

ASIAN IRRIGATION IN TRANSITION

Responding to Challenges

Editors

Ganesh P. Shivakoti, Douglas L. Vermillion,
Wai-Fung Lam, Elinor Ostrom,
Ujjwal Pradhan and Robert Yoder



Sage Publications

New Delhi / Thousand Oaks / London

2005

15

Coalition-Building for Participatory Irrigation Management under Changing Water Resource Trends: Reflections on Reforms in Andhra Pradesh, India*

m.v.k. sivamohan and christopher a. scott

Introduction

The trajectories in the history of the much-lauded recent irrigation sector reforms in Andhra Pradesh, India (as a special reform effort in South Asia) draw many parallels with those behind the historic Green Revolution in Asia. It is argued in this chapter that the paradigm change in irrigation management in Andhra Pradesh cannot fully be understood by “big-bang” explanations; indeed it was facilitated by several coalition formations and also personal engagements by different actors at different points of time. Simultaneously, the situational compulsions of water resources availability and allocation as determined by hydrological and institutional processes played a dominant role, which will continue to shape the evolving reform process. Taking the network approach in the organization theory context, this chapter explores “prescribed” or “formal” network development after the creation of water users associations and the “emergent” or “informal” networks evolving around the formal networks. The spontaneous formation of an apex association of water users’ associations at the irrigation project level in the Krishna River Delta

*The research reported in this chapter was conducted by the International Water Management Institute under an Asian Development Bank supported project titled “Pro-Poor Intervention Strategies in Irrigated Agriculture in Asia.”

is a case in reference here to explore the interplay of formal and informal networks and their links with water resources availability and allocation.

The inception and leading rationale for participatory irrigation management (PIM, also referred to as irrigation management turnover or IMT in various contexts) has tended to be based on efficiency and transparency considerations. Irrigation bureaucracies, whose emergence and stagnation are recounted below, were largely unable to perform routine operation and maintenance, with performance implications for the deteriorating irrigation infrastructure. The collection of water service fees, which served as the “front end” point of contact between farmers and the irrigation agencies came to be viewed as a crucial lever in influencing the behavior of various actors, not just farmers and agencies, but also investment and rehabilitation decision makers. After a decade of PIM/IMT in a range of contexts, it is fair to say that the current model has run its course. Other factors and processes in which PIM/IMT case examples have been embedded have exerted overriding influence on the ability of PIM to “deliver the goods.” This includes water sector institutional arrangements (particularly irrigation reforms), and water resource trends (availability and allocation) as determined by hydrologic and institutional factors. These processes will be explored in this chapter, with a focus on Andhra Pradesh in India, and the Krishna River Delta in particular.

The literature survey shows that the politics of water resources policy has several themes. One of them that is engaging the attention of researchers of late is the institutional reforms in the irrigation sector, especially participatory irrigation management. However, most publications in this field tend to be prescriptive; present models for desired end states and list policy recommendations (Vermillion, 1999). Some of them are performance accounts by implementers and NGOs. Documentation of actual processes is virtually non-existent (Mollinga, 2001). Fewer still are assessments of the evolution of reform processes (including the emergence of institutional innovations), coupled with trends in water resources availability.

Taking clue from the case of technology development as amplified by Biggs and Smith (1998, p. 245), specific historical and institutional conditions influenced the participatory irrigation management (PIM) paradigm in India; “[O]ne feature of these histories has been the mobilization of support and resources around key development issues, methodological and technological options by coalition formations by individuals.” The same authors define coalition as “a curious and opportunistic

grouping, loosely connected through friendship and other ties, reflecting both idealistic and self-interested impulses. It is pervasive enough to pass unnoticed but remains remarkably significant in affecting the outcomes of development process, as well as in influencing the way those processes and histories are seen" (Biggs and Smith, 1995, p. 240). Advocacy coalitions are important units of understanding policy change over time. They consist of people from a variety of positions (elected and agency officials, interest groups leaders, researchers, etc.) who share a particular belief of system-basic values, causal assumptions and problem perceptions and who show a non-trivial degree of coordinated activity over time. In the emerging PIM in India, the idea of coalitions provides a useful conceptual framework in the learning process.

The ongoing "reform" process in the irrigation sector in Andhra Pradesh provides the backdrop for this chapter. It can be seen as a part of the overall policy and global trend of devolution of responsibility and control over natural resources from government agencies to user groups. The changing concept of governments, and the growing recognition of limits of government agencies in the management of irrigation at local levels, gave further impetus to the need for devolution in this sector. The reasons for and the objectives of reform are varied (Mollinga, 2001)—ranging from economic perspectives, financial dimensions, equity considerations, decentralization and democratization agendas to environmental effects. It is more often a complex combination of different elements of the objectives. It is to be noted here that devolution of resource management to user groups is different though accompanied by administrative reform policies of decentralization or transfers of powers from higher levels to the lower levels of government structure (See Meinzen-Dick, Knox, 1999; Meinzen-Dick, Raju and Gulati, 2000).

The word "reform" is often used in irrigation context in a rather bureaucratic sense of organizational reform, shuffling structures and components, rather than institutional reform in the sense of changing the fundamental rules about the way the irrigation "administration" actually operates, and in particular, where the decision making authority really lies. In other words, reform needs to address the underlying political economy. This problem goes beyond irrigation, and it will actually require reform of the entire public administration. The state of Andhra Pradesh took up the World Bank funded economic reform process in 1997 with the following core objectives: (1) re-prioritizing expenditure;

(2) improving expenditure management; (3) reforming public enterprises; (4) reforming tax system; (5) restructuring power sector; (6) improving the efficiency of public canal irrigation network; (7) improving maintenance and upgrading of roads; (8) speeding up private sector participation in the port management; (9) improving public health services, and; (10) implementing universal primary schooling (World Bank, 1997).

While all these efforts constitute the reform process enabling water users and creating right conditions, it is argued here that "reform" in the sense of institutional change is mostly an incremental, evolutionary process, which allows coalitions to emerge and solidify in response to changing circumstances. It is therefore, a localized incremental learning paradigm of institutional and organization change rather than a radical, uniform "blue print" model. Establishing coalitions of interests and nurturing them in ways that are sustainable and equitable, is the future role of public administration. The question of reform, therefore, is one of how to get from here to there.

The following section of this chapter gives an historical account of how the PIM process in the state of Andhra Pradesh has emerged with the coalition of different actors. The second part deals with the efforts to create fresh organizational arrangements or networks in irrigation management by the government, and modifying the institutional framework by enacting the Andhra Pradesh Farmers Management of Irrigation Systems Act (APFMIS) 1997. Our intention in this section is to review the debate on the importance of institutional context in the irrigation sector, and its impact on water resource allocations and efficiency. An attempt is also made to map the prescribed networks and structures that have evolved with the passing of the new Act. The third section presents the case of the federation of Krishna Delta WUA presidents as an innovative organizational arrangement, and as an informal/emerging network providing pointers for policy and action for further reforms. Integrative system to an extent results, because of the dynamic of self-designing nature of organization, where prescribed structure often arises from task driven emergent networks. An argument is presented, suggesting that institutional innovation is ongoing but unless these (often informal) innovations are legitimized, and coalitions emerge to promote them, the widespread adoption of new working practices is unlikely to emerge.

Early Coalitions

The early history of irrigation in India is replete with evidence of farmers themselves managing whatever irrigation systems they had. The flux of time, alien rule, and the subsequent development of modern irrigation systems on a large scale in the country saw total replacement of these farmer institutions by centralized government bureaucracies. In the present day context, irrigation reforms became inevitable and necessary as the irrigation sector suffers from three-fold crisis in financial, technical/managerial, and image or legitimacy aspects (Mollinga, 2001). Many deficiencies, such as (1) unreliable water delivery and complete neglect of maintenance of systems; (2) inadequate water distribution and deprivation of water to the tail ends; (3) inefficient and wasteful use of water; (4) insensitivity of government service delivery; (5) lack of incentives to economize and conserve water; (6) low water rates and recoveries; and, (7) deteriorated physical infrastructure, are common to all the irrigation projects. Revival of farmers' involvement in irrigation management is viewed as a strategic step in the reform process, based on financial and managerial efficiency imperatives related to the deficiencies listed.

The cock-eyed view of the politicians and the normal bureaucratic apathy for change in bringing transformation, passed through several stages of evolution of the very concept—from beneficiary participation to PIM, and finally to IMT.

Efforts in this direction of reforms began in India with the initiation of command area development (CAD) program in 1973 with the objective of improving water use efficiency and productivity in irrigated agriculture. Since it was felt that great opportunities lie in improving the portions of irrigation systems managed by farmers in the farm fields "below the outlet" of irrigation canals, the CAD program included the formation of farmers' organizations at outlet level as one of its important components of work. It was expected that the organizations, thus formed, would maintain the newly built field channels and manage water distribution by adopting rotational water supply (RWS) methods (Brewer, Kolavalli, et al., 1999). Initially, the concept was that the farmers who were viewed as beneficiaries were expected to participate with the irrigation agencies in the discharge of the latter's duties. The idiom gradually changed from participation to management by farmers in the early 90s. But the then prevailing misconceptions of the process and rationale for developing farmers' organizations for effective

management were strongly conditioned by a set of unvoiced assumptions about the way such organizations work, and about the nature of their relations to the state (Ambler, 1994).

The government initiatives with the World Bank assistance tried to improve the situation in the 1970s through CAD, and in the 1980s through National Water Management Program. However, in all the efforts, technical solutions were sought through technical measures in these massive programs. Institutional¹ issues were not given due importance, and the technical solutions alone could not bring in better performance (Sivamohan, 2001). On the other side, the government of India showed consistent commitment to participatory irrigation management (PIM) as seen from the Five Year Plan documents, National Water Policy, 1987, and several committees and commissions' reports.

Around this time, experiences from the different "models" of PIM implemented in other countries was flowing in, in addition to the researches on participatory approaches and experiments in India, with the support of organizations like Ford Foundation, and the national and state governments. The Planning Commission set up a separate working group on PIM to review and suggest the strategies for the Ninth Five Year Plan. The working group identified several crucial legal, institutional, and financial issues for the effective implementation of PIM programs and concluded that the efforts made so far were tentative in nature, and the absence of clear legal provisions rendered WUAs weak and vulnerable.

The state of Andhra Pradesh of late has laid pathways in irrigation sector reforms in India. The APFMIS Act was passed in 1997 and the WUAs were formed in all the areas served by the irrigation systems in the state, and are working well for the last five years. In the South Asian context, the reform is lauded as rather a "special reform" as it is characterized by strong political support of the state government—no lack of infamous "political will"—and the implementation by a dynamic group of committed reform agents (Mollinga, 2001). In the light of these events a critical examination of the experiences in Andhra Pradesh becomes highly useful in understanding the reform process.

The state of Andhra Pradesh is among the first batch of states to initiate CAD program. Syed Hashim Ali, the then commissioner of Shri Ramasagar Project working in the department of irrigation, agriculture and cooperation under World Bank loan, took initiative to process a proposal for the establishment of a separate department for CAD, and was subsequently appointed as the secretary of the newly

formed department in 1974. He served the department for seven years, which is an unusually long period without a transfer in the Indian Administrative Service. During this time, the coalition building focused on interdepartmental coordination and team building, and thereby, directing the process of change for better utilization of irrigation potential created in major and medium irrigation projects for increased production of food grains. Hashim Ali had to face opposition and conflict while carving out a new department in the government set-up, taking out powers from the established departments and working out alliances with other departments like agriculture, irrigation, revenue under the multi-departmental organization structure of CAD Authority. With remarkable commitment he pursued the program objectives and negotiated with several actors at different levels. There was a coalition of donor, academic, administrative, and political actors, both at center and state levels.

The water and land management practices implemented under "pilot projects" caught the attention of the government because this showed that coordinated functioning of irrigation and agricultural officials along with farmers helps in water use efficiency, and has its potential for application in the entire command area for rotational water supplies below the pipe outlets. By 1981, as many as 3,000 outlet committees of farmers were constituted for water management below the outlets of irrigation projects in the state. Very soon they became defunct. Several observers (Sunder and Rao, 1980; Chambers, 1988; Singh, 1991) pointed out that deficiencies in the management of the main systems was responsible for the inability of farmer's organizations taking up RWS. The "blind spot" was becoming visible and the mindset of implementers was changing from its "fixation below the outlet." Hashim Ali vehemently pleaded with the irrigation department and policymakers that formation of outlet committees alone would not solve the problem of water delivery. He introduced the rotation of main canals and called the process Systematic Canal Operations (SCO) for pushing the water to outlets downstream. He felt that outlet committees seem to be the natural units essentially bound by water management under the guidance of the O&M staff (Hashim Ali, 1981).

As a result of his persistent lobbying at the central government level, the government of India commissioned yet another pilot experiment in order to scale up and organize farmers above the outlet level in three states—Andhra Pradesh, Maharashtra and Gujarat. This time the function of facilitating the process of implementation by farmers themselves

was given to NGOs, with a grant of Rs 2.8 lakhs to each, by the government of India. The results were encouraging towards the end of the project period as the farmers opened up to the need for alternate thinking and behavior. The Ford Foundation once again stepped in and funded an NGO operating in Andhra, namely, Institute of Resource Development and Social Management (IRDAS)², to extend its action research to a large area. Initially IRDAS started in an area of 5,000 acres and expanded its operation to 1,500 acres and further to 50,000 acres with the funding of Ford Foundation. In the three-year period of the operations, more area was brought under irrigation as healthy alignments among farmers took shape, conflicts reduced, and productivity of individual farms improved.

Individuals from donor agencies, the irrigation bureaucracy, NGOs and research organizations coalesced as per the needs of the time. The methodologies used by the implementers involved arranging recurrent consultations among farmers and brainstorming with them to evolve decision options. Teams of field level functionaries were constituted, and were asked to visit the farmers together in a group in order to facilitate coherent interactions.

The Evolving Reform Agenda

New initiatives in irrigation sector reforms continued to be the main agenda of the state government as the actual utilization of the irrigation potential created decreased, and in the late 90s net irrigated area in the state decreased from 2.9 million ha in 1990 to 2.3 million ha in 1994. Of the 4.8 million ha of the potential created to date, only 48% was actually irrigated. An Act to provide for the involvement of farmers in irrigation utilization, in accordance with the CAD concept called the "AP Irrigation Utilization and Command Area Development Act" was made in 1984 for implementing CAD programs effectively and provides for regulation, maintenance, and repairs of irrigation systems. It also envisaged the formation of "pipe committees" by the water users. The spatial and time dimensions in the development of canal irrigation systems had brought in certain rights, privileges, and patterns of management in water supplies which have got deeply rooted, creating considerable gap between the potential created and utilized (Chambers, 1992).

The situation was aggravated by a gap in the project plan itself. The Commission for Irrigation Utilization in Andhra Pradesh (1982) elaborated that the planning gap was created due to adoption of over-optimistic and unrealistic duties, inadequate water allowances, under-estimation of seepage and other losses, overestimation of dependable yields into the project area and so on. The commission estimated that the planning gap for nine large canal systems in AP ranged from 20–40% based on water requirement for crops planned under the project and the water allocated. The commission felt that this would be the minimum gap under different canal systems, unless of course, irrigated dry crops were sown on a large scale in areas “localized” (planned) as wet, which was most improbable. Due to the neglect of maintenance over many years, the irrigation systems were under severe disrepair, canals and drains were heavily silted, lining was damaged, drops (engineering structures) were eroded and collapsing, and many structures were either inoperative or defunct.

The deterioration in irrigation systems and their poor performance were attributed to a combination of many mutually supporting negative influences commonly characterized as the “vicious circle” of effects (Oblitas, Raymond et al., 1999). The government of Andhra Pradesh headed by Chief Minister Chandra Babu Naidu, reacting to the situation prepared a “white paper,” clearly mentioning these issues. Discussions were initiated throughout the state on the subject. State level conventions, project level workshops, and workshops with NGOs at district level were organized to decide on the approach to be adopted in tackling the problems confronting the irrigation sector. The reform thrust and agenda, thus was evolved with a clear direction that farmers’ empowerment and management should form the core of the reforms and, the process should be bold and comprehensive rather than incremental. At the same time, the government constituted a Water Charges Review Committee (WCRC) in December 1997 to annually review charges and expenditure in the irrigation sector. Enlisting support from different political parties and all stakeholders was considered as essential for the reform process. The state, thus, was witnessing a dynamic reform process. Coalition formation was conspicuous with Chandra Babu Naidu and World Bank officials working closely, and an Additional Secretary of the government, Raymond Peter, working committedly to push the implementation process of the reform. The Chief Minister was even criticized by opposition parties for playing into the hands of donor agencies by accepting loan conditionalities.

Organizing Formal Networks

The irrigation sector reform process in Andhra Pradesh can be viewed as a top down exercise. However, it is an attempt to devolve authority to water users. This is gradually being accompanied by decentralization in irrigation hierarchy and other procedures, like in financial matters. For example, the water users associations now get their share of the water tax collected directly from the District Collector, without waiting for treasury disbursement procedures. The competent authorities are appointed from irrigation agency at different levels of water users organizations with delegated powers. Creation of water users’ associations can be viewed as creating formal networks in the organization context. The APFMIS Act of 1997 is all about providing a legal backing to the farmers’ organizations—an element, which was hitherto lacking and blocking the formation of such organizations. This formal or prescribed network provides the ground rules—a framework of roles, rules and relationships.

Briefly, the Act has the following features:

- Gives water rights in an irrigation system to the farmers through the farmers’ organizations (FOs);
- Ensures functional and administrative autonomy to the FOs;
- Provides the modalities for the creation of FOs in all irrigation projects of the state representing all the water users (At the field level, these are called Water Users’ Associations [WUAs] covering a group of minors/small distributaries. A group of WUAs along a distributary or distributaries are federated into a Distributary Committee [DC]. The DCs under a major irrigation project are brought under a Project Committee [PC]);
- Staff of the irrigation department is made accountable to the WUAs, DCs or PCs as the “Competent Authority,” requiring compliance of government staff to the decisions of FOs;
- FOs to resolve conflicts among farmers;
- Enables maintenance and improvement of irrigation systems by the FOs based on resources raised by them, or from the share given by the government as a percentage of water charges collected from the water users;
- Allows access to information on scheme operations;
- Permits preparation of the operational plan and the maintenance plan by WUAs/DCs/PCs;

- Provides freedom of cropping pattern to farmers (unlike in the earlier law of "localization"), subject to the availability of water; and
- Provides procedures and guidelines on accounting, social auditing, water budgeting, election procedures and other matters of administration. As per the Act, the FOs have a right to take action on any of the offenses specific.

After a massive publicity and extension campaign involving all political parties and the entire state administrative machinery, statewide elections of WUAs were organized on June 17, 1997 for the presidents and territorial constituency members of WUAs for all the irrigation systems in the state. In total, 10,292 WUAs were created. The jurisdiction of the WUA was delineated on a hydraulic basis and typically covered a minor canal, a group of minors, or a small distributary, or in case of minor irrigation, the entire system. In November 1997, elections were conducted for the second tier of management, the DCs.

Devolution of authority and responsibility to farmers in the management, maintenance and distribution aspects constituted the core of reform process as pointed earlier. Simultaneously, several administrative reforms were also worked out for effective implementation of the Act. Among others, they include: (1) delegation and enhancement of financial powers to irrigation officials; (2) appointment of district coordinators to network with farmers' organizations; (3) reformation and simplification of the "tender" process; (4) appointment of quality control adviser; and (5) engagement of private agencies for carrying out investigation works. The prescribed institutional change can be said to have influenced the roles of actors to an extent with changes in behavior patterns. This can be reflected from the following example. On conclusion of a meeting between an executive engineer, a WUA president and a few farmers, the engineer exclaimed, "Look! These people who could not dare enter my office in the past, dictate to me now!" Farmers, on the other hand, are highly appreciative of the easy access they have now with the officials. The WUA presidents or DC presidents are the *de jure* "competent authorities" to decide the works to be taken up in the irrigation systems, whereas the *de facto* decision makers continue to be the competent authorities as designated in the irrigation department. The channels of communication in between them are well defined. However, the deliberate attempt by government not to create the project level or water resources allocation organization (Oblitas, Raymond et al., 1999) (called the Project Committee in the Act) constitutes a gap in the network structure.

The following is the SWOT analysis of the PIM in Andhra Pradesh:

Table 15.1
SWOT Analysis of the Newly Formed WUAs in Andhra Pradesh

<i>Internal</i>	
<i>Strengths</i>	<i>Weaknesses</i>
<ul style="list-style-type: none"> • Strong legal framework provided by 1997 Act with provision of recall. • Established and functioning WUAs and increased user participation. • Increased satisfaction of farmers for the quality of service since IMT. • Dependency syndrome with agency broken. Increased levels of managerial accountability. • Improved maintenance service provision. • Reduced levels of bribery and rent seeking by agency functionaries. • Increase in irrigated land. • Improved math between farmers' perceived needs and expenditure. • Reduced water disputes and improved collective action. • Increasing awareness for water use efficiencies. 	<ul style="list-style-type: none"> • Weak representation of farmers in water allocation—Organizational structures not in place at project level. • Lack of WUA contingency funds. No individual water rights to farmers. • Lack of knowledge among users (<70%) of WUA election procedures. • The institution of competent authority and possible collusion with rich farmers and elected members. • Identification of poor and pro-poor strategies missing.
<i>External</i>	
<i>Opportunities</i>	<i>Threats</i>
<ul style="list-style-type: none"> • Effective management made possible by extensive water resources information processes. • Increased stakeholder participation at project level under new Act. • Delegation of water sector responsibilities from state level to grassroots. • Changing perception and philosophy of the value of water in society, leading to need for more efficient and productive irrigation. 	<ul style="list-style-type: none"> • Bureaucratic resilience and perceived threat at lower levels. • Increasing demand by other users of water. • How annual surface water allocations are arrived at unclear; contested and not respected by stakeholders. • Increasing pollution of surface and groundwater from industrial and urban waste water. • Poor control of groundwater abstraction. • Changing perception/philosophy of water as an economic good. • Lack of appreciation for emergent informal networks.

It is particularly interesting to note that elections for the PCs have not yet taken place in Andhra Pradesh. The WUA presidents now want a say in the management of project at the main system level. The government on its part is unsure whether to allow the farmers' representatives to have such a major say at project level. They fear that the project committee will be all too powerful, and may be difficult for the administration to handle (Pangare, 2002). As has been demonstrated in other irrigation reform contexts, particularly in Mexico by Scott et al. (2001), claims by higher level, federated WUAs over water resource decision making are seen as contesting the decision making role of the irrigation bureaucracy. While the Andhra Pradesh Act intentionally provides for committees at the project level, their constitution will open the door to water resources allocation issues by the farmers.

Thus, we have demonstrated for the broader reform process in Andhra Pradesh, a combination of formal and informal networks; broadly constituted coalitions emerge when conditions for institutional innovation are ripe. In this context, WUAs in the Krishna river delta have formed a project level organization body that spans party political interests.

Emerging Networks: The Krishna Delta WUA Presidents Association

Emerging networks that are coalescing around the prescribed networks, and the interplay in between them, is examined in this section with a case study of the Krishna Delta WUA federation. The Krishna delta has a total command area of 1.3 million acres, divided into eastern, central, and western regions and served by two main canals: Krishna Eastern (KE) Canal and Krishna Western (KW) Canal. The command area is covered by 148 WUAs, which are grouped under 19 DCs. The area is highly prosperous with a rich tradition of irrigated agriculture. The soil is mostly black cotton soil and the main crops grown in the delta are paddy and sugarcane in *kharif* (June–October), and paddy, sugarcane, pulses, groundnut, chilies and vegetables in *rabi* (November–March). The Krishna river is the second largest in South India with a total catchment area of 97,000 sq. miles spread across Maharashtra, Karnataka and Andhra Pradesh. An *anicut* (dam) was constructed by the British in 1884–85 and was replaced by a barrage at Vijayawada in Andhra Pradesh in 1957. The Krishna delta system command areas are designed

for wet crop cultivation. Based on the availability of water inflows in the system, the extent of the command and crop seasons are decided. The estimated duty is about 70 acres per cusec or 1,000 hectares per cubic meter per second of water for irrigation. "Kammans" dominate the political, economic and social life in the delta. The irrigation sector reform process was received enthusiastically, and the WUAs were readily formed; within two years of functioning the water users perceived the need for an apex organization structure to negotiate with the irrigation department and the government. All the presidents of the WUAs and DCs met at K.L. Rao Bhavan, adjacent to the office of the Superintendent Engineer of Irrigation, in 1999 and unanimously elected a president and other office bearers of an apex body called the "Association of Krishna Delta WUA Presidents" (AKDWUAP) to provide leadership at the project level. Bhavani Prasad, a law graduate and a farmer on the KE canal, who was also elected as a DC president, was chosen as the President of the federation. He enjoys a good reputation and political linkages. The Secretary, Rao, is a civil engineer and a WUA president on the KW canal. He served in the defence sector, and after voluntary retirement took up the cause of irrigation distribution. He is also politically and socially well connected. Both the president and secretary belong to the progressive Kamma community in the region.

Since the formation of the federation, they have conducted five meetings and resolved on several issues, ranging from money payments to WUAs, maintenance works including rehabilitation of the barrage, water planning at the project level, to demanding the formation of project level committee of farmers' organizations. The federation is an informal organization networking with different actors within the project and outside. For the farmers and officials in the delta it is immaterial whether the association is constituted as per the letter of the law or not.

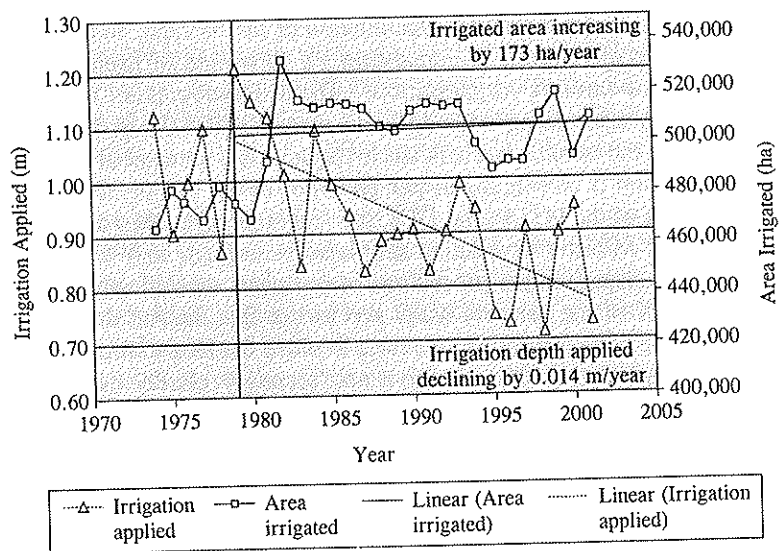
On behalf of the WUAs and DCs, the federation presented a petition to the Chief Minister to sanction additional state funds to WUAs, and requested a change in the procedures of payments (specifically the release of 10% of the per acre water service fee that the Act designates for PCs), etc. The federation also tried to move the idea to form a state federation of WUAs. The president and secretary closely liaise with the irrigation department and other government officials, participate in meetings—not only at the project level but also at the state level. In early 2002, the federation co-sponsored an all-India meeting of WUAs in Vijayawada. AKDWUAP successfully negotiated along with DC presidents on the lower reaches of Eluru canal (branch canal) for

adjusting irrigation in between Godavari delta irrigation officials and Krishna delta irrigation officials during the last *kharif* season, when there was acute stress for water in the Godavari delta tail end. Water from the Krishna system was let in to the Godavari distribution system at the confluence point at Eluru town.

Water Resources Trends

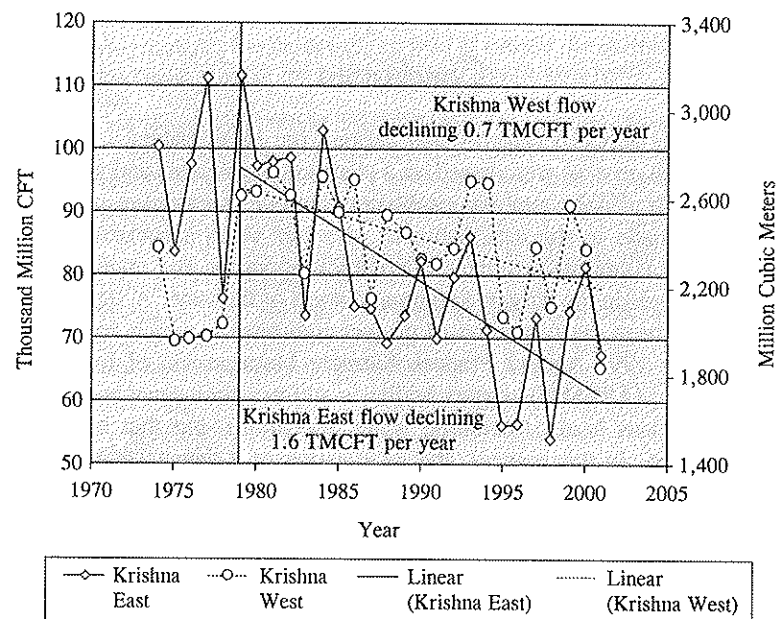
The institutional developments in Andhra Pradesh, particularly in the Krishna delta, are linked to water resources trends. While land pressure in this highly productive rice-producing delta continues to maintain (or even drive a nominal increase in) the area irrigated, there is a pronounced decline in water applied at the field level (see Figure 15.1). It appears that 1979 was a critical year; after several years of erratic conditions in the amount of water applied during the *kharif* season, a secular decline was initiated that continues to the present. On average throughout the delta, 1.4 cm (approx. 1/2 inch) less irrigation depth is applied per year during *kharif*.

Figure 15.1
Krishna Delta Area Irrigated and Irrigation Depth Applied (*Kharif*, 1979–2001)



This is, in fact, driven by declining canal flows, as shown in Figure 15.2. Two principal canals—east and west—derive water from the barrage and irrigate the 530,000 ha (1.3 million acre) command area. Similarly, from 1979 onward, both canals show declines in *kharif* season flows, with the KE canal flow declining 0.7 thousand million cubic feet (20 million m³) and the KW declining 1.6 thousand million cft (45 million m³) per year. The reasons for these declines need to be assessed in the context of upstream uses of water, particularly the inflows and operation of the large Nagarjuna Sagar reservoir. While these are beyond the scope of the present analysis, it can be inferred that increasing pressure on water resources throughout the Krishna river basin are reflected in the (declining) water availability in the delta.

Figure 15.2
Krishna Delta Canal Flows (*Kharif*, 1979–2001)



How declining water availability in the delta will be managed is an issue of critical concern to the federation. Just as tail-end users on a distributary—who are organized in a WUA—negotiate water allocation with head-end WUAs through the Distributary Committee, the Krishna

(basin tail end) delta federation is conscious that state level water allocation organizational structures are necessary. Similarly, it is not lost on the federation or on the Secretary of Irrigation for Andhra Pradesh that upstream water resource development leading to increasing diversions of water in Karnataka and Maharashtra will determine the amount of Krishna river water available to Andhra Pradesh. The Krishna river tribunal award that governed interstate water allocation for the 25-year period from 1976–2001 will have to be renegotiated. The rapidly growing and water-short metropolis of Hyderabad,⁴ too, has cast its eye south to the Krishna and is planning to install a pipeline and pumping capacity to withdraw 450 million liters per day (164 million cubic meters per year) from the river in a phased manner over the next four years. It is in this context that state and basin level federations of water users must carve out a role for themselves in water resource allocation decision making.

Conclusions

The Andhra Pradesh reforms that created the participatory irrigation management process were based on a coalition of interests and personal engagements. While teething problems continue, significant progress has been made in the establishment of water users associations and distributary committees to handle irrigation operation and maintenance at lower levels in the irrigated command areas of the state. A significant lacuna has been the formation of project committees, which are envisaged in the 1997 Andhra Pradesh Farmers Management of Irrigation Systems Act (APFMIS) as apex bodies to address main canal and reservoir operations issues (including water allocation), but that have not been created. In this context, the Association of Krishna Delta Water Users Associations Presidents has emerged as an informal network to press for consummation of the reform process, and thereby the formal recognition of this federation as a project committee with the accompanying role in water resource allocation decision making.

At the same time, water resources availability in the Krishna river basin has been declining over the past two decades, and competing demands for water will continue to exert a driving rationale for the constitution and formal recognition of state and basin-wide networks of irrigation water users. It appears inevitable that these will emerge spontaneously as informal networks; this will ensure that users' concerns

remain central to water resources decision making. However, social structure in India often creates social inequities in such spontaneous groups. But we now have many well developed tools for assessing power structures and dealing with them in conflict situations. Stakeholders' analysis is the most obvious tool. Consistent with its changing role, the government should attempt to build these local structures, not in a target box-ticking fashion, but in a way that recognizes diversity.

NOTES

1. Institutions are sets of common habits, routines, established practices, rules or laws that regulate the relations and interactions between individuals and groups. They are commonly described as the "rules of the game." They can be recognized at micro level in form of day-to-day operational rules with the actors in any system functioning most of the time; at the meso or government level, in form of governing the system; and at macro or constitutional level in form of allocating the responsibility of making and enforcing the existing day-to-day rules. "While substance of institutional reform relates more to the operational level of analysis, the process of institutional reform relates more to the governance and constitutional levels" (Gerrad, 2000, reprint).
2. The key persons from IRDAS who worked on the project are Turabul Hassan and Rao, a retired officer from the agricultural department of the state government who worked earlier as administrator of CAD Authority, and team leader of the pilot project respectively, in the Sri Ramasagar command area under the leadership of Hashim Ali.
3. 'Kamma' is the name of a caste that traditionally constitutes an important segment of the agricultural community.
4. Hyderabad currently meets its water needs from the Musi River, a tributary to the Krishna on which Hyderabad is situated, and from inter-basin transfers from the Manjira River, a tributary to the Godavari.

REFERENCES

- Ambler, S.J. (1994). The Language of Farmer Water Users Associations: Rethinking Irrigation Organization Development in India. In M. V. K. Sivamohan and C. A. Scott (Eds.), *India: Irrigation Management Partnerships* (pp. 15–16). Hyderabad, India: Booklinks Corporation.
- Biggs, S. and Smith, G. (1998). Beyond Methodologies: Coalition-Building for Participatory Technology Development. *World Development*, 26 (2), 239–48.
- Brewer, J., Kolavalli, S., Raju K.V., Naik, G., Kalro, A.H. and Sakthivadivel, R. (1999). *Irrigation Management Transfer in India: Policies, Process, and Performance*. New Delhi: Sage Publications.
- Chambers, R. (1988). *Farmers Above the Outlet: Managing Canal Irrigation*. New Delhi: Oxford & IBH Publication Ltd.

- Chambers, R. (1992). *Managing Canal Irrigation-Practical Analysis from South Asia*. New Delhi: Oxford and IBH Publishers.
- Gerrad, C.D. (2000). *Ten Institutional Perspectives on Agriculture and Rural Development: A Conceptual Framework for Policy Makers, Managers, and Analysts*. Paper presented at XXIV International Conference of Agricultural Economists, Berlin.
- Hashim, Ali S. (1981). *Water Scarcity and Role of O&M Administration and Farmers Organization* (Mimeo), Paper presented at the Workshop on Irrigation Management, Varanasi, India.
- Johnson, S.H., Vermillion, D.L. and Sagardoy, J.A. (Eds.), (1995). *Irrigation Management Transfer, Selected Papers from International Conference on Irrigation Management Transfer, 1994, Sep 20-24; Wuhan, China*. Rome: International Irrigation Management Institute; Food and Agricultural Organization.
- Meinzen-Dick, R.S. and Knox, A. (1999). *Collective Action, Property Rights and Devolution of Natural Resource Management: A Conceptual Framework*. Paper presented at Workshop on Collective Action, Property Rights and Devolution of Natural Resource at Puerto Azul, Phillipines, 21-25 June.
- Meinzen-Dick, R.S., Raju, K.V. and Gulati, A. (2000). *What Affects Organization and Collective Action for Managing Resources? Evidence from Canal Irrigation Systems in India* (Discussion paper no. 61). Washington: International Food Policy Research Institute (IFPRI), (EPTD).
- Mollinga, P. (2001). *Power in Motion—A Critical Assessment of Canal Irrigation Reform, with a focus on India*. New Delhi: Indian Network on Participatory Irrigation Management.
- Mollinga, P., Doraiswamy, R. and Engbersen, K. (2001). *Participatory Irrigation Management in Andhra Pradesh, India: Policy Implication and Transformation in the Tungabhadra Right Bank Low Level Canal*. Working paper/monograph series. New Delhi: Indian Network on PIM.
- Oblitas, K. and Raymond, Peter. (1999). *Transferring Irrigation Management to Farmers in Andhra Pradesh, India* (Technical Paper 449). Washington, D.C.: The World Bank.
- Pangare, G. (2002). *Scaling up Participatory Irrigation Management in India-Lesson Learnt from the Andhra Pradesh Model and Future Strategies*. New Delhi: Indian Network on.
- Scott, C.A., Silva-Ochoa, P., Florencio-Cruz, V. and Wester, P. (2001). Competition for Water in the Lerma-Chapala Basin. In A. Hansen and M. van Afferden (Eds.), *The Lerma-Chapala Watershed: Evaluation and Management* (pp. 291-323). London: Kluwer Academic/Plenum Publishers.
- Singh, K.K. (Ed.) (1991). *Farmers in the Management of Irrigation Systems*. New Delhi: Sterling.
- Sivamohan, M.V.K. (2001). Pro-Poor Intervention Strategies in Irrigated Agriculture in India: Some Issues. In I. Hussain, E. Biltonen (Eds.), *Irrigation Against Rural Poverty* (pp. 79-84). Colombo: International Water Management Institute.
- Sundar, A. and Rao, P.S. (Eds.) (1980). *Farmers Organizations for Efficient Water Use in Irrigated Agriculture: An Overview*. Bangalore: Indian Institute of Management.
- World Bank. (1997). *India, Andhra Pradesh: Agenda for Economic Reforms* (Report no. 15901-IN).