimensions of water resource management. Systematic treatment of the range of issues with respect to water resources is a challenge prior to the difficulties of implementing solutions to problems.

One of the biggest hurdles in tackling India's water management challenges is the creation of appropriate institutions for analysing problems and implementing solutions. Overall, the Indian government's responses to current and future water challenges have been quite broad but rather superficial, and only now display the beginnings of an integrated approach to water management. The quality of analysis of specific issues with respect to managing water resources is higher than in the past, but prioritization and rigorous cost-benefit analysis remains to be accomplished. Thus, the ideas and analysis that can guide institutional reforms still need to be developed and clarified. The sections on analytical review and current developments in this chapter offer some possibly fruitful ways of thinking about the problems faced by India's water sector, as well as potential institutional reforms that might create structures within which the problems can be tackled. A key conceptual point in the section on analytical review was that national and state-level reforms for water management will be sub-optimal without prior attention to improving local institutions of collective action with respect to water resources.

The federal dimension of water resource management has been recognized in the past, given the fact of India's many inter-state river basins. However, this recognition has not been complete with inadequate attention to state and local level policies and allocation mechanisms. Even with increasing recognition, translating national policies and strategies into state and local policies in many other sectors progress, but only of the biggest gaps in management coordination as well as state river disputes probably are best handled and away from developments in this case of vertical coordination.

The analysis in this book it is not clear that the network of institutional arrangements for the different states will remain in place for many decades and opportunities for reforms. In particular, the participatory water management led, so the build up of place. One positive note, however, is not clear how to manage local resources as well can be provided between political and water management itself. As has been tempting institutions of WUAs, and new started compaction lessons for integrating policy documents not enough at all.

Horizontals: responsible for a task in formation. Although the
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into state and local action remains a major challenge, as it has been in many other sectors. Local management of water resources is making progress, but only covers a fraction of the nation’s water resources. One of the biggest gaps is in connecting river basin management with local management through a chain of institutions that achieves vertical coordination as well as incentive efficiency through decentralization. Interstate river disputes continue to present challenges for India’s polity, and probably are best addressed by shifting the focus to continuous management and away from dispute resolution. The section on current developments in this chapter offers some ideas on achieving more effective vertical coordination in the context of managing India’s water resources.

The analysis in this chapter does not present a complete solution, and it is not clear that one is immediately available, or even feasible. Development of institutions takes time, and different circumstances across different states will require different approaches. What is worth noting is that for many decades national and state governments did not pursue all the opportunities for institutional development that were available to them. In particular, the creation of river basin authorities and of lower-level participatory water management organizations has been relatively limited, so the building blocks for hierarchies of institutions are not even in place. One positive development over the last two decades has been the creation and gradual strengthening of elected local governments. However, it is not clear whether these local governments are well-positioned to manage local water resources, as they lack the necessary financial resources as well as human and organizational capital. Of course, these can be provided or built over time but another issue is the differences between political and natural boundaries for water resource management. As has been highlighted in this chapter, some states have been attempting institutional innovations, with new legislative frameworks for WUAs, and new regulatory bodies for water resources. Researchers have started comparing the impacts of these innovations across states, to draw lessons for institutional design. This chapter argues that national-level policy documents do not have sufficient analysis of data from the states, nor enough attention to local-level issues of water resource management.

Horizontal coordination across ministries, particularly those responsible for agriculture and water resources, will also be a difficult task in formulating and implementing national-level water policies. Although the Planning Commission provides mechanisms for sectoral
views across ministry-level boundaries and for national–state coordination, its ability to influence and monitor implementation remains severely limited. The problem of ineffective or insufficient horizontal coordination is pervasive in Indian governance, but its implications are particularly acute in the case of water as Mandal and Rao (2005) have highlighted in their analysis of environmental policy in India’s federal context.

Returning to the vertical dimension of the challenges of water management, there are a well-known set of general problems with Indian federalism (Rao and Singh 2005). Getting funds down to the level where they are best spent, building the capacity for appropriate spending decisions, reducing spending distortions due to rent-seeking, coordinating complementary innovations, and designing policy to appropriately influence behaviour are all significant dimensions of what needs to be accomplished. These are long-standing problems of Indian federalism and the management of water resources from national considerations all the way down to day-to-day local issues exemplifies these structural challenges of India’s federal system. In the last analysis, therefore, if India is to have any hope of meeting its severe challenges with respect to water resources, it will need reform of the federal system as well as reform through the pathways of the existing system.

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40 This aspect of aligning revenue and spending, whether through assigning revenue authority or through fiscal transfers, is of course the heart of fiscal federalism, and has been analysed extensively elsewhere, so has not received much attention in this paper, where the focus is on institutional innovation. Clearly, new governance institutions need appropriate sources of revenue. This is an ongoing struggle for India’s newish local governments, and has arisen in the context of innovations for water management institutions as well. For example, Bhamoriya and Gandhi (2011) note the different financial arrangements legislated for WUAs in Andhra Pradesh and Maharashtra.


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**Federalism and Governance**

**Comparative Studies**

**Sherry Tao Kong**

**INTRODUCTION**

Political scientists have long argued that a country’s performance is determined by the quality of its institutions and the way power is distributed (Kaufmann et al. 2003; Kanbur 2003; Tabellini 2000). While a variety of factors contribute to this performance, economic performance has been found to be strongly influenced by the quality of institutions. In this respect, the effectiveness of governance has been found to have a strong impact on economic performance. Economic governance has been defined as the institutional framework within which economic decisions are made.