

# Participatory Irrigation Management in Andhra Pradesh, India<sup>1</sup>

*K. V. Raju<sup>2</sup>*

## Summary

The State of Andhra Pradesh has been leading in economic reforms in India, particularly within the irrigation sector. Major steps are focused on institutional reforms towards irrigation management turnover all over the state. In this connection, the state has formed 10,292 water user associations (WUAs) and 174 distributary committees. As a major positive change, the state government has done away with contractors for all maintenance and repair works. All irrigation lands in the major and medium irrigation projects in the state receive equal financial and physical attention for their improvement. Both farmers and officials have realized benefits in the process. With some modifications in the present approach, the state can become a model state both within and outside the country. This paper looks at the promises made, the actual practice and future potential of the whole approach.

## Introduction

The last 5 years have seen the State of Andhra Pradesh make rapid strides in its economic reforms. The irrigation sector has been positively influenced by institutional reforms largely focusing on a) the introduction of a suitable policy and legal framework, b) the formation of WUAs across all types of irrigation systems in the state, c) implementation of large-scale training programs for farmers and staff of the irrigation department, and d) bringing in significant financial reforms to influence quality performance of users' organizations. Today, this state is leading in its irrigation reforms in India. This paper, based on field visits, looks at what has made the Andhra Pradesh experiment work by examining a) the promise made through i) the Andhra Pradesh Farmer-Managed Irrigation Systems Act, 1997 (APFMIS Act); ii) document on "Vision 2000: Swarna (Golden) Andhra Pradesh," and iii) Government Orders issued over time to encourage the formation and functioning of WUAs; b) the practice, and c) key lessons.

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<sup>2</sup>Senior Fellow, Centre for Interdisciplinary Studies in Environment and Development, Institute for Social and Economic Change, Bangalore, India. E-mail: [kvraju@isec.kar.nic.in](mailto:kvraju@isec.kar.nic.in).

## The Promise

### *Background*

*Irrigated agriculture in Andhra Pradesh.* Andhra Pradesh with a population of 72.7 millions (2001 Census) and a geographical area of 27.68 million hectares, is the fifth largest state in the country. About 73 percent of the population live in rural areas. The labor force constitutes about 45 percent of the total population and about 65 percent of laborers are engaged in agriculture. Of the state's geographical area, 47 percent is under cultivation and the net area sown is about 11.04 million hectares (4.88 million ha irrigated). The dominant pattern of landownership in Andhra Pradesh is small private farms with an average of 1.56 ha per holding. Irrigated holdings have an average size of 0.88 ha.

The state's three major rivers, Godavari, Krishna and Pennar drain 70 percent of the state's land area (see annex table A-1). The water potential of Andhra Pradesh is estimated to be 7.78 million hectare-meters (ha-m) or 2,746 thousand million cubic feet (TMC). The major rivers are seasonal with more than 90 percent of the total flows occurring between June and December depending on the rainfall, which greatly varies from year to year. The ultimate irrigation potential from all sources is estimated to be 9.50 m ha (million hectares). It includes 7.30 m ha from surface water and 2.20 m ha from groundwater. The performance of the irrigation sector in the state is poor, particularly in the case of major and medium irrigation projects. Inadequate budget allocations for the O&M of irrigation systems have led, over the years, to poor maintenance and unsatisfactory service. This has resulted in poor irrigation service, low yields, and low farm incomes, leading to farmer dissatisfaction and political pressures affecting the allocations for O&M in the state irrigation budget. This vicious circle is observed in most of the Indian states (Gulati et al. 1999).

The Irrigation and Command Area Development (I&CAD) Department provides water and services to a) the farmers for irrigation purposes, b) the municipalities and villages for human and domestic uses, c) the state electricity board for power generation, and d) the industries. Water charges for irrigation, levied on a per ha basis, were increased by more than three times from 1997 (see Finance section, p. 142). Current O&M budget allocations for the various irrigation schemes are made on the basis of a uniform flat rate of Rs100/ha, and about Rs47/ha for special repairs. These values are about 50 percent of the tenth Finance Commission recommendation and about 30 percent of the actual needs of about Rs 500/ha assessed for the purpose of the irrigation component of the AP Economic Restructuring Project (APERP). Therefore, in effect, the current O&M budget allocations neither cover the full O&M cost nor the full establishment cost estimated at about Rs200/ha. As a result, no funds are available for the requirements of the actual O&M works. The deficits in establishment financing are covered to a small extent under special repairs by budget allocations for planned works and O&M works.

*Minor irrigation tanks.* The state has 12,294 tanks under the irrigation and CAD department covering 1.25 m ha in 27,379 villages. The overall performance of most minor irrigation tanks is more sensitive to droughts and cyclones due to their small size. Their deficient maintenance under the irrigation and CAD department has resulted in losses and decline of irrigated areas. Till May1999, tank-WUAs (8,180) constituted 81 percent of the total WUAs in the state. In

the Rayalaseema region, some 23 tank-WUAs have not used tank water for irrigation, yet they are listed; farmers use their own well water, which is recharged from tank storage. For example, in Chandurthi mandal (a smaller revenue zone below the district/province) some 20 km from Sircilla, a few tanks have closed (6–7 years back) their canals to recharge wells during two crop seasons. These WUAs just maintain tanks and not the distribution network.

*Percolation tanks.* In the Chittoor division area, some 80 percent of the 60 tanks has been converted into percolation tanks over the last 10–15 years, due to fast depletion of groundwater table and siltation of the tank bed. Gradually, farmers have shifted to groundwater usage from the earlier practice of tank irrigation. During the last 8–10 years, tank sluices have been completely closed to influence continuous recharge of groundwater. Farmers argued that direct tank water usage would empty the storage within 1 to 3 months, whereas groundwater usage would help irrigate up to 10 months. This is also because most of these tank command areas are under sugarcane crops.

The major problem with most of these more-than-a-century-old Zamindari tanks, is siltation of the tank bed and thereby, a loss of more than half of their storage capacity. The ID staff strongly feels that desiltation is very costly and it is better to opt for construction of new tanks. The percolation tanks are located in the northwestern part of the Chittoor revenue division, and are spread over 2–3 mandals. But towards the extreme south, east and northeastern part of the district, tanks are still sluice- and canal-operated surface irrigation systems. Many farmers of the command areas of these percolation tanks are debating whether to pay the water fee or not, owing to complete dependency on groundwater.

### ***Policy Framework***

The state irrigation policy has kept user involvement in irrigation management as the central theme and all concerted actions revolve around this. The need for reform became essential owing to the following:

- The low performance of the irrigation sector, despite massive investments on the latter. Traditionally, the sector (irrigation and drainage) has been the largest user of the planned funds; and even in the Eighth Plan (1992/93 to 1996/97), expenditure has amounted to Rs 25,000 million, or 24 percent of the planned expenditure.
- Infrastructure is in disrepair and irrigated area is declining. From 1991/92 to 1993/94, the gross irrigated area dropped from 4.3 m ha to 3.9 m ha. Currently (in 1998), out of 4.8 m ha of net irrigated area created only 2.8 m ha are actually irrigated.
- Low agricultural productivity. Growth in productivity has declined in recent years to less than 2 percent per annum. A major factor has been the weak performance of irrigated agriculture. On average, rice yields are only 2.6 t/ha (see annex table A-3).
- Cumulative impact of inadequate maintenance of infrastructure. For instance, expenditure on O&M in 1995/96 was only Rs 99/ha, as against the recommendations of the Tenth Finance Commission (1997) of Rs 300/ha for major and medium irrigation projects. Further, because of inflation of wage bills, over 75 percent of

O&M expenditure went to wages, leaving a negligible amount for actual maintenance works. Low maintenance has been compounded by a purely government approach to the sector despite the limited capacity for the government to intervene, especially at the lower levels of the systems, and by an extremely low cost recovery. With the threefold increase in water charges made effective from the 1996/97 rabi season, for the first time in many years, revenues exceeded O&M expenditure. As O&M expenditure has remained far too low, revenues remains inadequate to cover their entire needs. Further, to make up for the cumulative neglect, significant additional expenditure is required to rehabilitate the system.

- Rehabilitating and sustaining irrigation and enhancing agricultural productivity are of paramount importance. About 40 percent of the state's gross cropped area is irrigated. Irrigation's contribution to state agricultural production is about 60 percent.

### ***Policy Initiatives***

New initiatives in policy reform began with a diagnosis of the situation and subsequent issuance of a white paper on irrigation, outlining the performance of the irrigation sector over the years. This was debated in the legislative assembly and the following major actions were taken:

- Threefold increase in water charges from the 1996/97 rabi season.
- Passing of the APFMIS Act in 1997.
- Creation of WUAs across the state.
- Commencement of a massive campaign to make WUAs functional.
- Constitution of the water charges review committee in December 1997.

### ***Policy Objectives and Strategy***

It is from Mexico and Turkey that the idea of forming WUAs had been borrowed to a large extent. Both countries are international "success stories" in irrigation reform. The major increase in water charges, traditionally a politically sensitive aspect, required extensive public consultation and agreement by all parties. These steps are nevertheless acknowledged as only a start of the difficult actions that must follow. These must be seen in the broader context of Andhra Pradesh's long-term vision for the water resources sector within which irrigation, though important, is only one component. The core elements of the long-term vision are discussed next. They encompass two areas: reforms in ownership, financing and management of the state's irrigation systems, and progressive development of comprehensive multisectoral water resources management.

*Democratic decentralization, farmer management and financial autonomy.* These are considered vital to change the past "vicious circle"<sup>3</sup> of influences to a "virtuous circle," where these constraints were tackled systematically to generate mutually reinforcing improvement with in-built incentives to achieve this. The objective was to build rapidly form the WUAs at

a minor level to federated WUAs at the distributary and then at the project (scheme) level. The (ultimate) objective was to have self-financing and autonomous irrigation schemes managed by WUAs. An apex committee of farmers at the state level will provide a forum for statewide decision making. The government's role will progressively reduce as provider of technical assistance to manage the headwork of larger systems.

This process was accompanied by institutional and financial reforms and capacity building to create the respective autonomous entities. The short-term objective was that WUAs and the irrigation and the I&CAD should become financially autonomous for O&M and revenue and expenditure. They would generate their own revenue from water charges and finance O&M, thus giving them financial independence and being cost effective as well as quality effective, which were critically lacking in the past. WUA members have to contribute to the interest-earning reserve fund accounts, to progressively build up the financial capacity to reinvest or undertake improvements. New investment will continue to be financed by the government but with users or prospective users contributing through appropriate cost-sharing arrangements.

For I&CAD there was radical change in its role as the above progress took place. One of the major transformations was to switch staff orientation to the role of a service provider to WUAs. Rehabilitation of systems and upgrading maintenance were the responsibilities of the newly constituted Water Charges Review Committee (WCRC). The key need was to ensure the necessary direct financial link between revenue and expenditure and the availability of funds for this purpose.

*Sustainable water resources management.* Major principles for development and management of water resources are a) comprehensive water resources management, b) environmental management, c) water as an economic good, and d) technology development. To achieve these objectives several steps were suggested.<sup>4</sup>

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<sup>3</sup>A purely governmental approach, wherein poor system performance has led to farmer dissatisfaction, low fee payment and low cost recovery, and underfunding of O&M is common (for more details see Gulati et al. 1999. *From top down to bottom up: Institutional reforms in Indian canal irrigation*. A collaborative study of IFPRI-NCEAR-IEG-ISEC).

<sup>4</sup>The important steps are a) the establishment of a state multisectoral water resources board or committee to guide development of actions; b) the development of multisectoral river basin plans and environmental management plans to provide guidance for management and future development, c) continued development of watershed management practices and integrated conjunctive use of surface water and groundwater resources, d) promotion of technologies for greater water use efficiency, with emphasis on irrigation; e) progressive development of institutional and human resource capabilities in water resources management, and f) public awareness campaigns on water resources management issues to foster an environment for change.

### ***Strategy Implementation***

The immediate priority was to provide a follow-up to the change process already initiated in 1997 by the FMIS Act (for key provisions, see annex), the threefold increase in water charges, and the statewide elections for WUAs. This was followed in November 1997 by statewide elections for the second tier of WUA management structures. If they were to succeed and generate further reforms, these actions required urgent follow-up like restoring and improving the productivity of the existing irrigation systems; assuring their sustainable management by transforming management to farmers through the new WUAs and putting the sector on a sound financial footing. Concerted actions in the following areas are being launched such as a) the creation of a farmer-government partnership, b) consolidation of irrigation management transfer to farmers, c) maintenance and rehabilitation, d) agricultural extension, e) cost recovery and financial sustainability, f) expenditure prioritization, and g) institutional reforms and capacity building.

### ***Long-Term Vision***

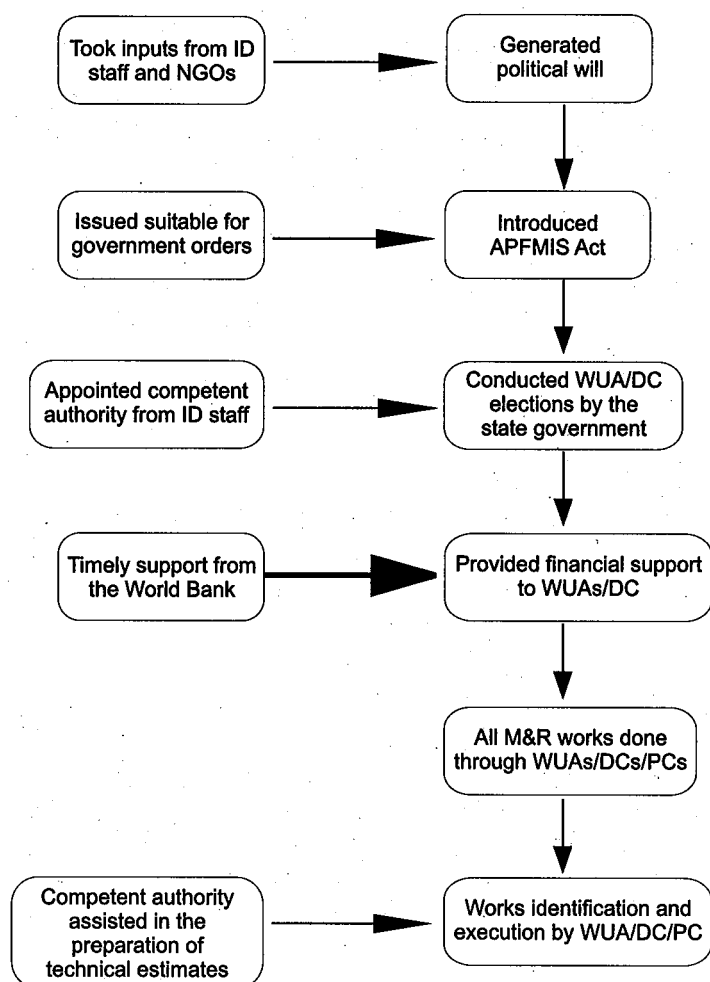
Andhra Pradesh is the first state in India to put forth a long-term vision through the document Vision 2020: Swarna Andhra Pradesh. Both the irrigation policy and the legal framework were in tune with the long-term vision evolved by the state. The vision document (GoAP 1999) has set ambitious goals to achieve them through a) building capabilities, b) focusing on high potential sectors of the economy, and c) transforming governance. As a part of building capabilities, the Vision document highlights involving people to manage services as a key area. It states that, an effective way to provide quality and responsive services is to decentralize them and ensure that the people have a role to manage them. Andhra Pradesh's own experiment in water management demonstrates the power of people's participation. Also, the state's own legislation (like the APFMIS Act, 1997) in relation to local bodies provides some basis for people's participation.

Investment in the irrigation infrastructure has been a priority. Successive five-year plans have emphasized the need for greater investment in the irrigation sector. Plan outlays on irrigation have increased from Rs 620 million in the Second Plan to Rs 31,860 million in the Eighth Plan. This has expanded the net irrigated area from 150,000 ha to around 5.9 million ha and has greatly increased the productivity of land, leading to a substantial impact on agricultural and industrial growth, incomes and employment. However, to achieve the long-term vision, more was required, such as a) realizing the maximum irrigation potential, b) improving the efficiency of the existing irrigation network, and c) managing water resources better through stakeholder participation. In the absence of funds from the Andhra Pradesh Economic Restructuring Project (APERP) supported by the World Bank, Participatory Irrigation Management (PIM) activities could have had little impact. Good blending of the APFMIS Act and timely assistance from APERP has made a distinct difference in the state. APERP has assisted WUAs through a) minimum rehabilitation of the canal network, b) regular O&M, c) scheme improvement and farmers' turnover (SIFT), d) agricultural intervention program (AIP), e) institutional support for project monitoring unit, and f) human resources development.

## Implementation

Overall, the PIM process followed in Andhra Pradesh was as shown in the figure 1. In the process of implementation and learning, 110 government orders were issued by the I&CAD till January 2001 to amend and clarify the APFMIS Act, 1997 and to facilitate better functioning of the WUAs and DCs. To help in physical and financial plan estimates and approvals, a junior engineer in the case of a WUA and an executive engineer in the case of a DC were appointed as the Competent Authority (CA). The main focus was construction-oriented system rehabilitation, repairs and adding essential structures. Many canals are 10–20 years old and have never been maintained. Stress is on cleaning shrubs, desiltation and strengthening bunds.

Figure 1. Participatory irrigation management process in Andhra Pradesh.



## ***Training***

The state had launched a massive training program on WUAs and the program aimed at covering the entire state, by having local training camps for a fixed period (ranging from 2 to 3 days per batch). A trainer's handbook containing the subjects, irrigation engineering, agriculture and revenue, was prepared by August 1999 for ready reference by the trainers.<sup>5</sup> Fifteen members from each district comprising I&CAD, agriculture and revenue departments of the state were selected to undergo training as trainers at the WUAs at district level. Outside agencies had collaborated to prepare the training material in the local (Telugu) language. The reading material was widely disseminated to participants. As of November 1999, all WUA presidents and TC members had attended the training program. WALAMTARI (Water and Land Management Training and Research Institute, located in Hyderabad) had become a live partner in the whole training process and dissemination of publications. The institute had shifted its focus from earlier engineering-oriented programs to WUA training programs. To bring in a practical perspective to classrooms, WALAMTARI had trained middle- and junior-level officials of the agriculture, revenue and irrigation department, as trainers under the Training of the Trainers program.

## ***Monitoring***

From mid-1998, every district had a PIM coordinator, who was primarily a member of the middle-level staff of I&CAD and transferred to this position. These coordinators were expected to coordinate all PIM/WUA/DC training programs, activities and meetings with district collectors. Currently, they were not dynamic owing to inadequate training and supportive staff. Some 25 PIM coordinators were positioned at the district level, mainly owing to problems in career promotion in the I&CAD. The PIM coordinator was responsible for computerization of WUA details; assigning 9-digit code numbers for each WUA (as of now only for major and medium projects), supervising training, planning and its implementation, communicating to all WUAs, and sending letters and publishing in local news papers.

All ID people have to report to the district coordinator on a regular basis. Because of the weekly (every Thursday) teleconference meetings, the district collector, along with ID senior staff have to discuss ID, WUA activities with the chief minister. At these teleconferences the chief minister receives all newspaper reports (from all district editions of some newspapers) for discussion. This had kept all collectors and, in turn, all staff of ID on tenterhooks, to regularly keep track of newspaper reports and answer them.

In some WUAs, the president and/or the executive committee has mismanaged the funds. Though the FMIS Act provides sufficient insulation, the Irrigation Department has not taken sufficient preventive measures. The Upper Manor Project is a medium irrigation project with a command area of 13,000 acres. It has seven WUAs, and no DCs or PCs as per the Act. In the first year, these WUAs got Rs 50/acre and in the second, Rs 100/acre. So far, three cases of misappropriation of funds have been booked against the presidents for utilizing the funds for nonspecific purposes.

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<sup>5</sup>A separate handbook for WUAs and field functionaries on participatory irrigation management was also prepared, by IRDAS (Institute of Resource Development and Social Management) and WALAMTARI.



## The Practice

In this part the study team had looked at the actual practices of WUAs in the three regions of Telangana, Coastal Andhra and Rayalaseema.<sup>6</sup> In each region, major, medium, and minor irrigation systems were visited and how the WUA functions, its advantages to members and the irrigation department were observed. Also the financial support received and the viability of WUAs in the present form have been explored. Many WUAs indicated how the current experiment is playing a pivotal role in the development of the command area. Some WUAs also expressed their demands and views on the whole exercise initiated by the state government. The number of WUAs visited (given below) varies across the region and the type of irrigation system.

Number of WUAs visited

Region	Major	Medium	Minor	Total
Telangana	4	1	2	7
Coastal Andorra	7	2	3	12
Rayalaseema	3	2	14	19
Total	14	5	19	38

## Formation and Structure of WUAs

The main role of the government was to promote farmer participation. The structure of users' organizations was given from the top. Each WUA was formed, based on the hydraulic boundary for 500–8,000 acres, and with four to six Territorial Committee (TC) members in each. Each TC will have an area in the range of 500–1,300 acres. The elected presidents of WUAs will become members of the Distributary Committee (DC) at the distributary level. WUAs and DCs were formed through elections in 1997. Till January 2001, Project Committees (PCs) were not formed. Elections were held for each of these tiers of the organization, as per the government order and all processes were formally handled by the government agencies. Till 31 May 1999, the total number of WUAs formed was 10,292; it includes, 1,699 major, 413 medium, and 8,180 minor projects (see table 1. Also see annex table A-4 and A-5 for district-wise details). Elections were conducted for 9,797 WUAs (in minor projects, only for 7,749 WUAs). In the case of 495 WUAs, elections were not held for various reasons. The recall clause in the Act is a large booster for members; so far, seven presidents have been recalled due to misappropriation of funds. Wide publicity of this information in the farmers' newsletters has sent warning signals to others.

<sup>6</sup>a) Telangana region has 39 percent of the state population and 42 percent of the geographical area, b) Coastal Andhra, 43 percent population and 34 percent area, and c) Rayalaseema region, 18 percent population, and 24 percent area.

Table 1. Distribution of WUAs by type of irrigation systems and method of elections.

Type of irrigation	Unanimously elected	Contested	Elections not held	Total
Major	649	935	89	1,673
Medium	118	179	07	304
Minor	4,714	3,110	491	8,315
Total	5,481	4,224	587	10,292

Since the formation of WUAs, more emphasis has been laid on meeting the president, conducting training courses, short workshops and keeping him/her as a contact person of the WUA. This has helped the president understand the internal process. In case of many WUAs, TCs and ordinary members have little access to the information flowing from the higher-ups and to the CA. With increase in size of funds and powers, WUAs have become more influential. For water allocation, farmers go to the WUA president and not to the staff of the Irrigation Department. In some places, there are efficient WUAs mainly owing to good senior officials and their efforts (e.g., in SRSP project, Karimnagar; Sri Kakulam and West Godavari). Poor WUAs are mainly because of political interference (e.g., in Cuddapa, Chittoor and Mehboobnagar). WUAs are categorized (informally by officials) based on the complaints and progress heard from the presidents of WUAs. However, WUAs and DCs face opposition from senior and junior staff of the Irrigation Department, since they have lost money and power.

*Court case of lascars.* A lascar is primarily a system-level canal operator and water regulator for approximately 800 hectares. In the Srikakulam district, there were 574 WUAs, and 180 lascars. The services of lascars, originally employed by the state government, have now been transferred to WUAs. They are under the functional control of WUAs and receive salaries from the government. Some 3,500 lascars in the state have opposed this government order and a legal battle is still on. There was also opposition from the engineers' association regarding the transfer of roles and responsibilities to WUAs. The government gave them three choices: a) a voluntary retirement scheme; b) work according to government instructions, or c) punishment by government of erring staff. For now, the staff has agreed to work according to government instructions.

*Trendsetters.* The Srikakulam district claims to be a forerunner in the WUA movement in the state. In this district, WUAs maintain schedules and conduct meetings on time while the Irrigation Department disburses funds regularly to WUAs and responds to government orders regularly. Newsletters are published in Telugu (local language) regularly. The Superintendent Engineer (SE) and his staff take a keen interest in all the activities and works. But the middle- and lower-level officials have complained that their workload has increased. The Krishna district is a trendsetter in the delta region leading both in area coverage and expenditure incurred by WUAs and DCs.

The WUA movement in Andhra Pradesh has gained its momentum. With all visible physical benefits, the spirits of the farmers were high because they felt that the system belonged

to them. Farmers had felt that if users take an active part in system maintenance, it brings them better flows and improved yields. Developing the sense of ownership was getting established in many places. WUA members unhesitatingly and with pride said now water is ours; we have a right on that. In the reform process, farmers made no (or in some cases, little) monetary contribution, and they were involved in decision making and work execution, and hence, the quality of work was better and farmers felt the structures belonged to them. A septuagenarian (a freedom fighter, and president of WUA-47, in Manthani village) said "earlier government officials were saying and holding important roles; now that is lost. Users have got a major say in all irrigation-related aspects; this is a good trend in the state."

### ***WUA Meetings***

The APFMIS Act clearly delineates roles and responsibilities at each tier of the organization. User organizations take pride in saying, "This is the first time, in the state's history, that a chief minister is directly writing to organizations at the village level. So, we feel, we can communicate directly with the chief minister and that is a large achievement for us." Over the last 2 years (1998–2000), general body meetings have been initiated through CAs. Twenty to 50 percent of the members attend these meetings; in a few cases, this has exceeded 60 percent. Otherwise, the WUA/DC president and TC members call small group meetings (6–20 farmers) on their own, as and when required; more specifically, to endorse identification of works and their execution and to discuss funds received and expenditure incurred. Informal meetings are held to discuss if voluntary work is required to clean canals and water regulation across the reaches. For calling a meeting drum beating is common across the state. For small group meetings, the WUA/DC president informs through oral communication. Unfortunately, WUAs and DCs have not focused on a) water acquisition, b) equity in distribution, and c) efficiency in water use. The CAs had not stressed these issues and WUAs have not discussed them seriously in their meetings.

### ***WUAs v. Village Panchayat***

There is a growing dissent in some village Panchayats on the WUAs control of resources, which until now was in the hands of these Panchayats. They feel that there are too many organizations. The village Panchayat, in some places, felt that it could have handled water management since farmers belonged to the same village. But in many places, with a separate organization like the WUA, farmers feel that they have done better work and have greater freedom to do what is actually required. Water fee can be used for WUA works and functions. In some WUAs (including tank-WUAs) which are close to urban areas and headed by an absentee landlord, there is noncooperation from member farmers. In the case of tank-WUAs close to urban areas, members have only a secondary interest in tank management.

### ***Physical Works***

In Andhra Pradesh, as elsewhere in India, the emphasis till 1970s was on creating infrastructure. From the 70s onwards, the state faced a financial crunch leading to a lack of management and maintenance. System delivery was weak and system efficiency was down to 40 percent in major projects. Hence, in May 1998, many works were taken up, most being repairs to canals and structures and addition of some new structures, below the distributary level. The number of works carried out over the last 3 years are shown below:

## Number of works carried out by WUAs.

Year	Number of Works	Expenditure in Rs. Million
1998-1999	21,406	118,562
1999-2000	17,185	16,957
2000-2001	9,289	5,155

By 1999 a new trend had started; i.e., contract being farmed out by local officials (who are CAs) to WUA presidents. Some presidents have taken the work on behalf of WUAs and then subcontracted it to their territorial committee (TC) members, who are basically subcommittee members. In the register of administrative approvals, only TC names figure (e.g., medium-irrigation project UMD, WUA-1-4). Most of these presidents are contractors by profession and the WUA work came as an opportunity to get involved and gain confidence at the local level to execute these works. Around 30-40 percent of the WUA presidents in the state have been involved in this kind of processes.

The last 2 years (1998-2000) have seen the following practice. The WUA president, one or two TC members and some farmers identified the required works via a walkthrough survey. These works were then discussed in an executive committee meeting and then passed on to the CA for preparation of technical estimates. An agreement was signed between the CA and the WUA president. Funds were released at the rate of Rs 50 per acre in the first year and Rs 100 per acre in the second year. During the second year, for tank-WUAs the rate was Rs 90 per acre (Rs10 per acre was given to the village Panchayat). Forty percent of the fee was paid in advance and the remainder on completion of the works. But in a majority of the cases, even after completion of the works, the balance amount was not paid. Whatever funds were released went directly to the WUA account. The ID staff had no role in handling the funds. Proximity to the process of technical and financial estimates, funds disbursements, works execution by local farmers have all brought more transparency in WUA dealings. Contractors are almost out of the picture and the saving on this alone is about 30 percent.

The government has given clear instructions that there will be no new structures or alteration of original designs. So, the major emphasis is on restoring the original designs. Repairing and strengthening of structures, addition of missing structures, desilting canals, installation of water regulation structures wherever damaged or not installed earlier, strengthening canal bunds and construction of drop-structures are some of the major works that WUAs have carried out. In the Godavari and Krishna delta areas, in addition to these works, emphasis was on drainage works. In the tank systems, in addition to the above works, the major focus was on repairing and strengthening of surplus weir and apron, raising and strengthening tank bunds to the original designs, and improving sluice structures.

In the process of the users identifying and executing works, much attention has been paid on users' needs like cattle pathways, washing steps for women in canal systems, removal of encroachments, and clearing shrubs and silt for the smooth flow of water till the tail reach. In most places, farmers have contributed their labor for additional working days, as part of their earlier practice of *shramadana* (voluntary work)<sup>7</sup>.

### ***Problems of Execution of Works***

One of the problems in the execution of works is the rate approved by the government for various works in 1999–2000. The rate for a Proclainer machine is Rs 16.24 per cubic meter and from this 15 percent is deducted as farmers' contribution. This becomes Rs13.50 per cubic meter, for which no machine owner is willing to work. Also farmers are not willing to pay this 15 percent. With 40 percent of grants (disbursed as the first installment), work was carried out to the extent possible. Hence, many WUAs and DCs are not taking up any work. The new work masters like the WUA and DC presidents got trapped in difficulties owing to poor planning of both materials and manpower. Meanwhile, the CA is unable to attend to all works and, hence, work is badly affected in some places.

### ***Water Management***

Across the state, unauthorized outlets have retained their status quo. However, WUAs have ensured that water traverses to tail reaches by canal cleaning, or and by rotation of minors, as in most problematic areas. Across the state, WUAs have a neeradi (a water distributary, hired locally on a temporary basis by the ID) for water distribution; earlier the neeradi was accountable to an informal group/association of farmers; now, he is answerable to the WUA, as a formal setup. Some WUAs have hired neeradis on their own for the irrigation period and pay them salaries.

Water regulation in the Tungabhadra High Level Canal, Stage I (in the Ananthpur district) had undergone changes owing to the WUA's active role. Owing to the WUA's continuous demand for better water regulation across the reaches, the ID devised an alternative system. Accordingly, from 1998, distributaries are closed every Monday. Sluices below the distributary are operated on a rotational basis. In 1999, with the consent of the WUAs, distributaries were closed once a week and thus the approximately 6 TMC water saved were supplied for the second crop in the rabi season to 52, 631 hectares. For the first time in the project history, such a large area was irrigated without any additional supplies. Field officials felt that gradually this may increase to 72,874 hectares.

However, some constraints as shown below had remained as reported by the farmers during our interviews:

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<sup>7</sup>Owing to these induced works, WUA members of Elabotharam village in SRSP project in the Telangana region feel they have come together and can take more collective action now. In the Narmala village of Upper Manor dam, desiltation of canals was done after 14 years. In Thotapalli tank-WUA, farmers contributed carts and tractors for desilting at a lower rate of Rs 100 per trip, which is Rs 30 less than the market rate. The Bajjipuram tank in Coastal Andhra had three surplus weirs at different levels; now there is just one and this helps in having more storage.

- Several WUAs and DCs were demanding for grants since in some places political leaders had made false promises about liberal grants for the construction of office buildings.
- Power supply in rural areas is limited to a total of 5–9 hours per day, supplied in 3–4 slots. This affects the cultivation of commercial crops and increases the dependency on canal water.<sup>8</sup>
- In many places, the water supply had not reached the designed discharge levels at regulation points, even after some structural repairs and desilting by WUAs.
- WUA and DC presidents were not very clear about their future activities and the potential of these organizations to carry out allied activities.
- Government grants have remained the sole source of funding for most of the WUAs with little (or no) efforts having been made to mobilize own resources.
- Most of the WUAs have not made serious attempts to mobilize contributions from the farmers to meet the prescribed 15 percent of the estimated costs of works. Hence, physical works have been carried out from the government-allotted funds (i.e., 85%).

### ***Royalaseema Region: Acquiring and Regulating***

In this region surface irrigation sources are limited and groundwater has to be extracted from the deep bottoms. Increasingly, this region has shifted towards mango orchards, citrus fruits and other long-gestation and long-term yielding tree products. Farmers prefer this option because of better insulation from the vagaries of rainfall and labor availability and, yet, receive promised returns over the years. More farmers have opted for low-water-consuming crops. But, within the authorized command areas, demand for canal irrigation is high owing to rice cultivation. Most of the tanks in the Royalaseema region, are 100–450 years old. Owing to good physical features, most of them are free from major maintenance problems; bunds are leak-proof, even after 200 years. But, they are constrained by siltation in the tank bed, and reduction in the inflows.

### ***Coastal Andhra Region: Delta and Drainage***

This region consists of two deltaic areas, Krishna and Godavari where the irrigation systems are centuries old (with some additions and modifications in recent decades) and well tuned to rice cultivation. The region has been named as the “rice-bowl” of India. Over the years, urban-pull and rural-push factors have led to more large landholders shifting their base to urban areas; in addition, the next generation showed little interest in farming activity. This trend has

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<sup>8</sup>In spite of cheaper power rates, many farmers have not paid up the bills. Because, the Congress party has promised in their electoral manifesto (of Parliamentary elections, held in October 1999) that they would reduce the current rates, and abolish all arrears. These arrears range from Rs 4,000 to Rs 35,000 per farmer, with a burden of about Rs 3,000 million per year on the state exchequer.

pushed many farmlands (more than 75%) into the hands of sharecroppers. Production sharing varies from 25 to 50 percent, depending on soil quality and water availability. Since the owners can do little with soil quality, they have taken a keen interest to improve the acquisition and distribution of water. The WUAs then came as a boon to execute essential works and check the system O&M. Farmers (mainly landowners) have taken an enormous interest in WUAs and their activities, mainly to boost production levels.

Another major problem in the deltaic region is drainage. Being a deltaic region and close to the sea (distances ranging from 20 to 60 km) the gradient is low, 1 foot per 5 km. During the rainy season, a sheet of water covers the whole area with a depth ranging from 1 to 3 feet. Inadequate drainage facilities were major problem. Funds for WUAs, DCs, and PCs came as a large boon to this region. During the last 2 years, all over the deltaic region, heavy machines were used to desilt main canals, branch canals and distributaries. Essential structures were constructed in some places and repaired in many places. This massive work was visible to landowners and sharecroppers. All this facilitated a smooth flow of water, advancement of transplantation (by 2 to 3 weeks) before the arrival of the monsoons, and yield levels went up by 20–40 percent. Now, water flows regularly and drains easily. Hence, there are improved yield levels, and farmers are happy too. This has helped to grow a second crop.<sup>9</sup> In the Nagarjuna Sagar Right Bank canal system, owing to a weak database, the project-level data could not be collected for season-wise benefits accrued due to WUA activities. In all these (Krishna, Godavari, and Nagarjuna Sagar) projects, the constraint is more in canal regulation and their carrying capacity, rather than in water-supply levels. The main advantage, as many farmers mentioned was, “after several years, for the first time the deltaic region did not get submerged in the monsoonal period; otherwise, by August, one could see all lands covered by a sheet of water.” The study team did not find (during its visit at the end of August 1999) any submerged rice fields and most of the transplantation, including that in the tail reaches, was completed before the onset of the monsoon.

### ***Telangana Region: Sustain Current Development***

Traditionally, the Telangana region had less experience in canal irrigation; however, many surface irrigation projects are close to the completion stage (some of them have been ongoing over the last 20–30 years). The SRSP project, which had created a large irrigation belt, had induced social and economic development in this region; the project is yet to attain its full potential. Hence, the irrigated area (one-third of the designed command area) had surplus water. But the carrying capacity of the distribution system had been declining over time owing to the lack of maintenance and repairs. Under these circumstances, funds through WUAs, DCs became handy to carry out works of their choice. This had boosted the local farmer's confidence in WUAs.

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<sup>9</sup>Farmers of the Duggirala and Emani WUAs in the Krishna deltaic area have honored WUA presidents and ID staff for their tremendous efforts in water supply and cleaning canals. They had conducted public functions and honored these guests by presenting shawls on their shoulders; now some farmers jokingly say, if they do not perform well, the same farmers will take back the shawl.

## Finance

The government was saving about 20 percent on works (which earlier went as rent- seeking at various levels) more as cost effectiveness. Some money was spent but presumably more works were done. The main idea was not to save money (by avoiding contractors) but to increase the area under irrigation. At the WUA level, contributions were set at only 15 percent (unlike the 30% under Janmabhoomi schemes). Unfortunately, only a few WUAs had contributed their 15 percent share. Neither the CA nor the project-level ID office had records to indicate the WUA's contributions.

To begin with, the ID was expecting part of the work (as prioritized from the walkthrough survey) from the current maintenance grant of Rs 40 per acre, which was supposed to be given to the WUAs. Based on the rate of Rs 40 per acre for maintenance and repairs, the SRSP project received Rs 63 million per year (out of the state Rs 1,500 million); nearly 85 percent of it was spent on staff costs. This amount was planned to be given to the WUAs in mid-1997, soon after the WUA elections. Meanwhile, (3 months after the WUA formation) observing the formation of WUAs and the state's long-term plans, the World Bank expressed interest to support some activities. The Bank was ready to fund, initially, minimum rehabilitation and then O&M activities. The detailed costs worked out to Rs 1,300 per acre in major and medium projects (minor projects were excluded at that time, but for no reason) for minimum rehabilitation. O&M costs worked out to Rs 500–600 per acre. From this bank grant, the department provided each WUA with Rs 50 per acre during the first year and Rs100 per acre during the second year. Grants were given from 1998 to all WUAs in the state for a total of 5 years. These grants were meant for the non-SRSP projects under the APERP project of the World Bank.<sup>10</sup>

### *Proposed sharing pattern of irrigation revenue across the schemes.*

Level	Major	Medium	Minor
Water charges/acre <sup>a</sup> (in Rs)	200	200	100
Allocation in (Rs)			
WUA	50	60	90
DC	20	-	-
PC	20	30	-
Local government			
(Gram Panchayat)	10	10	10
ID	100	100	-

<sup>a</sup>One hectare = 2.47 acre.

<sup>10</sup>The World Bank funding for WUAs through the Andhra Pradesh Economic Restructuring Program (APERP) arrived after the whole process had started. Under APERP, major items of expenditure (during 1998–99) totaled Rs 1,114 crores, and it included: a) minimum rehabilitation, Rs 336 crores, b) SIFT, Rs 120 crores, c) O&M, Rs 600 crores, d) Management Information System, Rs 29 crores, and e) Human Resources Development, Rs 29 crores.



In the reform process, the state budget is not touched. After the APERP project period, WUAs were expected to collect fees, which would be given to all tiers of the organization, the local government and the ID as shown above. But this sharing pattern was approved only in February 2001. During the first year (1998–99), each WUA and DC got Rs 50 per acre, and during the second year (1999–2000) Rs 100 per acre as maintenance grant. Of the Rs 100 per acre, minor-level WUA had 60 percent, DC 20 percent and PC 20 percent of the share; since PC was yet to be formed, ID had taken 20 percent till PC was formed. In this process, Rs 1,070 million was spent during 1998–99 out of which some Rs 1,030 million was spent during 45 days. Every bill of ID had to be passed by the accounts officer, before going to WUA. This was a hindrance owing to the delays and rent-seeking attitude at that level. The annual demand raised (based on water fees) was Rs 1,400 million, while actual collection was only 50–60 percent of this. However, water fee collection had increased to 65 percent during 1998–99, from 54 percent during 1997–98.

The financial component had played a pivotal role in expediting the whole WUA exercise in Andhra Pradesh. To begin with (during the APFMIS Act formulation), the financial map was not clear; the introduction of the APERP project (as part of the world bank funding for economic reforms in the state) during the latter part of 1997 had changed the scenario. The focus shifted to fund allocation for physical rehabilitation. Till 1997, the main problem was the lower level of grants for O&M at Rs 40 per acre, of which Rs 25 was spent on staff costs. With the remaining money, a few essential works were carried out. Now, WUAs receive Rs 50 per acre during the first year and Rs 100 per acre during the second year and it is free from staff costs. In the process, farmers were realizing benefits from the WUA's function in the present pattern.<sup>11</sup> Some farmers as well as field officials have agreed that, "the government investment is less than one bag of paddy [unhusked rice] per acre (i.e., about Rs 400 per bag of 75 kg, as per the minimum support price); while the return is 5–10 bags per acre (additional yield per acre). That is the real benefit of formation and funding of WUAs." In some places, funds were also promised for WUA and DC office buildings. Every year, WUAs in the major canal irrigation projects receive Rs 200 per acre (100 for WUA and 100 for DC). During 1999–2000, the Krishna delta received approximately Rs 123.6 million; NSLC Rs 60 million; medium projects Rs 3 million and minor projects Rs 10.4 million. Under APERP, the Krishna delta got Rs 40.2 million (during 1999–2000) including project committee works on main canals and drainage works.

One of the key factors attracting the WUAs to function is the size of funds ranging from Rs 700,000 per WUA in Coastal Andhra to a mere Rs 12,000 for the tank-WUA in the Rayalaseema region. The former focuses only on O&M and repairs of the distribution system in its command; while the tank-WUA has to take care of both the source (including tank structures) and distribution system. There was an imbalance in the fund allocation pattern, as most of the tank-WUAs in all regions have complained. Indeed, minor field officials of the ID endorsed this view and suggested modification in the present allocation pattern to encourage tanks rehabilitation.

<sup>11</sup>For example, at division level (in the deltaic area), Rs 20 million (at Rs 40 per acre), nearly Rs 13 million goes to salaries. At the subdivision level (at Duggirala in Krishna delta) the Rs 40 per acre grant was Rs 6 million, out of which work-charge staff salaries are Rs 3.5 million, leaving a balance of Rs 2.5 million for works. In 1999, this subdivision got Rs 26 million for minimum rehabilitation through WUAs. Clearly, a four times increase in the allocation of funds and all these without any salary component.

As of 2000, collection of water fees and assessment of area were done by the patwari (a field staff of the Revenue Department) and, in few places, WUA president and TCs are involved when they jointly endorse the figures. About 70 percent of farmers have paid, the remaining 30 percent were mostly large landholders who delay or do not pay quickly. If fee collection was the responsibility of the WUA, it could have been easier, since they can cut off the supplies to the fields. Otherwise, there was no record as to who had paid or defaulted. WUAs can raise this issue in the general body meeting and, owing to social status, people will pay up; this cannot be done by the revenue patwari. On the other hand, WUAs are not focusing on resource mobilization nor has the ID stressed this point. In some places, farmers were willing to invest on lift irrigation. Priority may be given to such villages, where villagers were willing to contribute a major portion of the investment. This would influence more villages to mobilize their own resources.

### ***Fishing Rights***

All tank-WUAs think that fishing rights should be given to them. Currently, fishing rights given to the local fisherman cooperative societies on a 3–5 year leases at much lower rates are unfair, e.g., in Srikakulam's Bajjipuram tank, the fishing rights were sold for only Rs 2,000, while it could have fetched Rs 50,000. Many of the fishermen cooperative societies belong outside the WUA boundary and even outside the village boundary. Local WUAs feel very strongly on this matter because these contracts could have boosted their resource mobilization.

### ***Maintenance of Records***

The FMIS Act, 1997 has suggested the maintenance of 12 types of registers at the WUA level; registers ranged from the work register to the WUA property register. The field staff of the ID report that most WUAs/DCs being in their early stages, maintain just three or four registers pertaining to the minutes of meetings, payment of bills, physical works, and cash dealings. There were a few WUAs, promoted as models, which have all 12 registers, e.g. Elabotharam WUA in SRSP and Yenubilli tank-WUA in coastal Andhra. Interestingly, many members of the field staff were not aware of the 12 registers. In a few cases, the members of the department staff have got registers printed in the local language. Many WUAs (and field staff) are not clear whether they can spend the grant allocated for administrative expenses for this purpose. Even the CAs in many places were not clear about the nature of registers to be maintained. The training programs have not incorporated bookkeeping by the executive committee as a main activity, as informed by WUA presidents. All WUAs, except a few, maintained only a cashbook, administration approval, minute's book and a bank passbook. Field staff of the department wrote these registers/records. In a few cases, locally hired persons wrote them. Only a few "model" WUAs had task-specific printed (as prescribed by the Act) registers. In spite of providing Rs 10,000 for administrative purposes to all WUAs (many WUAs had not even entered this in their cashbook till August 1999), neither they nor the local A.E/DyE. Es had printed task-specific registers.

### ***Area Irrigated Records***

Till November 1998, the Revenue Department, with the help of the Agriculture Department used to assess the irrigated area at the end of each season. Owing to an understanding between the farmer and field staff, reported irrigated area values and, in turn, water fee levels were less

than actual. "Discounted" figures vary from 20 to 40 percent less than the actual. By involving WUAs in the assessment process, irrigated area values had gone up by 20–40 percent owing to correction in the documentation process. During field interviews, farmers reported that, in several schemes, they had no command area maps and information on water fee defaulters; till October 1999, either the concerned WUA or ID staff had records to indicate actual levels of water fee collected in their jurisdiction. The revenue staff felt it was not obligatory on their part to share this information with WUAs or ID staff; the village agricultural officer also expressed similar feelings.

### ***Information Diffusion***

The major advantage of having WUAs was quick information flow from farmers to senior officials and vice versa. Before the formation of WUAs, the process of information flow from bottom to top, used to take a week to 10 days and sometimes even longer. Reporting activities of WUAs in local newspapers and state-level newspapers had contributed significantly to information dissemination. In other states, local newspapers are area-based, and restrict their coverage to the local area (mostly town/city/district level). In Andhra Pradesh, particularly in recent years, the state-level newspapers in the Telugu language have started having editions at the district level. Indeed, these newspaper reports have also become inputs for the Chief Minister's teleconference every Thursday morning.

### ***Forum of District-Level Tank-WUAs***

In Karimnagar, the district-level WUAs' President's Forum was started on 20 April, 1998, to provide a link between WUAs and the government in order to solve problems of funds and grants. Until the end of 1999, this forum had 7 meetings. The forum demands were the following:

- Provide allocation of Rs 250 per acre instead of Rs 100 per acre (no basis for this value).
- Neeradis should be under WUAs, rather than under the mandal revenue officer. Of the WUAs, 80 percent have neeradis and their salary should be given by the government.
- Of the funds accrued through fishermen coop societies 50 percent should be transferred to WUAs.
- Revenue collected from toddy tappers (mainly from palm trees) through leasing out trees, on canals or tank catchment at Rs 11 per tree, should be given to WUAs.
- WUAs should receive revenue records, a map of command and a list of voters.
- The Act should enable WUAs to punish or decontrol encroached lands in tank command and catchment areas.
- Presidents are expected to do a lot of work, including record keeping and cash maintenance. WUAs need one accountant per mandal.

- The responsibility of CAs is biased; some CAs have 45 tanks each under them; even if he visits one tank per day, he cannot inspect all tanks in a month (this problem is not there in major projects).
- The District Pay and Accounts Officer gives account-payee checks payable at the Karimnagar town and it takes 20 days for their realization. Alternative arrangements (like demand draft) should be made at the local level.

The Ananthapur District Tank-WUAs' Association was formed in July 1999 and had met once in 3 months. Its focus was mainly a) to fight for auction rights of fish and trees on the foreshore and tank-bunds area, b) since many WUA presidents are illiterates, and not fully aware of the WUAs' rights and responsibilities, the district tank-WUA association would like to help them, and c) through this association, the fight for funds from various district offices. However, so far, the association has not discussed problems of siltation and possibilities of increase in storage capacity. Most tanks help recharge groundwater downstream, in some cases up to 10–15 km.

### ***Support from Officials***

A large number of field staff and senior staff of the ID had realized how WUAs and DCs have positively facilitated their functions. The CA a) sanctions estimates of DC works and approvals up to Rs 100,000 and enter into an agreement for the execution of works, b) resolves water-acquisition- and distribution-related constraints and supervises works, given to DC. In most cases, CAs feel that, in spite of more work, they are enjoying it, especially, since the reform process has facilitated more interaction with farmers. Problems are aggregated at the DC level and become easy to handle. The distributary committee necessitates farmer's participation in O&M of canal network.<sup>12</sup>

During the field interviews, the senior officials reported that officials like the executive engineer (EE), superintending engineer (SE) and chief engineer (CE) should have direct contact with farmers of various reaches and the top officials should frequently visit the sites and have open dialogue with the users and personally observe the sites. The SE brings out the district-level newsletter on WUAs. This newsletter is quite regular and is released during the first week of every month, reporting the progress made, funds disbursed, and results of interviews held with one or two farmers on WUAs. Every month, a thousand copies are printed and distributed to all WUAs. The SE himself edits the newsletter (till now, four issues) and receives a monthly supportive grant of Rs 5,000 from the ID.

Some field officials shared their disappointment owing to WUAs. These have cut into their additional earnings, which may further decline. A deputy executive engineer expressed that, owing to too many WUAs everywhere, a new breed of contractors, WUA presidents, have emerged and they charge a commission of about 10 percent. They would like to have all

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<sup>12</sup>For example, according to one of the CAs in SRSP project, after DC and WUA formation irrigated area increased to 3600 acres from 2000. The CA said, additional 30 per cent owing to revision of revenue records, and 70 per cent owing to better structures and improved maintenance. The SRSP would gain additional 20 per cent of irrigated area, if staff could reconcile groundwater irrigated area (now groundwater area is not recorded, properly).

monetary details with them. Many territorial committees are against the practice both of the 10 percent commission and of presidents holding most of the financial control. Many presidents do not even discuss these monetary aspects during the general body meetings. On the other hand, engineers are hesitant, since they are losing their additional earnings and have to answer to the public. Earlier, they were answerable only to the government.

In Ananthpur, the SE of the minor irrigation department, and the SE of the major Irrigation Department said that before formation of WUAs in major projects, farmers used to have protest marches. During emergencies, tractor loads of farmers would barge in to the local department office to demand water and some essential physical repairs. By 1999, all that had stopped. Farmers address the WUA president with their problems. Even officials direct farmers to route their complaints through WUA presidents. In effect, for any problems of the command area, only one or two persons meet or call upon the officials. According to these SEs, major achievements are a) water reaches the tail end, which is a large achievement, b) WUAs look after all O&M, and c) ID is relieved of regular O&M problems. In the Rayalaseema region, the situation of water regulation was terrible, before the formation of WUAs. From 1998, there was a forum of WUA) to whose presidents the ID officials can speak about the emerging issues. In turn, these WUA presidents, brief their members and arrive at consensus.

## **Benefits**

Large sums have been spent through users associations ranging from Rs 5,000 to Rs 900,000 per WUA. Users have identified works and executed them. They have also carried out their long pending essential physical works. Physical benefits are accrued in a short time, and they are distinctly visible. Across the state, our field observations had indicated that WUAs were happy for the same reason. Wide awareness on WUAs created by the government and the media has surely raised the users' aspirations, and thereby pressurized the WUA presidents and TC members on the one hand while, on the other, pressurized the ID staff to execute the works. It is hard to dispute visible benefits. However, some researchers in the state have a different opinion. The solid benefit across the state is water flowing to the tail reaches. Some of them had been deprived of water for years and now receive water for the first time. Minimum physical rehabilitation works had definitely facilitated better water flow, both across the reaches, and for the length of time, as the study team had observed in various places. This has enhanced crop yield levels by almost 20–30 percent across the state. Every WUA that the study team had visited has vouched for both yield increase and water flow to the tail reach.

## **Crop Pattern**

By and large, the irrigated area had expanded owing to improved water supplies and cleaning of the canal network. This had largely benefited the tail-end areas. All this had increased the production and productivity levels due to better water distribution practices by the WUA. In most areas, the shift was towards rice cultivation in both kharif and rabi seasons. For example, in Bannuvada village-WUA area, in the kharif season, rice was grown in 3,011 acres while the total rabi crop area was 3,000 acres. There was no open or bore wells owing to loose and

sandy soil, and mainly close to the seacoast. In the Duggirala-WUA area, the net profit from kharif rice is Rs 8–10,000 per acre, according to farmers. In rabi, the entire 6,727 acres are cultivated; the area under rice cultivation has increased from 600 acres before WUA, to 2,500 acres after carrying out all physical works. The records of field officials show all 6,727 acres of the command area as wet (paddy) area, plus 1,000 acres of non-rice area. In Emani-WUA in the Krishna delta, during kharif all 5,700 acres are cultivated for rice. The command area has some 100 filter points; the groundwater from these wells was used for preparation of seedbeds; thus some 200 acres use water from borewells. In the rabi season, the cultivation of 3,700 acres of rice and 2,000 acres of blackgram was made possible only after the WUA works.<sup>13</sup>

Even the ID officials are convinced about the benefits. According to one of the executive engineers of the Vamsadhara project in Coastal Andhra, the following benefits have accrued from WUAs:

- Carrying capacity of main, distributary and minor canals has increased by 20–30 percent.
- Irrigated area has increased mainly in tail reaches by 10–15 percent.
- Number of complaints has been drastically reduced.
- The EE and SE have quick access to information. Before that, information was available only from the AE and Dy EE. Presently, it is from all WUAs.
- Users prioritize works and carry them out with technical approval from the CA.
- Now users have a role in works identification, prioritization and execution.
- Collective action among users is increasing.
- In the future, WUAs have to collect fees and do all O&M works; but this will emerge gradually.
- WUAs are more beneficial in minor irrigation tanks and medium projects, since source and control can be seen and separated. In major projects, mainly O&M can be carried out by WUAs.
- In the Vamsadhara project, the problem was water-carrying capacity and not water availability. WUAs solved them since most of them are river-diversion schemes and run of the river channels. Canals run continuously from end of July to December.

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<sup>13</sup>The study team also looked at cost of rice production in Dharmavaram tank-WUA. In this command, generally only one crop is cultivated; rice in kharif and no crop in rabi. According to local farmers, one acre of rice produces some 25–30 bags (each bag of 70 kg of unhusked rice), a gross value of Rs 15,000, labor costs of Rs 7,000 (5,000+2,000); chemicals and pesticides of Rs 2,500 and a net profit of Rs 6,000.

In some places, the star gains were the removal of encroachments, particularly in tank-bed areas. Godavari and Krishna deltaic areas had gained a leading edge in cashing in the WUA movement, and its associated financial allocations. Because of the sheer size of the command area (altogether one million acres), and large size WUAs (average is 9,000 acres) work components and benefits were large. Their prime focus on improving drainage facilities and desilting the distribution network of earthen canals had paid rich dividends. Even officials concur with user pride. Some major benefits in the Krishna delta were reduced canal breaches, building of much-awaited bathing and washing stone steps, construction of cattle ramps, desiltation of minors and distributaries and equity in distribution from tail to head reach. In some distributaries, owing to desiltation and canal- protection walls, water easily flows till the tail reach. Hence, water distribution started from the tail to the head, unlike earlier when it started from the head to the tail, owing to less water and difficult flow. The yield level of the rice crop has increased by 10 bags of unhusked rice in the tail reaches (from 15 to 25 bags per acre) and by 5 bags (20–25 to 30 bags per acre) in the head reaches.

The top officials said that the initial motive was to do away with contractors, involve farmers and spend the whole money on works. The few PIM coordinators in the recently created posts and appointed at the district level, were in full support of WUA activity. Some of them have never worked on WUAs and were close to retirement. These coordinators confirmed to us during our interviews that, owing to PIM, they were able to see returns such as expansion of irrigated area, increased yield levels, reduced or almost no protest marches and agitation by farmers, and active involvement of users in irrigation management.

### ***Reduction of Staff Size***

At a circle level (i.e., SE level), since the formation of WUAs, all maintenance and repair works were carried out by WUAs. This had some impact on the size of the ID staff and the workload of this staff. For example, the SE (major irrigation) in Ananthapur has confirmed that his circle was supposed to have 149 assistant engineers. In reality, 60 posts were vacant. The system was still running without any hitch. The SE said “this is mainly owing to the involvement of WUAs and is really beneficial to the department.” Even at the middle level there were vacant positions for six deputy engineers (the sanctioned number being 35) and at the level of executive engineers there were 50 percent vacant posts (the sanctioned number being 8). In the Sri Ram Sagar Project, reforms led to the following staff scenario as in 2000.

*Staff size in Sri Ram Sagar Project as in 2000.*

Level	Pre-1998	2000
Chief engineer	2	1
Circles	7	5
Divisions	36	25
Staff position sanctioned	2,953	2,078
Working	2,391	1,740

In the Chittoor division, the percolation tank-WUAs have focused on improving the inflow channels and strengthening surplus weirs and aprons. They had also strengthened tank bunds and cleared shrubs and weeds. To improve storage levels and, in turn, improve their groundwater recharge levels in the command area, most of these tank commands grew sugarcane as a traditional crop.

The Commissioner of Irrigation and Command Area Development clearly identified two major benefits due to WUAs and DCs, which were a) simplified payment procedures and b) introduction of simple monitoring procedures. Further, he gave a list of some major achievements:

- Empowerment of farmers who are more articulate now.
- Emergence of young leadership in rural areas.
- Teleconferences for effective monitoring (every Thursday, of the first 3 weeks of the month, with all district collectors and department officials).
- Awareness on both WUAs and the Act is good.
- Farmers and their organizations have a role to maintain the system.
- Hardly any complaints on system damages in any project area.
- Faction leaders demand collective action in poor areas.

He also identified some major strengths of this experiment, some of which were effective, innovative and quick action for monitoring and follow-up. Since the state has evolved this process many irritants have been removed, there has been regular field inspection and, to a large extent, rent-seeking levels have been removed. In recent months (early 1999), WUAs have been assigned a nine digit code for better monitoring and follow-up at the district and ID levels. The state keeps tab on these inputs and, hence, at all levels, it becomes easy to access data and report progress made and problems if any. Formats are being developed for this.

In Andhra Pradesh, strong political will has made a major difference to the whole WUA exercise, followed by continuous bureaucratic support at the top level. This has led to the empowerment of farmers and greater awareness among farmers who have even been able to question the local officials and field staff.

### ***Economic Benefits***

Some of the economic benefits accrued owing to PIM in Andhra Pradesh are:

- Additional 5.21 lakhs of acres came under irrigation. In the SRSP project, the reported area has increased from 95,000 acres to 237,000 acres in the first year (1997–98) and to 345,000 acres in the second year (1998–99).
- In spite of heavy rains in Coastal Andhra, there was minimum loss owing to drainage works carried out by WUAs. Besides, rice transplantation was advanced by 15 days.



- The yield level of unhusked rice has increased from 2.5 tons per acre to 3.5 tons per acre. Farmers reported that they obtained 45–60 bags of unhusked rice per acre (70 kg/bag). Before WUA formation, this value was 30–35 bags per acre.
- The worth of the total additional production per year was estimated at Rs 6,140 million

Economic benefits are enormous at the state level,<sup>14</sup> and expenditure was more productive-oriented. Wasteful expenses were reduced and resource mobilization at the local level were increased. Rent-seeking had reduced. O&M grants can be reduced and they may be spent on works.

### ***Perceptions of Government Officials***

Interestingly, across the state and across the levels, officials of the I&CAD echoed different tunes on their involvement in the PIM-related activities. The following are some key perceptions of officials interviewed by the study team:

- The present course of events would lead to a major shift towards decentralizing the perceived power structure of local officials, both lower and middle. At this speed, officials feel that even senior officials may lose their “powers.”
- However, there was a growing understanding across the state and across all levels of officials that the WUA movement had helped both in a large way in system O&M and, to a large extent, in influencing farmers’ involvement in irrigation management. Officials at all levels and in all places (more in major irrigation systems) feel that their major burden is reduced in O&M of the system.
- Officials feel that local engineers should have powers of signing bank checks along with the WUA president and TC members. Unfortunately, none of the WUAs were in tune with this view. WUAs feel, this was another tool for arm-twisting and they pleaded “this should not be encouraged; if any WUA presidents and TC members have misutilized the funds, the ID staff can always take stringent action on them.”
- Minor irrigation officials argue that present grants (Rs 50 or 100 per acre) were grossly inadequate for tank systems; in the absence of any DCs and PCs for tank systems, WUAs have to take care of both main system (reservoir, sluices, regulation points) and distribution systems. Since recent grants were proportionate to the size of the area, tank systems receive much lower grants (in many cases, in the range of Rs 12,000–25,000) while major irrigation system WUAs receive grants in the range of Rs 300,000–900,000 or even more. Tank systems need different levels of grant. They need completely one-time allocation of large amounts to completely rehabilitate the tank systems to their original standards, and then WUAs can receive the present level of grants.

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<sup>14</sup>But exact values were not readily available.

- Some senior irrigation officials felt that, during the next 5 years, WUAs should completely a) operate and maintain the system, b) regulate water supplies, and c) collect water fees.
- In the APFMIS Act, according to the SE minor irrigation, Ananthapur, some changes such as the following are required: a) recalling of WUA president should be made more effective, b) CA should have control over the funds disbursed (because, the WUA president and TC members of the area are misusing funds, he feels), and c) the Act should provide a clause to take back funds from the WUA, if it does not execute agreed works.
- In the process of reforms, members of the government staff, particularly those at the level of service delivery and have direct links with the users (like lascars, assistant engineers, deputy executive engineers) feel threatened, primarily because they lose their undisputed powers, the prestige attached to their positions, no more endless requests from the users for their services, and thereby a major loss in their additional earnings. Indeed, the absence or reduction in these additional earnings affects the upper hierarchy too, owing to the lack of demand for such positions, and no grease money involved in transfers and appointments. These positions, termed as “wet” positions, have now become “dry.” They have to be more accountable and transparent in their dealings.

## Key Lessons

This part of the paper focuses on some of the critical issues and key lessons of PIM in Andhra Pradesh. The issues deliberated are based on observations, discussions with the ID officials and WUA members, and on experiences of other states in India. At the outset, there is no road map as such to drive the WUA movement in the state during the next 5 or 10 years. But the ID has kept irrigation management transfer as its main goal. Towards that direction, the formation of WUAs, DCs and PCs is perceived as most important. “We do not have any blue print; we wanted to build as it grows” says the Commissioner of I&CAD who was the key driving force in the ID for the WUA movement.

Members of both top-level and field staff are making efforts to learn while they do things. The chief engineer of the SRSP project would like the following as a future plan to give a boost to the WUA movement in the state by a) linking water fee with revenue, b) ultimately, making WUAs responsible for collecting water fees, c) future releases of government funds to be proportionate to fee collection of WUAs, and d) development of financial management systems for farmer groups at WUA and DC levels.

Andhra Pradesh has made a beginning in large-scale PIM whose chief features are the following:

- For the first time, in the state and also in the country, a suitable legislation has been enacted. The administrators and senior engineers, with plenty of field experience, have crafted it. Users across the state and field staff hail the legislation.

- The state has mounted awareness and training camps in different parts and for different levels.
- Continuous and effective monitoring mechanism both at lower and top levels.
- A strong political will laced with administrative acceptance.

Though the state has made a good beginning it has to go a long way to claim all-round success. Even sustainability becomes crucial in the long run. The state has to gear up the process to emphasize the following key issues. Recommendations are also indicated in the appropriate places.

### ***Necessity to Strengthen Performance Monitoring***

The key question here is "what is the criterion for the performance measurement of WUAs and DCs? The performance evaluation formats (quarterly and annually) should have been devised when WUAs were formed. These formats should be on season-crop basis, covering problems, area covered, production and yield levels in their jurisdiction, activities undertaken, resources mobilization and item-wise expenditure incurred. It requires focused planning and frequent appraisals and upgrading to keep up with the growth of WUAs, their functions and allied activities.

### ***Provision of Access and Control to WUA Area Records***

WUAs and DCs should have access to revenue records related to the collection of water fees and land acquired on either side of the canal and distributaries. They should be able to grow plants and auction them or lease them periodically to mobilize resources. Thus, canal bunds would be protected and organizations will have a regular source of income. This would also help reduce silt accumulation in the canals. In each WUA, one or two TCs should also be trained in bookkeeping and their skills upgraded over time, as WUA/DC/PC activities expand. Training should focus on function-specific aspects. If one or two TC members are not willing to shoulder the responsibility, locally hired educated unemployed persons can be trained. WUA/DC/PC should agree to pay their salaries and costs. Copies of all official records<sup>15</sup> should be given to WUAs. This would help remove the encroachments and improve the storage level and the carrying capacity in canals of all types of irrigation systems. WUAs would be able to receive more funds on a per acre basis and collect more water fees. This would help strengthen the resource mobilization capacity of WUAs and reduce disputes relating to authorized and unauthorized areas.<sup>16</sup> The process of rectification, and thus revising area records, needs to be done before asking WUAs to collect water fees on their own. It was a common demand across all WUAs in the state.

<sup>15</sup>These records should include information on storage levels, reservoir size, tank-bed area, canal boundary, catchment area, authorized command area with survey numbers, structures, and other irrigation and revenue details.

<sup>16</sup>For example, in Vamsadhara project some 40,000 acres are receiving unauthorized canal water through the use of private diesel engines. This practice had gone on for several years; yet, official records do not indicate this.

### ***Restructure the Capacity-Building Mechanisms***

In any given project area, at any time, there should be a minimum of 60 percent staff trained on PIM-related aspects. Their skill needs to be upgraded regularly. Organizers have to conduct need assessments on contents, timings and locations of the training programs. The staff needs to be reoriented to prepare case studies, design effective training and use innovative teaching methods for task-specific and level-specific programs. They may need to forge an alliance among NIRD-IRDA-HRD agencies.

The training institute WALAMTARI, under ID control, needs to be restructured, preferably on the lines of recommendations made for WALMI-Gujarat<sup>17</sup> to design and offer more demand-driven training programs, to recruit more productive persons on time-bound and incentive-based scales and to bring in output orientation to the institute. Currently, in spite of a strong WUA movement in the state, WALAMTARI has a few faculty members with good social science, organization behavior and management skills. This institute needs to respond to the changing needs of the state and its activities. It has to a) play a pivotal role in capacity building for the WUA movement, b) essentially, track down its road map for the next 5 to 10 years in order to be a productive partner in the WUA movement, and c) be a truly autonomous organization, free from the ID control. Its staff skills<sup>18</sup> should be upgraded since the training materials currently used for WUAs presidents and CAs training programs are designed by outside agencies.

### ***Forge Institutional Alliance***

As of now, the WUA movement has been mainly confined to the ID. To utilize the available expertise both within the state and outside, this movement needs to forge an alliance with NGOs and research institutes. To draw a road map, with clear milestones and financial implications, and potential outputs and inputs, it may be worthwhile to collaborate with mutually beneficial reputed institutes (e.g., the International Water Management Institute, Colombo). All these would enable better: performance measurement, appraisals and mid-course corrections, evaluation and learning from mistakes.

### ***Focus on Organizational Principles***

WUAs should be directed from the present orientation towards physical works and meetings. They should shift towards water management and productive functioning of the organization in terms of resources mobilization, long-term plans, member education, member participation, water and related activities, value-added functions, and strengthening the rule-making process and rule-enforcement mechanisms. The current method does not focus on the organizational design of WUAs. The experience with creating user organizations, especially in gravity flow

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<sup>17</sup>For details see Report of the Small Study Group appointed by the Government of Gujarat to evolve a plan for restructuring the Water and Land Management Institute, Gujarat, April, 1999 (draft).

<sup>18</sup>The Institute needs to utilize the services of all those staff trained under USAID assistance, both within and outside the country (currently most of the trained staff are posted elsewhere in the state).

systems, is still formative and are yet to yield firm design principles which will ensure that the user organizations will be capable of self-governance and self-management. The WUAs will be in jeopardy unless they begin with valid assumptions about the design principles that need to be followed to catalyze participatory user organizations. Designing energetic member organizations involves understanding their working through focusing on the interactions between their three constituent subsystems: members, the governance structure (board or management committee) and the operating system that provides the services.

Extensive research in member organizations in various fields suggests that robust self-governing user organizations achieve high levels of goal-cohesiveness, governance effectiveness, and member-need responsiveness by satisfying four design principles: a) Member-Centrality of the Goal; b) Goal-Cohesive Governance; c) Receive the Right Operating System; and d) Secure and Retain Member Faith and Allegiance.

### ***Developing Model Projects***

The AP-FMIS Act is a trendsetter for the country and also for south Asian countries. The Act remains the same for the whole state while the government orders have to make provisions for regional variations. For users, and also field staff, seeing is believing. As of now, the state has no pilot site/project to show as the model and from which to learn lessons. The state has to have demonstration sites/projects, wherein the total irrigation management transfer has taken place. Good documentation and lessons learnt will be a good guide during the training programs and for replication in the state. In the absence of that, both water users and field staff are riding on wish-horses. For demonstrative effect, in each of the three regions (Telangana, Coastal Andhra and Rayalaseema) one full major project (or a hydraulic boundary of 50,000 acres or above), one medium project, and two minor irrigation projects (or two tanks) should be taken to bring all WUAs and DCs, and form one PC. Farmers should be involved in selecting the pilot sites for full turnover.

First, bring these sites on to a dynamic function in tune with the Act and establish a true organic link across all tiers in their functions, responsibilities and roles. Each tier, wherever applicable, should be accountable both upward and downward. Gradually, in a phase-wise manner, as the tiers are strengthened, the ID should be withdrawn from all projects (under this experiment). Each tier or concerned organization level should have an office space in the regular ID office and use it for regular liaison purposes. As the number of ID staff is reduced, the WUA/DC/PC should, if they feel, increase their staff. If the user organizations are made to pay staff salaries, they will be in a better position to judge the need-based staff. Just as, today, the lascar is accountable and works under WUAs, so AEs and DyEEs should work under DCs. Gradually, this should move up to EE and SE levels.

The state has to design and attempt three different approaches, one each for the three levels of projects: minor, medium and major. While the existing Act serves a good purpose at the macro-level, in practice, for effective implementation, problems are mainly technical and social. Feasible approaches have to be evolved, designed region- and type-wise. To test the feasibility of these approaches a period of two crop seasons should be considered. Geographically, the experiment should cover three districts in three regions. In each region, it should cover a minor, medium and a major project. During the second year, the approach may be modified and extended to two more districts, and during the third year onwards it may be replicated all over the state.

### ***Expediting the Transforming of Technocracy***

In the state, the focus is on transforming technocracy. Owing to the Chief Minister's teleconferences and district collectors' frequent meetings, countless formats have to be sent to the I&CAD secretary regularly. As part of the transforming technocracy, the present setup of the organization may be restructured on the following lines. The proposed federal structure will have the WUA at the bottom and the ID at the top. The federal structure will be as follows:

- It will be self-supporting with initial corpus fund from the government.
- It will hire professionals at all levels, and will have own staff rules and incentive schemes for high performers.
- It will have rights to raise funds and loans at all levels and it will have a four-tier structure: WUAs at the bottom, DCs at the second tier, PCs at the third tier (project level) and the state-level federation at the top level.
- Each level will be self-supporting with autonomous powers, with clear rights and responsibilities and, yet, vertically and horizontally well integrated (e.g., for water acquisition, water distribution, system maintenance and fee collection). The study team feels that the federal structure as shown in figure 2 may be useful.

### ***Separate Scheme for Tackling Tanks***

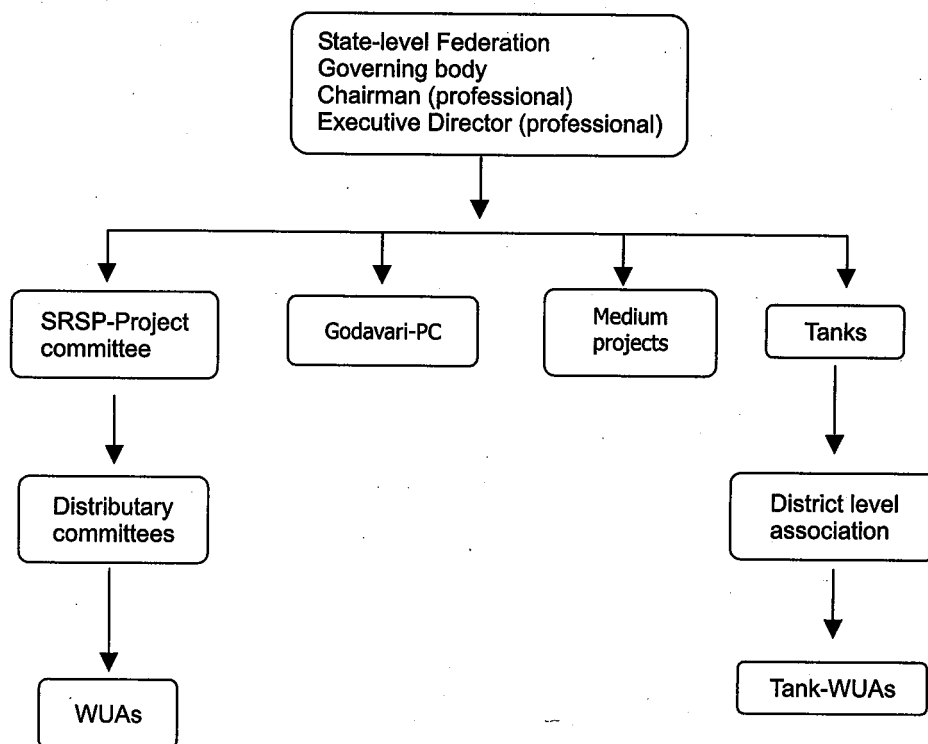
The management of tanks necessitates an altogether different approach. Tank users' associations have control both of source of water and its entire distribution system. Compared to major and medium irrigation systems, tank systems are pretty old.<sup>19</sup> But present O&M grants at Rs 100 per acre are inadequate for any tank rehabilitation work. The growth of weeds (ipomea and others) in the tank-bed area had increasingly affected around one-third of the storage capacity, particularly in Coastal Andhra region. Farmers have reportedly said that for permanent removal of weeds, they are willing to share up to 30 percent costs. Tank-WUAs need different financial disbursements. First, they require physical rehabilitation. Prior to that, tank-WUAs should be made vibrant and responsive. This needs a special task force both at the state and regional level.<sup>20</sup> A time-bound plan has to be evolved in consultation with the existing tank-WUAs and, in some cases, (wherever available) district-level tank-WUA associations.

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<sup>19</sup>A large number of rain-fed tanks in Vishakapatnam district are of the preindependence vintage. Most of them have a designed command area of 150 acres and more. In 1953, the ID took over these tanks, which had hardly undertaken any repair and maintenance works. Some of them have silt close to their surplus weir level. Most of the silt comes from nearby hillocks owing to flash floods, high slope, deforestation in the upper stream and lack of treatment of the catchment area. What is required is to desilt for sustainable irrigation and increased irrigated area.

<sup>20</sup>For example, Karnataka, a neighboring state, has mounted a separate project to rehabilitate 5,000 minor irrigation tanks on the community-based approach. The project has taken an integrated approach for the tank system as a whole for forming the stakeholders' association, which is quite different from WUAs in major- and medium-irrigation projects.

Figure 2. Suggested federal structure.



### ***Facilitate Additional Resource Mobilization***

The WUAs should be encouraged to attain financial independence. Towards this goal, gradually, WUAs have to increase their resource mobilization capacities through (besides the collection of water fees), auctioning rights on fish, grass, trees, silt and grazing, and they should be able to undertake allied activities. Most tanks have potential to cultivate fish and sell them for Rs 10,000 to 200,000 per year. But, until 2000, they were helpless to make use of this opportunity, owing to rules. The rules permit fishing only by fishing cooperatives at the local level, who pay some nominal amount to the Department of Fisheries. In turn, the Department of Fisheries pays some nominal amount to the WUAs. According to the Bajjipuram tank-WUA, it can receive Rs 50,000 per year as fishing rights, while presently it receives only Rs 2,000 per year from the Department of Fisheries. To improve the resource mobilization capacity of WUAs, rules need to be revised. The fishing community also does not receive any benefits. As of 1999, middlemen have profited.

***To have more effective integration of WUAs at all levels, they need to be federated into a four-tier structure.*** The tiers are primary (present level), secondary (distributary or DC level), project (PC level) and apex (state level). This would enhance the coordination of various aspects (organizational, financial and manpower). This would also facilitate focusing on essential activities like water acquisition, water regulation and distribution, and moving towards equity within the WUA level and across the reaches in a project. The apex body has to take full responsibility for all these functions. It should plan and execute its activities on its own; generate funds and be able to borrow funds and receive grants on its own. The organization should lay emphasis on member-controlled WUAs, DCs and PCs. The apex body and the four-tier organization should function as vibrant and truly member-controlled organizations.<sup>21</sup>

***Need to strengthen local and traditional approaches of labor-sharing and community efforts.*** Before the WUA formation, local informal committees or groups (both in tanks and canal systems) used to collect both men (one per acre or household) and money (Rs10–50 per acre or household) for essential works like cleaning canals (before the crop season began), desilting and some essential repairs. After the formation of WUAs, the perception of all farmers is that since the government is giving money the WUA president and TC members should do all the works. In general, farmers contribute neither labor nor money. The new initiative of the government has weakened the local initiatives and participation. The new initiatives are defined to be participatory but the approach is different. The new approach was imposed from outside and has little member-contribution and control while the traditional approach was locally evolved and member-controlled.

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<sup>21</sup>In India, such member-controlled organizations and their success stories have proved that it is possible to effectively function that way. e.g., three-tier milk societies in many states, which have created a white revolution in the country; apple growers' cooperatives in Himachal Pradesh and Uttarakhand, which have strengthened growers and, at the same time, delivered apples round the year all over the country. Locally, Andhra Pradesh can look up to the Mulkanoor Multipurpose Cooperative Society for its effective member-controlled and good servicing society.



The new approach should have taken local approaches into consideration. In this new approach local farmers should contribute first and the government may give a matching grant of twice the amount of that contribution. Local contributions should have been made compulsory on an acre basis. As many WUAs have mentioned a rate of Rs 30–50 per acre per year is ideal. Thereby, members would develop stakes in the organization and its functions. Some WUAs have suggested that the accumulated money may be deposited in a commercial bank and the interest accrued may be spent on other activities.

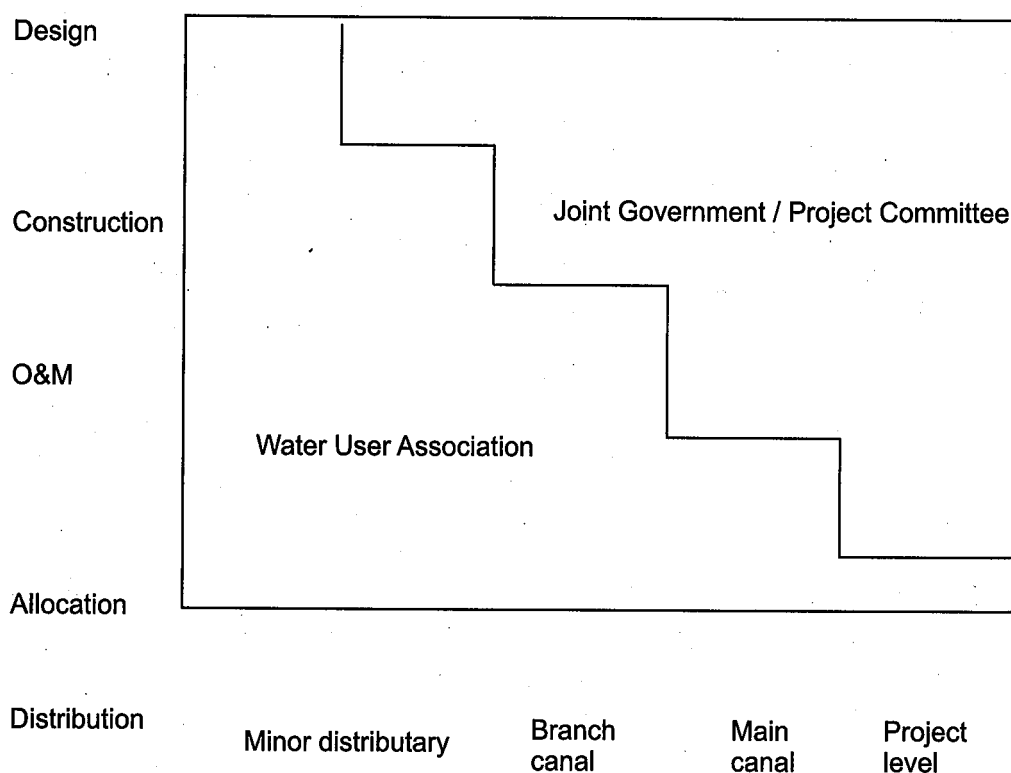
### ***Replicability***

The Andhra Pradesh program on WUAs is a good example of how an impossible task can be made possible. To surge ahead in a similar and a better fashion, any new state has to muster the following strengths.

- *Focus on key areas.* Emphasis should be laid on getting rid of middleman, i.e., the system of employing contractors in O&M and the users should be responsible for identifying and executing essential works for repair and maintenance. The ID's role in O&M has to be reduced.
- *Building capabilities.* Training should be given at all levels. The focus should be more on middle- and lower-level field staff. The ID staff may be trained as trainers while for the users training should be conducted in all centers. Wide dissemination of specifically prepared training material in the local language is essential. Similarly, the Act should also be made available in the local language and needs to be distributed widely all over the state.
- *Good governance.* Strong political will at the top level (at the level of the chief minister and irrigation minister) will make a positive difference. The right kind of bureaucrats needs to be identified to head the department/divisions.
- *Effective monitoring.* Tele-conferences are required at the top level, with all district collectors and senior officials of the ID. Regular monitoring through specially designed formats by filling and filing to higher level offices and quick consolidation at the top level would help in the necessary decision-making process.
- *Institutionalization.* The PIM in Andhra Pradesh was evolved through the government setup. While in most states of India, WUA movement came through a nongovernmental or semigovernmental agency (SOPPECOM in Maharashtra, and in small scale through WALMI's in some states). In Andhra Pradesh, the ID has taken the present initiative and, thereby, it has become part of the regular ID work. It is one of the statewide department's initiative and main activity. The Competent Authority (CA) for WUAs and DCs are regular ID staff and currently they are responsible for preparing technical estimates and for authorizing work completion.
- *Large-scale operation.* This has four key features like a) do it in one shot, b) massive scale, c) learning by doing, and d) modify through government orders and continuous monitoring. Anything large is visible and will have wider implications at all levels. Large operations also demand a larger human-power effort

and related operational and organizational efforts. Large-scale operations are mounted to achieve larger outputs in one shot. If operations are spread out both in space and time, there is scope to learn by doing. If the framework is flexible to achieve the given targets, then one sees variations across regions and levels. Indeed, flexibility over time provides opportunities to modify the process. Senior officials understand that the reform process is moving towards receiving it right: learning by doing. To support the process, government orders, circulars and guidelines are issued regularly.

*Figure 3. WUA and government responsibilities in the process of irrigation management. Transfer for adoption in demonstration sites in Andhra Pradesh and replication in other states.*



Impressed by the performance, some states have made a modest beginning to replicate the experiment. Madhya Pradesh has already formulated legislation, mostly in tune with the AP-FMIS Act. Tamil Nadu seems to have started an internal exercise to move towards this direction. Officials of the Andhra Pradesh ID strongly feel that the states interested in replicating the experiment should have taken the Andhra Pradesh State personnel during the initial years of WUA formulation. This state could share its rich experience with other states.

Demonstration sites in both Andhra Pradesh and other states have to make well-designed and constant efforts to move towards total irrigation-management transfer. To begin with, as shown in figure 3, responsibilities of the joint government/project committee have to be minimal at the lower level of the canal distribution network. These responsibilities have to be gradually increased towards main-canal and project levels. The above chart indicates the kind of responsibilities of WUAs and the joint government/project committee across different levels of the irrigation system.

What is also essential is that both the Planning Commission and the Command Area Development wings of the Government of India should make such Acts and internal changes as a precondition for any assistance, including financial disbursements from the central government. This would help build pressure to expedite the process. In spite of having a separate component on farmers organization and turnover in the Water Resources Consolidation Project, three states (Haryana, Orissa, and Tamil Nadu) have made little progress in that direction. These three states had started their exercise, much earlier than Andhra Pradesh. On the other hand, the Indian Network for Participatory Irrigation Management (INPIM) should play a more active role at two levels: central level and state level. It should help restructure all state training institutes (like WALMI's) to respond to the emerging needs of the state irrigation sector. At the state level, the INPIM can facilitate the formulation of policy and legal frameworks, guidelines for monitoring and evaluation of WUAs and irrigation management transfer activities, and training of farmers and officials at various levels.

**Key Provisions of the APFMIS Act of 1997**

- The Andhra Pradesh Farmer Managed Irrigation Systems Act came into effect in Andhra Pradesh in April 1997. Under this Act, till July 1999, some 10292 WUAs were constituted and elections were held in June 1997. Further, 174 distributary committees for the major projects in the state had also been constituted and elections held in November 1997.
- The Act facilitates: a) the formation of WUA on the basis of a hydraulic boundary; b) the inclusion of landowners and tenants; c) making a person eligible to become a member of more than one WUA boundary; and d) the right to vote to only members (owners or tenants).
- The Act has made provisions for the election of president and members of the managing committee for a period of three years at three levels: a) WUA level, b) distributary level, and c) project level. Members have a right to recall the elected president and managing committee after one year, based on their performance.
- The Act also stipulates that the elected members are progressive. The Act says, "a person having more than two children shall be disqualified for election or for continuing as a Chairman or a President or a member of the Managing Committee;" in addition, "the person shall be disqualified, if he/she is a defaulter of land revenue or water tax or charges payable either to the government or to the WUA; and if he/she is interested in a subsisting contract made with, or any work being done for, the gram panchayat, mandal parishad, zilla parishad, or any state or central government or the WUA." Such clauses are rare to find in other Irrigation Acts of India.
- The FMIS Act has clearly underlined the objectives, functions and resources of WUA; to provide clarity, the Act also holds the government officials and WUAs responsible.

Table A-1. Water resources of Andhra Pradesh.

Sl. no.	River system	Drainage area in the State in '000 km	Ratio of drainage area to the total area of the State (%)	Assessed annual yield in the State (million ha)	Remarks
1	Godavari	73.201	26.45	4.23	Assessed
2	Krishna	74.382	26.88	2.30	Allocated
3	Pennar	48.111	17.39	0.28	Assessed
4	Nagavalli	4.833	1.75	0.14	Assessed
5	Vamsadhara	1.934	0.70	0.04	Allocated
6	Other minor rivers draining into the sea	74.239	26.83	0.79	Allocated
	Total	276.700	100.00	7.78 (2746TMC)	

Source: NWMP Phase II: Vol. I Project profile, A.P. State.

Table A-2. Andhra Pradesh profile of plan expenditure and irrigation potential created.

Sl. no	Period	Amount spent (million RS)			I. P. created (million ha)		
		Major & medium	Minor	Total	Major & medium	Minor	Total
1	Pre-Plan Period 1951	-	-	-	1.332	1.372	2.704
2	First Plan (1951-56)	374.7	35.2	409.9	0.079	0.025	0.104
3	Second Plan (1956-61)	574.3	43.8	618.1	0.181	0.016	0.197
4	Third Plan (1961-66)	915.2	186.0	1101.2	0.368	0.050	0.418
5	Three Annual Plans (1966-69)	608.7	108.1	716.8	0.078	0.037	0.115
6	Fourth Plan (1969-74)	1187.1	181.5	1368.6	0.190	0.063	0.253
7	Fifth Plan (1974-78)	2691.1	388.2	3079.3	0.213	0.092	0.305
8	Two Annual Plans (1978-80)	2576.9	237.9	2814.8	0.154	0.057	0.211
9	Sixth Plan (1980-85)	7295.9	411.0	7706.9	0.305	0.082	0.387
10	Seventh Plan (1985-90)	13064.0	1314.0	14378.0	0.089	0.067	0.156
11	Annual Plan (1990-91)	2827.5	477.7	3305.2	0.006	0.009	0.015
12	Annual Plan (1991-92)	3339.2	485.8	3825.0	0.009	0.007	0.016
	Total	35454.6	3869.2	39323.8	3.004	1.877	4.881
	Eighth Plan (1992-1997) anticipated	22653.2	1869.2	24522.4	0.042	0.040	0.082
	Grand Total	58107.8	5738.4	63846.2	3.046	1.917	4.963

Notes: a) The above values do not include expenditure on CADA up to the Seventh Plan.

b) These above values have been adopted from the eighth Five Year Plan (1990-95) AP-F&P (PLG) Department, Oct.'90 Vol.11, Sectoral Programme.

Table A-3. Average yield per hectare, area and turnout of principal crops, 1993-94.

Sl. No.	Crop	Region	Estimated average yield (kg/ha)	Area under the crops	Production (‘000 tonnes)
(1)	(2)	(3)	(4)	(5)	(6)
1	Rice*	Coastal Andhra	2,952	2,249	6,417
		Rayalaseema	2,622	293	752
		Telangana	2,381	1,005	2,393
		Andhra Pradesh	2,759	3,547	9,562
2	Jowar (Sorghum)	Coastal Andhra	945	55	52
		Rayalaseema	1,037	215	223
		Telangana	763	783	597
		Andhra Pradesh	828	1,053	872
3	Bajra (Millet)	Coastal Andhra	943	62	59
		Rayalaseema	1,034	32	33
		Telangana	374	49	18
		Andhra Pradesh	778	143	110
4	Ragi (Finger millet)	Coastal Andhra	1,059	79	84
		Rayalaseema	1,775	29	51
		Telangana	874	32	28
		Andhra Pradesh	1,164	140	163
5	Maize (Corn)	Coastal Andhra	2,497	30	75
		Rayalaseema	2,292	2	4
		Telangana	2,562	272	697
		Andhra Pradesh	2,554	304	776
6	Sugarcane	Coastal Andhra	72,837	187	8696
		Rayalaseema	79,048	50	2348
		Telangana	75,590	68	4013
		Andhra Pradesh	74,464	305	15057

Source: Directorate of Economics and Statistics, Andhra Pradesh.

\* Paddy is 1.5 times the weight of the finished product of rice.

Table A-4. District-wise/Sector-wise WUAs in Andhra Pradesh (as on 20 May 1999).

Sl. No.	Name of the district	Total no. of WUAs notified			Total Notified
		Major	Medium	Minor	
1	Adilabad	35	27	221	283
2	Ananthapur	46	7	305	358
3	Chittoor	0	51	644	695
4	Cuddapah	74	8	276	358
5	East Godavari	106	12	225	343
6	Guntur	245	8	81	334
7	Karimnagar	249	10	586	845
8	Khammam	50	4	183	237
9	Krishna	189	12	288	489
10	Kurnool	116	12	153	281
11	Mahabubnagar	21	31	478	530
12	Medak	0	12	585	597
13	Nalgonda	91	45	538	674
14	Nellore	110	58	695	863
15	Nizamabad	78	13	267	358
16	Prakasam	124	5	317	446
17	Ranga Reddy	0	3	165	168
18	Srikakulam	37	28	459	524
19	Visakhapatnam	28	18	375	421
20	Vizianagaram	0	25	439	464
21	Warangal	29	18	683	730
22	West Godavari	71	6	217	294
Total		1,699	413	8,180	10,292

Table A-5. District-wise/Sector-wise WUAs (as on 23 March 2000).

Sl No.	Name of the district	Major	Medium	Minor	Total notified (3+4+5)	Major	Medium	Minor	Total elections conducted (7+8+9)	Stay by court	Stay by govt.	Other reasons	Total elections to be held (11+12+13)	Total No. of WUAs (10+14)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Adilabad*	35	27	221	283	35	27	212	274	3	0	6	9	283
2	Ananthapur	46	7	305	358	46	7	302	355	3	0	0	3	358
3	Chittoor	0	51	644	695	0	48	616	664	1	15	15	31	695
4	Cuddapah	74	8	276	358	74	8	259	341	8	4	5	17	358
5	East Godavari#	106	12	225	343	106	12	215	333	7	0	3	10	343
6	Guntur	245	8	81	334	239	8	76	323	3	6	2	11	334
7	Karimnagar	249	10	586	845	249	10	571	830	4	0	11	15	845
8	Khammam	51	5	181	237	50	5	180	235	0	2	0	2	237
9	Krishna	189	12	288	489	166	12	256	434	1	20	34	55	489
10	Kurnool	116	12	153	281	114	12	145	271	4	2	4	10	281
11	Maha-bubnagar	21	31	478	530	21	29	473	523	1	6	0	7	530
12	Medak	0	12	585	597	0	12	551	563	2	0	32	34	597
13	Nalgonda	91	45	541	677	91	44	541	676	0	1	0	1	677
14	Nellore	110	58	695	863	100	57	612	769	22	72	0	94	863
15	Nizamabad^	78	13	267	358	78	13	228	319	3	0	36	39	358
16	Prakasam	124	5	317	446	113	4	291	408	16	11	11	38	446
17	Rangareddy	0	3	165	168	0	2	165	167	0	0	1	1	168
18	Srikakulam	37	28	459	524	37	28	442	507	6	1	10	17	524
19	Visakha-patnam**	28	18	375	421	28	18	369	415	0	1	5	6	421
20	Vizia-nagaram	0	22	439	461	0	21	422	443	0	0	18	18	461
21	Warangal	29	18	683	730	28	18	623	669	1	0	60	61	730
22	West Godavari	71	6	217	294	70	6	205	281	1	0	12	13	294
Total		1,700	411	8,181	10,292	1,645	401	7,754	9,800	86	141	265	492	10,292

\*Includes 9 WUAs under Vattivagu &amp; Chelamavagu.

\*\*Includes TANDAVA (part only).

#Includes 12 WUAs under TANDAVA.

^Includes 7 WUAs under Koulasna.



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