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2

**Formalising Irrigation Institutions  
A Study of Water User Associations  
in Andhra Pradesh**

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## **Foreword**

In the last 27 years of its existence, the Centre for Economic and Social Studies (CESS) has always been aware of its role and commitment to society through its research and publication activities. The main objective of the Centre is to undertake research, documentation and training activities in the field of economic and social development in general and with reference to the state of Andhra Pradesh in particular. The Centre recognizes that a comprehensive approach to development requires an interdisciplinary approach and tries to involve researchers from various disciplines.

In keeping with the interests of the faculty, CESS has developed expertise on several themes such as agriculture and livestock development, food security, poverty measurement and poverty alleviation programmes, unemployment, district planning, resettlement and rehabilitation, state finances, economics of health and demography. The Centre has made important contributions to research in these areas.

Social science research has to respond to the challenges posed by the changes in the development paradigms such as economic reforms and globalization. Since research is the primary activity at the Centre it is important to recognize the need to redefine/refocus the priority areas of research taking into account the contemporary challenges. While the main focus of research on poverty related issues remained the same, since the mid 1990s the area of research of the Centre became more diversified. New research areas related to broader national and frontier research issues such as evaluation of the economic reform process and its impact on different sectors of the economy, environmental and natural resource economics, livelihoods, health and education, bio-technology etc are added.

The Centre has always tried to ensure that its research is theoretically sound and methodologically rigorous, so that it can directly or indirectly contribute to policy formulations or prescriptions. In the last two and half decades, CESS has published several books and working papers. The Centre has decided to start its monograph series in this year. The monographs are basically research studies and project reports done at the Centre. It provides an opportunity for CESS faculty, visiting scholars and students to disseminate their research work.

This Study entitled “Formalising Irrigation Institutions: A Study of Water User Associations in Andhra Pradesh” is the second one in the monograph series. Despite ever increasing budget allocations towards major and medium irrigation, funds available for operation and maintenance (O & M) are inadequate resulting in poor maintenance of the systems, unsatisfactory service and ecological problems. To

counter this problem, number of States in India has transferred the irrigation management responsibilities to Water User Associations (WUA) or private/NGO contractors during the second half of the 1990s. Andhra Pradesh has shown the way to scaling up of participatory irrigation management through formalizing the irrigation institutions to bring in efficient and equal distribution of water resources. The most interesting feature of these reforms is that they are 'top down' with a 'bottom up' approach.

Irrigation reforms in AP, through external funding, have provided an opportunity to revive and strengthen the ailing irrigation systems. The improved systems are expected to enhance the credibility of the department in providing assured water supplies, a precondition for increased water tariff. The funding is expected to help in building the necessary social capital for sustaining the reform process. Strengthening the social capital is a prerequisite for the reforms that aim at transferring irrigation management to farmers. Reforms also focus on financial sustainability through price reforms. In spite of increase in water rates by 3 times initially, they are still short of O&M expenditure. Though user contribution of 15 percent is inherent/included in the PIM act there is no evidence of any contribution from farmers, as revealed in the study. The main reason is that little effort is made in the direction of strengthening the institutional structures.

The study clearly brings out that awareness is low, primary stakeholders involvement in the process of management is low, commitment and contribution to the cause are lacking. This is mainly due to the fact that irrigation department is not willing to devolve powers to WUAs. All the major activities are still carried out by irrigation and revenue departments, leaving only the responsibilities of water management to the WUAs. This is not done even after five years of the existence of WUAs, though devolution of powers pertaining to assessment, fee collection and fund allocations are in the main agenda of reforms. Reform process would have been more meaningful if it had moved towards devolution of powers to farmers instead of tinkering with the election process. The only development in five years is to share the 50 percent of water fee with the WUAs. This makes the WUAs more dependent on the department funds, as the assessment is still carried out by the irrigation department and the revenue department collects fee. This clearly indicates that irrigation reforms are also seen as one of the many government programmes. And hence there is no commitment or sense of ownership among the farmers. Interestingly, they are becoming a political lobby group and demanding their political and financial share. This could be attributed to 'elite capture' of the WUAs - another important aspect revealed in the present study. Party politics have already made a dent in the village unity. These institutions in their present form tend to dilute the social capital rather than strengthening it.

While it appears that an opportunity to build stronger and sustainable irrigation institutions is floundered, the opportunity is not totally lost, as the WUAs are still in place. The study indicated that informal or socially embedded institutions were more effective than the formal WUAs. The reason being that informal institutions reflect commitment and cohesion as it is evolved from within the system. Under the present circumstances, the WUAs cannot guarantee equity, especially under scarcity conditions. Self-sufficiency and resource strength is central to the sustainability of the institutions. The formal institutions are yet to generate their own funds, while informal ones have succeeded in generating surplus funds. Lack of proper devolution of powers to local level is hindering the progress in this direction. Reforms should initiate the process to convert all forms of irrigation water into an economic good through introduction of cost-based pricing as per volume and use (priority). This would help in realizing the relative importance of each source of water. This calls for an integrated approach towards water resources planning and management. In this context, bringing groundwater under the purview of WUAs would go a long way. Further, there is need for exploring the possibility of integrating the Panchayati Raj institutions into the reform process for sustaining the reforms in the long run.

The study has relevance in the context of the increased budgetary allocations towards irrigating in AP and in India and increasing realization of the importance of water resource management in general and irrigation management in particular.

Similar to other publications of CESS, I hope the monograph series will be useful to the research community, civil society and policy makers.

**S. Mahendra Dev**  
Director, CESS.



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Number of officials from the irrigation department at the State and district levels has facilitated secondary as well as primary data collection. Our grateful thanks are to them. As part of our fieldwork we have covered 222 WUA Presidents and 300 households who have provided valuable information not minding some of our irritating questions even at inconvenient times. But for their cooperation the study would not have come to the present form and we are deeply indebted to them for their untiring support. Our field staff has faced the daunting task of eliciting very demanding information from the households unmindful of repeated visits to the villages and households. Our thanks are due to their untiring work in not only filling the schedules but also preparing the field notes.

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Authors



## **Executive Summary**

### **I Background**

Judicious management of water resources is among the critical policy issues across the continents due to the absence of proper mechanisms for conservation, distribution and efficient use. Despite ever increasing budget allocations towards major and medium irrigation, funds available for operation and maintenance (O & M) are inadequate resulting in poor maintenance of the systems, unsatisfactory service and ecological problems. To counter this problem, number of States in India has transferred the irrigation management responsibilities to Water User Associations (WUA) or private/NGO contractors during the second half of 1990s. In most of the cases, full transfer of powers has taken place as far as responsibilities are concerned (O&M; water distribution, fee collection, etc), while only partial transfer has taken place in the case of assessment, assured water supply, etc. However, the effectiveness of these institutional arrangements needs to be assessed.

Most of the earlier studies narrowed their focus by studying the impact of one or two successful WUAs or the initial phase of their implementation, thus limiting their scope to economic impact. The literature has shown that the representatives elected to the WUAs possess weak organizational capabilities, resulting in low profile success of these WUAs. However, there is ample evidence on the repairs and rehabilitation work done throughout the country and spread over different projects. The review identified some gaps which include: i) lack of proper maintenance of the system, ii) time-overruns to utilize the funds, iii) no planned works, iv) lack of convergence between project committee-Executive committee and WUA, v) no powers to WUAs for the collection of Water tax (Revenue department is having major role in collection of water tax and the role of WUAs is restricted only for helping the revenue department), and vi) lack of irrigation regulatory committee consisting of the personnel from agricultural department, revenue department, irrigation department and farmer representatives for control, advice, monitoring, assessing and for various decisions on water management. The review brought out other issues pertaining to role of collective action and social capital in PIM. Some of the important issues/hypotheses include (a) socially embedded or informal institutions are more effective than formal institutions, (b) development and strengthening of social capital in terms of leadership, community cohesion are critical for the success and sustainability of institutions.

## **II Objectives**

The present study is an attempt to provide a comprehensive view on the status and management of water resources in the State of Andhra Pradesh with special focus on water user associations. Our aim here is to critically examine their innovation and sustainability with a view to explore the possibilities for replication else where in the county. The specific objectives of the study include:

- Arrive at a comprehensive assessment of the water user association (WUA) legislation and examine feasibility and practicability of its implementation,
- Examine the political economy aspects of the implementation of WUAs,
- Evaluate the economic impact of WUAs across regions and irrigation systems,
- Understand the social and institutional dynamics in the success/failure of WUAs, and
- Examine the policy environment (including legal) facilitating the effective functioning of the institutional mechanisms and their sustainability in the long run.

## **III Functioning of WUAs: A Macro and Micro Assessment**

Analyses were carried out at WUA as well as household levels. At macro level, the analysis was based on the information collected from 222 WUAs across 22 districts in the State. Ten sample WUAs were selected randomly from each district irrespective of the actual number of WUAs existing in the district. Broadly, these WUAs are distributed between canal and tank systems. About 63 per cent of them pertain to tank systems. Within the canal systems, the sample WUAs were distributed among head, middle and tail reaches and in the case of tanks they are distributed between percolation and irrigation tanks. In the case of canal WUAs 66 per cent of the sample WUAs are located in the middle reaches followed by 18 per cent in the head reaches and 16 per cent in tail ends. Where as in the case of tank systems 92 per cent of the sample WUAs pertains to irrigation tanks.

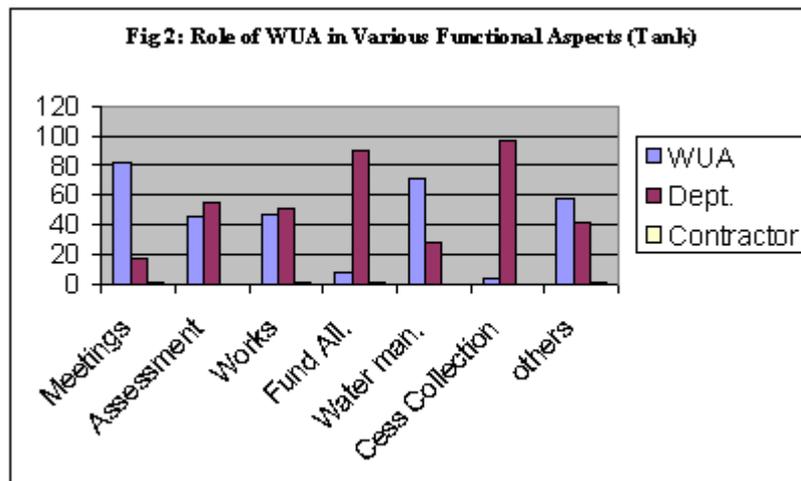
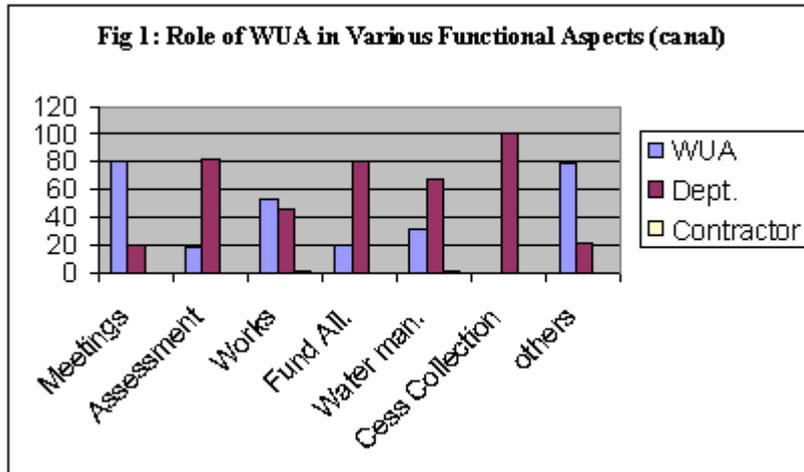
### *a) WUA Level Assessment*

Average area per WUA varies across systems and locations. WUAs in the head reaches are bigger in terms of command area and area irrigated when compared to middle and tail end WUAs. Canal WUAs are larger than tank WUAs by a factor of more than ten i.e., 4900 in the head reaches to 268 acres in the Tank WUAs. In most of the cases area under WUA, command area of WUA and area irrigated under WUA are co-terminus. The size of WUA affects the fund allocations, as the fund allocations are on per acre basis. While canal WUAs get anywhere between

Rs. 2 to 3 lakhs per year, the tank WUAs get between Rs. 50, 000 and 70,000. On per acre basis tank WUAs are getting more money when compared to canal WUAs due to the limited area under tank systems. While tank WUAs got above Rs. 200 per acre per year canal WUAs got about Rs. 100 per acre per year. Though tank WUAs received substantially higher allocations (2-4 times in 6 years) when compared to canal WUAs, the amount is much lower than the requirement for tank restoration i.e., between Rs. 3000 – Rs. 7000 per acre depending on the tank size without desilting. The low allocations are mainly due to the reason that funds are allocated for canal repairs rather than restoration of tanks. This approach suits well in the canal systems, as the main problem is canal maintenance. Where as in the case of tank systems the length of the distributory canals or feeder channels is not much. More over, the requirement of tank systems is the repair of tanks in terms of repairing the breached bunds, de-silting, etc. In the absence of funds for such activities tank WUAs may not be effective. Majority of the works were carried out on repair of canals followed by formation and rising the height of the bunds and removal of silt and maintenance of structures. In the case of canals, works mostly pertain to canal cleaning and repairs. In the case of tanks, the distribution of works is more even across the type of works.

As per the guidelines two general body meetings should be held in a year i.e., one before starting of the kharif season and another before starting of the rabi season, whereas, the executive committee meets as and when necessary. The past six years (1997-2002) experience indicates that GB meetings were not held twice a year, though more number of GB meetings was held in the head reaches. This could be due to lack of irrigation water in some of the systems during the last two years. The frequency of EC meetings was more in tail end WUAs followed by head and middle WUAs. This indicates that middle reach WUAs face less number of problems when compared to head and tail reaches. EC meetings are more frequent even in the case of tank WUAs. The Presidents of WUAs reported that participation (above 80 per cent in the case of canal and above 90 per cent in the case of tank WUAs) and co-operation (above 95 per cent in canal and tank WUAs) of members in the EC meetings is quite high. While general body discusses the overall situation and the general approaches to water management, the EC discusses and takes decisions on important issues such as conducting meetings (GB and EC) assessment of land, works to be carried out, fund allocations to works, water management, cess collection, etc. It is proposed that the responsibility of carrying out all these activities will be shifted to WUAs (EC) in a gradual manner. But, even after six years of existence the only activity carried out predominantly by the WUAs is conducting the meetings. The only important activity in which the WUA has say in majority of the cases is regarding the works (Figs. 1 and 2). The dominance of the department is clearly seen in the most important aspects like assessment, fund allocation, cess collection and water management, though the involvement of WUAs is better in

the case of tank WUAs. Despite the promises the devolution of powers has not taken place even in the case land assessment, let alone fund allocation and collection. This is one of the main bottlenecks for the sustenance of the WUAs. On the other hand, the role of contractors appears to be marginal even in the case of works.



In the absence of devolution of powers there is no clarity even on the part of WUA Presidents regarding the purpose and role of WUAs. Only 40 per cent of Presidents are aware of the WUAs role in the canal systems while 59 per cent of them are aware in the case of tank systems. Only 45 per cent of them are clear about the purpose of the WUAs in both the cases. Nevertheless, 90 per cent of the Presidents in the case of canals and 70 per cent in the case of tanks endorse effectiveness of WUAs. This indicates the less effectiveness of WUAs in the tank systems. This is mainly attributed to the insufficiency of funds, as fund insufficiency is reported in 62 per cent of the tank WUAs as against 37 per cent in the case of canal systems. This re-emphasises our earlier argument that fund allocations to tanks are not according to their requirement. Though there are no serious problems associated with WUAs, there appears to be scope for improvement in the functioning of the WUAs, according to the perceptions of the Presidents. Devolutions of more powers to the WUAs are expected to improve the performance in 67 per cent of the canal WUAs. On the other hand, repairs to main systems (tanks) would improve the performance in 60 per cent of tank WUAs. These are consistent with our earlier observations. As per the relationships between the constitutional (Panchayati Raj) and parallel (WUA) institutions they are cordial in more than 90 per cent of the cases. That is there are no conflicts, though they are not working in tandem-a case of passive or indifferent attitude of the PRIs.

As far as the impact of WUAs is concerned the results shows mixed picture. They seem to be working well in the canal commands while their impact is not so conspicuous in tank irrigation regions. While these observations are vindicated as far the institutional aspects are concerned, the economic impact of the WUAs needs to be established. Hitherto studies observed that tail-end locations are getting sufficient water for the first time in five years. However, this is not coming out from the data at the WUA level. For, the data on area under paddy (irrigated) and other irrigated crops shows a declining trend over the period of six years in both canal and tank systems. This could be due to poor rainfall and water shortages during the last 2-3 years. Even after taking out the extreme drought year (2002), area under irrigation has declined though the decline is less. In the case of canals, decline is observed in irrigated as well as unirrigated area, while in the case of tanks the decline in irrigated area is compensated by an increase in the unirrigated area. Decline in area under canal irrigation at the State level over the last decade commensurate with this. It may not be fair to attribute these changes (decline) to the advent of WUAs, given the poor rainfall situation. More over, the improvements could in qualitative terms such number of irrigations, productivity, etc.

Though the initial success of WUAs is linked with the funding, the study brings out clearly that little effort is being made to make them self-sufficient or financially independent. On the contrary, external fund flows have made them targets of elite

and ruling party capture. Women representation is very poor. As a result, cooperation and collective action potential at the village level have received a set back. There is limited awareness about the WUAs even among the Presidents. This is mainly attributed to the absence of devolution of powers. It is clear that when WUA is not familiar with its command area it is unreasonable to expect them to ensure equitable distribution of water, which is still in the hands of the irrigation department.

On the other hand, the funding arrangements and the works carried out are not very appropriate in the case of tank WUAs. Tank restoration is the major work in the case of old tanks, which require substantial funding. Meager spending on repairs of channels and bunds with out addressing the main issue is proving to be ineffective. User contribution has not really materialised, as the share of contribution is less than 10 per cent in all the cases though little better in the case of tanks. As a result, user involvement, stake and economic efficiency get least priority. The result: sustainability of WUAs is in danger once the funds dry up. Neither the bureaucracy nor the beneficiaries are motivated enough to sustain these institutions.

#### ***b) Household Level Assessment***

The study assessed the situation from two angles at the household level, viz., institutional strengths of WUA in terms of sustainability and incentives structures for collective action. While the former is assessed in terms of stakeholder involvement, commitment, adoption of democratic process in the functioning of WUAs and devolution of powers to the WUAs, the later is assessed in terms of benefit flows to the households due to the advent of collective action institutions. For this purpose detailed data was collected from individual households in the sample WUAs. Fifty households from each WUA were selected using probability proportionate sampling. The sampling was carried out at two levels. First, the sample of 50 households was distributed among head, middle and tail reaches of the WUA in proportion to the actual number of households in the respective location. The sample thus divided among marginal, small, medium and large size class farmers in proportion to their actual population in the respective location. This distribution indicates that greater proportion of marginal and small farmers are located in tail reaches in majority of the cases when compared to large and medium farmers. Therefore, the benefits of better water management would benefit accordingly across size classes i.e., greater benefits to head reaches would benefit the medium and large farmers more and improvements in tail reaches would benefit the marginal and small farmers more. This pattern is observed both in canal and tank WUAs, though not very systematic.

Very few farmers are involved in the pre-planning phase of the WUAs, though a majority of them expressed that the formation of WUAs is appropriate to solve the problems of irrigation. The involvement of local community was much less in the

middle and tail reaches of canal system and almost zero in the case of tank systems. In the absence of local community participation, the main lacuna observed in the pre-planning process was: limited devolution of powers to the WUAs and selection of good leaders. It is observed that caste, gender and activity did not play an important role in the formation of WUAs.

The awareness regarding the WUAs is quite high among the communities. Greater awareness in the tank communities could be due to the smaller coverage, often pertaining to one village. Within the canal systems the awareness is higher in the head reaches compared to middle and tail reaches. However, the high awareness is not due to any systematic campaigning by the department or village panchayats. This coupled with poor pre-implementation involvement of communities, the involvement of farmers in the programme is very poor. Irrespective of the system and location most of the people remained as passive observers rather than participating actively in the process. Though it is reported that farmers have elected the WUA members and the president in majority of the cases, voting was hardly conducted in the case of canal systems. Elections were unanimous in more than 80 per cent of the cases in canal systems while it is above 50 per cent in the case of tank systems. Unanimous is more prevalent in the head and middle reaches than in tail reaches. This could be due to the nexus between the village elite (social or political or economic). Interestingly, political interference was observed in substantial number of cases, though these institutions are expected to be apolitical entities. Interferences are reported to be high in the canal systems when compared to tank systems.

Democratic process is measured in terms of conducting, attending meetings and decision-making process (collective / majority). Though GB meetings should be held once in a year and EC meetings twice in a year, they are not conducted regularly. While GB meeting was conducted only in the beginning of the WUA, on an average only one EC meeting was conducted in a year. EC meets whenever the need arises. Participation in the meetings is very poor. And the issues discussed mainly pertain to crop or system development. Democratic decision-making is more or less absent in the canal systems. Important issues like fund collection and allocation are hardly discussed. Even on the simple issues decisions were made either by irrigation department or the Presidents themselves in majority of the cases. In the case of tank systems also the Presidents mainly took decisions, though democratic process was adopted in some instances. And the role of department is marginal in the tank systems when compared to canal systems. Nevertheless, in most cases farmers expressed that the decisions taken in the meetings were implemented.

When enquired about the functioning of the WUA, the opinion of the sample farmers was divided. In the case of canal systems middle and tail farmers are more satisfied

than their counter parts in the head reaches. In comparison, tank WUAs seem to be faring better in satisfying their members. In the case of tanks, head and tail reach farmers are more satisfied than those in the middle reaches. Political interference appears to be the dominant reason for the member dis-satisfaction, especially in the canal systems. On the contrary more people are happy about the performance of the previous president in both the cases and across the locations. This indicates the unanimous selection process of the Presidents is not very faulty. The difference of opinion between the WUA and president's performance could be more due to the institutional aspects, like devolution of powers. In the absence of relevant powers the functioning of WUA functioning cannot be satisfactory. Here also sample farmers have indicated that WUA powers are limited to conducting meetings and development of irrigation channels. There are disputes among WUA members of canal systems regarding works carried out and distribution of water. Greater number of disputes was reported in the middle reaches when compared to head and tail reaches. And irrigation department plays an important role in solving the disputes. This indicates that the involvement and influence of the department has not declined. Interestingly, majority of the farmers do not have any suggestion for improving the performance of the WUAs, though some of them expressed the need for cooperation among the farmers. This clearly reflects the poor awareness and commitment of the farmers, indicating weak institutional structure in terms of social capital.

Lack of commitment and ownership also comes out clearly from the farmer's involvement in the maintenance of the systems. Farmer's involvement is limited to participation in elections, attending general body meetings (conducted only once) and to some extent water distribution. Their involvement in the important works like rehabilitation and resettlement and joint assessment survey is found to be marginal. In the case canal systems, less than 20 per cent of the farmers contributed to the maintenance works, either in cash or kind. Interestingly, more people contributed in the head reaches when compared to middle and tail reaches though the differences are marginal. More farmers contributed in the case of tanks. The reasons for lack of contribution are: a) no demand, b) lack of money and c) nobody were contributing. As per their opinion on the maintenance works, majority of them is not satisfied, especially in the case of canal systems. However, maintenance works appear to be satisfactory in majority of the cases in tail reaches. This is true in the cases of canal and tank systems. Despite the low satisfaction levels majority of the farmers indicated that they are getting sufficient water in canal systems. However, majority of the farmers in the tank WUAs are not getting sufficient water. Differences between the locations indicate that water availability in the tail ends is not satisfactory.

Low availability of water in the tail reaches is also reflected in the quality of works carried out. Over all less than a quarter of the works are observed to be of good

quality in the case of canal systems, while it is more than 60 per cent in the case of tank WUAs. The quality of works decline as we move from head to tail reaches. However, the better quality works in the tank WUAs is not translated into improved irrigation facility. This could be due to the absence of tank renovation and the absence of sufficient water storage facility. In the case of canal tail reaches substantial number of farmers (37 per cent) has reported improved irrigation facility. But, the impact on equity in the distribution of water is marginal. Political interference appears to be the major demerit of the WUAs, especially in the canal systems. One important indicator of social capital development is capacity building at the local level. Here capacity building is measured in terms of training and exposure visits. Only a quarter of the sample farmers have reported the capacity building activities that too in the canal systems. Capacity building is less emphasized in the tank systems. In both canal and tank systems capacity building is concentrated in the head reaches. The major activity in capacity building is better water management practices.

It is clear from the analysis that the performance of WUAs is not up to the mark. But, due to the improvements in the distributory systems and better availability of water there is bound to be some impact on irrigation and related indicators. However, the unprecedented drought situation and shortage of water even in major systems like Nagarjunasagar has left the farmers high and dry for two years i.e., 2002-03 and 2003-04. This factor needs to be taken into account while assessing the impact of WUAs. Keeping this in view we have assessed the impact between 1997-98 and 2001-02, though we have collected the data till 2002-03.

Assessing the impact of any particular programme or initiative is complex. Better water delivery / distribution is assumed to be an important indicator of the efficient functioning of any WUA. Water delivery performance can be estimated on the basis of area irrigated, number of waterings and crop productivity (here paddy, the main irrigated crop). Between 1997-98 and 2001-02 there was an increase in average area irrigated of the sample households in the canal systems. But, tank WUAs had recorded a sharp decline. The analysis indicated that there are differences in the number of waterings required and actual number of waterings for Paddy, a water intensive crop. The difference between different reaches under tank WUAs is much more when compared to canal WUAs.

While the quantitative (area) impact is more in the middle and tail reaches, qualitative impact appears to be more in the middle and head reaches. Qualitative impact is observed in terms of improved productivity of paddy. Canal systems in all the locations have experienced increased productivity of paddy, while tank WUAs have experienced negative growth. Within the canal systems the rate of change is higher in the middle reaches followed by head and tail reaches. Middle reaches appear to have benefited most in quantitative and qualitative terms. However, this may not be

directly attributable to the WUAs, as the productivity changes could be due to various reasons. The cost-returns data indicates that returns to agriculture are positive (on operational cost) in majority of the cases in all the locations.

Farmers are positive about the benefits from the new institutional arrangements, though the benefits appear to be more in quality terms. On the other hand, the benefits are limited to improved water availability in the canal systems only and failed to make any dent in the case of tank systems. Even in the canal systems the benefits are strictly limited to water availability and failed in addressing other important and related aspects of water logging, salinity, drinking water, etc (environmental issues). Though these positive benefits are an incentive for collective action, the magnitude of the benefit is too small to sustain the collective action in the long run. This is mainly due to the failure of the initiative to create and strengthen the social capital that would have helped in taking the initiative forward. In fact, very little is done in this regard. Poor awareness, marginal commitment and low involvement of the primary stakeholders even after 5 years of the initiative talks volumes and questions the seriousness and commitment of the implementers. In the absence of devolution of powers to the WUAs, people consider it as one of those government programmes and runs only with government funds. There were no serious attempts to involve the primary stakeholders in terms of their share in contributions and decision-making process. Farmers felt that WUAs have only limited powers and hence the continuation of the initiative is linked to the fund flows. All the important activities like assessment, fee collection and fund allocations are with irrigation or revenue department leaving little in the hands of WUAs. The nexus between political and department people has further alienated the farmers.

#### **IV Conclusions and Implications**

The Maintenance and management of irrigation systems through user societies and participatory process is expected to bring in efficient and equal distribution of water resources. But such processes often remained at a micro level as good examples are often found to be difficult to replicate. The State of Andhra Pradesh has, however, shown the way to scaling up of participatory irrigation management through formalising the irrigation institutions. The most interesting feature of these reforms is that they are 'top down' with a 'bottom up' approach. It has the advantage of greater reach (possible under 'top down') and intensity through involvement of the community (possible under 'bottom up'). These reforms under the guidance of some committed officials at the State level have taken off in good spirit and received good support at the farmer level. Though one may argue that flow of funds is the main factor in generating such response, it is necessary to support the ailing systems in order to generate trust among beneficiaries. For, over the years, farmers have lost the trust in the government and are in no position to respond to the false promises.

Therefore, the initial boost was necessary to regain the lost credibility and build the trust. Once this is in place, institutional reforms from the top become smooth and easier. But it is necessary to understand the direction in which the reforms are progressing. This direction would ultimately determine the strength and sustainability of the reforms.

While substantial amounts of money was spent on the reform process, the money was used mainly for the improving the ailing irrigation systems rather than making an effort to transfer the irrigation management to farmers. Our study clearly brought out the lopsided approach of the reforms. The main lacuna in the reforms is at two levels: a) conceptual or formulation level, and b) implementation level. At the formulation level, tank and canal systems are treated as similar in fund allocations. While the degenerated tanks needed more allocation for rehabilitation, the allocations under WUA were based on the command area. This has led to under funding and resulted in little improvement in the systems *per se* and availability of water. For, unless water storage of the tanks is improved there is no gain in improving the distribution systems. Our analyses clearly brought out that there is hardly any improvement in the tank systems. As per the official estimates about 69 per cent of the tanks in the State are in disuse. And farmers are asking for more funds / works pertaining to tank deepening and strengthening the bunds. Another issue in this regard is that groundwater resources, the single largest source of irrigation, are completely left out of the purview of the WUAs. That is irrigation reforms are neither comprehensive nor followed an integrated water resource management approach. Though it would be extremely difficult to bring groundwater under the purview of WUAs, it is necessary given the magnitude and importance of the resource. Moreover, the inter-linkages between tank and groundwater resources call for treating these two resources as complementary rather than substitutes. The irrigation reform process is placed under the ministry of major and medium irrigation, showing an inherent bias against minor irrigation.

At the implementation level, an important aspect revealed in the present study is the 'elite capture' of the WUAs. As in the case of most of the parallel institutions initiated in AP, forward castes and large farmers are occupying the position of president disproportionate to their actual populations. This is mainly due to the reason that they are loosing their positions in the constitutional bodies of PRIs due reservations. Moreover, parallel institutions are financially stronger when compared to PRIs. All the rights in WUAs are given to land owning and tenant cultivators to the neglect of land less and other water users such as land less women, fishermen, etc. This denies equitable access to a common pool resource. As a result, the huge public investments in this sector benefit only a section of the community, though in majority. Equal distribution of water rights is seen as vital for sustaining water institutions. One of the recent demands is to make women participation mandatory in the WUAs.

One of the main ideas of initiating parallel institutions in AP, by passing PRIs is that these institutions would be apolitical and focus on delivery. But, the emphasis on elections has resulted in the fight between parties to capture the power, which makes people insensitive to common good. Besides, the WUA election is one among the five / seven such committees electing their office bearers every five years. Party politics have already made a dent in the village unity. The frequent elections to the newly created institutions would aggravate the situation. The indications are already there, especially in the case of watershed committees. Though it is a healthy democratic process, it goes against the basic philosophy of participatory development and management. Moreover, these institutions are providing backdoor entry to the power mongering elite, which lost power due to constitutional obligations. These institutions in their present form tend to dilute the social capital rather than strengthening it.

The irrigation reforms in AP, through external funding, have provided an opportunity to revive and strengthen the ailing irrigation systems. The improved systems are expected to enhance the credibility of the department in providing assured water supplies, a precondition for increased water tariff. The funding is expected to help in building the necessary social capital for sustaining the reform process. Strengthening the social capital is a prerequisite for the reforms that aim at transferring irrigation management to farmers. Reforms also focus on financial sustainability through price reforms. Though water rates were increased initially by 3 times, they are still short of O&M expenditure. Moreover, increased prices are not translated into revenues due to weak institutional structures. Though user contribution of 15 per cent is imbibed in the PIM act there is no evidence of any contribution from farmers, as revealed in the study. In fact, there are no efforts to collect this contribution. The main reason, as revealed in the present study, is that little effort is made in the direction of strengthening the institutional structures. It is clearly brought out in our analysis that awareness is low, primary stakeholders involvement in the process of management is low, commitment and contribution to the cause are lacking. This is mainly due to the fact that irrigation department is not willing to devolve powers. All the major activities are still carried out by irrigation and revenue departments, leaving only the responsibilities of water management to the WUAs. This is not done even after five years of WUAs, though devolution of powers pertaining to assessment, fee collection and fund allocations are in the main agenda of reforms. Reform process would have been more meaningful if it had moved towards devolution of powers to farmers instead of tinkering with the election process. The only development in five years is to share the 50 per cent of water fee with the WUA. This makes the WUAs more dependent on the department funds, as the assessment is still carried out by the irrigation department and the revenue department collects fee. The result, as observed by an official, “even for small works of canal clearing, which they used to do on their own prior to the WUA,

farmers are asking for funds from the department”. This clearly indicates that irrigation reforms are also seen as one of the many government programmes. And there is no commitment or sense of ownership among the farmers. Interestingly, they are becoming a political lobby group and demanding their political and financial share.

#### *Strengthening of irrigation institutions*

Our study clearly brings out that the major benefit from the formal WUAs is improved irrigation facility, quantitatively as well as qualitatively. Though some benefits in terms of increased area under irrigation in canal systems and improved quality of irrigation is evident, the sustainability of these benefits is rather uncertain in the absence of efficient institutional structures. While it appears that an opportunity to build stronger and sustainable irrigation institutions is floundered, the opportunity is not totally lost, as the WUAs are still in place. There is greater need to strengthen them in terms of people’s participation and involvement. The immediate need is to increase the awareness about the WUAs and the advantages of these institutions. Based on the comparative analysis of formal and informal WUAs some pointers for strengthening and sustaining this important policy initiative are presented below.

Our study indicated that informal or socially embedded institutions are more effective than the formal WUAs. The reason being that informal institutions reflect commitment and cohesion, as it is evolved from within the system. More importantly, it is flexible in adapting to the changing situations. On the other hand, formal institutions are rigid and rule bound. In the present case the president of WUA was nominated from a smaller village, which received irrigation from another channel. As a result, the president of WUA was least interested in the distributary that served the other villages. This has diluted the interests of the farmers to participate in the WUA activities. In fact, farmers demand the split of WUA in order to serve their interests. This raises the question of viability of the size of WUAs. In the case of informal institutions, equity in water distribution is taken care of through rotational systems. Independent third party supervision mechanisms are in place to safeguard the effectiveness of the system. Proper incentive and disincentive structures were designed to support rule compliance. No such systems are present in the case of formal WUAs. Under the present circumstances, the WUAs cannot guarantee equity, especially under scarcity conditions. Why should everybody co-operate for the benefit of the few? In fact, the formal WUAs have no powers to do anything in this regard.

Self-sufficiency and resource strength is central to the sustainability of the institutions. The formal institutions are yet to generate their own funds, while informal ones have succeeded in generating surplus funds. Lack of proper devolution of powers to local level is hindering the progress in this direction. Transfer of powers

and responsibilities to the WUAs at the minor level should be done effectively though in a phased manner. Only under such circumstances innovations at the community level would become possible. Hitherto, the WUAs are entrusted with responsibilities without any rights.

The main reason for the ineffectiveness of the formal WUAs is that lack of co-operation and interest among the farmers. This is mainly attributed to, apart from the above reasons, low economic incentive. It appears that institutions would be effective if the economic gains are substantial. Though this may be a typical case, economic gains from canal irrigation are low due to the reason that the prices of alternative sources such as groundwater or complementary inputs like electricity do not reflect their scarcity values. Reforms should initiate the process to convert all forms of water into an economic good through introduction of cost-based pricing as per volume and use (priority). This would help in realising the relative importance of each source of water. This calls for an integrated approach towards water resources planning and management. In this context, bringing groundwater under the purview of WUAs would go a long way.

However, lack of interest among farmers in the WUA activities need not be taken as an indication of failure of WUAs. Attempts should be made to understand the reasons behind such apathy. Our study indicates that the farmers are not against the concept of WUA. On the other hand, their awareness about the WUA is rather low. Therefore, efforts should be made to increase the awareness of the farmers about the benefits of WUA. Devolution of powers to the local level and making the WUA structure more flexible would go a long way in addressing the awareness problem. Further, there is need for exploring the possibility of integrating the Panchayati Raj institutions into the reform process for sustaining the reforms in the long run. For, these local bodies are totally bypassed by the new initiatives. But, there are indications that there is a move in the opposite direction.

## CHAPTER I

### INTRODUCTION

#### I Background

Judicious management of water resources is among the critical policy issues across the continents. The need for action in this direction is growing, as countries and communities across the globe are increasingly experiencing water stress in various contexts. Water stress often leads to civil strife and conflict. The conflicts could be traced from micro level to global level. The conflicts range from killing of own brother over irrigation water, district officials coming to blows for a share in canal water (AP), to the inter-State water dispute between Tamilnadu and Karnataka (Cauvery) or the *Paragodu* controversy between Andhra Pradesh and Karnataka, and the very recent controversy between Punjab and Haryana relating to Satluz. At the global level, while water conflicts are well known in the Middle East, sharing of river waters between India and Bangladesh poses a potential conflict situation. These conflicts are expected to be more frequent in future due to the increasing pressure on the resource. Increasing inter-sectoral competition between agriculture and other users (i.e., drinking water, industry) is adding to the complexity of managing both surface and groundwater resources. These conflicts represent culmination of gross neglect and miss-management of water resources over the years. For, the problem is not due to absolute shortage of water, but due to the absence of proper mechanisms for conservation, distribution and efficient use.

Irrigation development and management assumes paramount importance in the situation marked by water stress and in the agrarian economies like India. In these economies irrigation consumes more than 70 per cent of the water utilised and continue to face shortages in quality as well as quantity terms. Water scarcity is resulting in regional inequalities and political turmoil. Though genuine natural or environmental factors explain such a division, policy induced ill management of water is at the core of the water stress and conflicts. In order to improve the management practices various policy measures such as institutional approaches and market mechanisms are suggested<sup>1</sup>.

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<sup>1</sup> There is an overlap between institutions and markets as water markets are also institutions. Here, market mechanisms mean pricing and other instruments like, property rights and public-private partnerships rather than water markets per se.

Water security means that “people and communities have reliable and adequate access to water to meet their different needs, present as well as in future, are able to take advantage of the different opportunities that water resources present, are protected from water related hazards and have fair recourse where conflicts over water arise” (Soussan, 2002). Such water security ensures equity and sustainability. In the context of scarcity allocation of water should be governed by optimality rather than productivity alone. For, optimality combines economic as well as social benefits. Water security is an important concept for addressing inter and intra regional as well as inter household inequalities in growth and development and sustaining the ecological balance. In the fragile resource regions environmental degradation is seen as a cause of household food insecurity as a consequence of water insecurity. In other words, food security is linked to water security through environmental degradation in these regions (Reddy, 2003).

Despite ever increasing budget allocations towards major and medium irrigation, funds utilised for operation and maintenance (O & M) are inadequate resulting in poor maintenance of the systems, unsatisfactory service and ecological problems. While the tail-end regions are facing severe water shortages due to poor maintenance of distributory systems, head reaches are having water logging and salinity problems due to poor drainage facilities. The vicious circle of lower allocations to O & M, poor service, declining area under irrigation, low yields and incomes, low recovery of irrigation charges and low allocation is common in all the Indian States (Raju et al., 1999). It is often argued that participatory institutional approach is effective in addressing the issues at hand. Often these impressions are based on small-scale experiments managed by committed non-governmental organisations (NGOs), but are found to be difficult and costly to replicate. An alternative lies in scaling up of the institutional arrangements by formalising the institutions through the State legislation.

During the second half of 1990s number of States in India have transferred the irrigation management responsibilities to Water User Associations (WUA) or private/ NGO contractors (see chapter II). The initiative has come mainly from the government. In most of the cases, full transfer of powers has taken place as far as responsibilities are concerned (O&M; water distribution, fee collection, etc), while only partial transfer has taken place in the case of assessment, assured water supply, etc. However, the effectiveness of these institutional arrangements needs to be assessed. While some of the early studies indicate the positive aspects of the WUAs, most of them raise questions on the sustainability of the programme once the external funding dries up (Deshpande, 2003; Van Koppen, Parthasarathy and Safiliou, 2002; Meinzen-Dick, Raju, 2000; Jairath, 1999; Brewer, et. al., 1999; Naik and Kalro, 1998). However, most of these studies are narrow in their focus i.e., studying the impact of one or two successful WUAs or pertain to the initial phase of their implementation limiting their scope to economic impact.

This study is an attempt to provide a comprehensive view on the status and management of water resources in the State of Andhra Pradesh with special focus on water user associations. Our aim here is to critically examine their innovation and sustainability with a view to explore the possibilities for replication else where in the county. The specific objectives of the study include:

- a. to arrive at a comprehensive assessment of the Water User Association (WUA) legislation and examine its feasibility and practicability in terms of implementation,
- b. to examine the political economy aspects of the implementation of WUAs,
- c. to evaluate the economic significance of WUAs across regions and irrigation systems,
- d. to understand the social and institutional dynamics in the working of WUAs, and
- e. to examine the policy environment facilitating the effective functioning of the institutional mechanisms and their sustainability in the long run.

The State of Andhra Pradesh (A P) provides a good backdrop for the study. Andhra Pradesh perhaps is the first State in the country to recognize the importance of institutional factors in water conservation and management. To that effect the State Government has brought in a legislation making Water User Associations (WUAs) mandatory for managing irrigation water in 1996. All the major, medium and minor irrigation projects in the State are brought under the purview of the legislation on WUAs covering both canal and tank irrigated areas. So far about 10,000 water user associations have been formed with the involvement of local people. The scale and the approach of these programmes have been unprecedented in the country. The success of these programmes will rewrite the path of development policy. A more detailed account on the WUAs in AP is presented in the next section.

## **II Setting**

The A. P. Farmers' Management of Irrigation Systems Act was enacted in 1997. Following this, elections were conducted in June 1997 to WUAs for all major, medium and minor schemes. In November 1997, elections to the distributory committees were also completed. It was proposed (1997) that project level committees would also be constituted soon in order to effect total transfer of management to the farmers' organisations. The main objectives of the WUAs act include: i) realising the maximum irrigation potential, ii) ensuring equitable and reliable supplies, iii) improving the efficiency of the existing irrigation network, and iv) managing water resources better through stakeholder participation and withdraw the department from O & M. Under this act, upto March 2000, 10,292 WUAs have been registered (Table 1.1). Of these, elections for 9,800 WUAs

elections were conducted and these WUAs were formalised by March 2000. Elections were not conducted in 492 WUAs for various reasons such as stay orders from court or the government. Interestingly, elections were unanimous in majority of the cases (Jairath, 2001). Elections for the second term were conducted during 2003, though not in all the WUAs. Second term elections were conducted in all but nine districts and in about 4,564 out of the total 10,790 WUAs. Elections were postponed in nine districts<sup>2</sup>. The main reason given was that there was no water in the canals, especially in the Nagarjuna Sagar command area. About 80 percent of these WUAs are in minor systems. The evolution of water user associations is mainly facilitated by the A. P. Economic restructuring project (irrigation component) funded (Rs.4,994 crores) mainly by World Bank, NABARD and through the Accelerated Irrigation Benefit Programme (AIBP) of Government of India.

### *Institutional Structure*<sup>3</sup>

As per the act all the surface irrigation schemes, major, medium and minor, are covered under the programme. Only the schemes under the *Panchayati Raj* institutions and all minor water bodies in the scheduled areas of Andhra Pradesh are not covered. Command area of the project has been delineated on hydraulic basis that was administratively and functionally viable. Each farmer's organisation was expected to have even number of territorial constituencies or committees (TC) within the WUA. Area covered by each constituency depends on the nature of the project and size of the command area. It ranges between 150 and 250 hectares in the case of major and medium projects and between less than 50 and 200 hectares in the case of minor irrigation projects. Each TC will have an area between 250 and 600 hectares. The area under the WUA ranges from 250 to 3500 hectares. The area will be much less in the case of minor systems. Depending on the type of irrigation scheme, one to three tier systems of associations / committees will be in place. Each Assistant Engineer will be in-charge for a maximum area of 4445 ha and four to five times of this area would be under a Deputy Engineer. The basic structure of the PIM is presented in Figure 1.

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<sup>2</sup> These districts include Anantapur, Cuddapah, Guntur, Khammam, Krishna, Kurnool, Nalgonda, Nellore and Prakasam. Besides, elections for 22 WUAs in West Godavari and 11 WUAs in Chittoor are with held.

<sup>3</sup> For more details see Pangare (2002); Jairath (2001) and Raju (2000).

Table 1.1: District / Sector Wise WUAs (as on 23/03/2000)

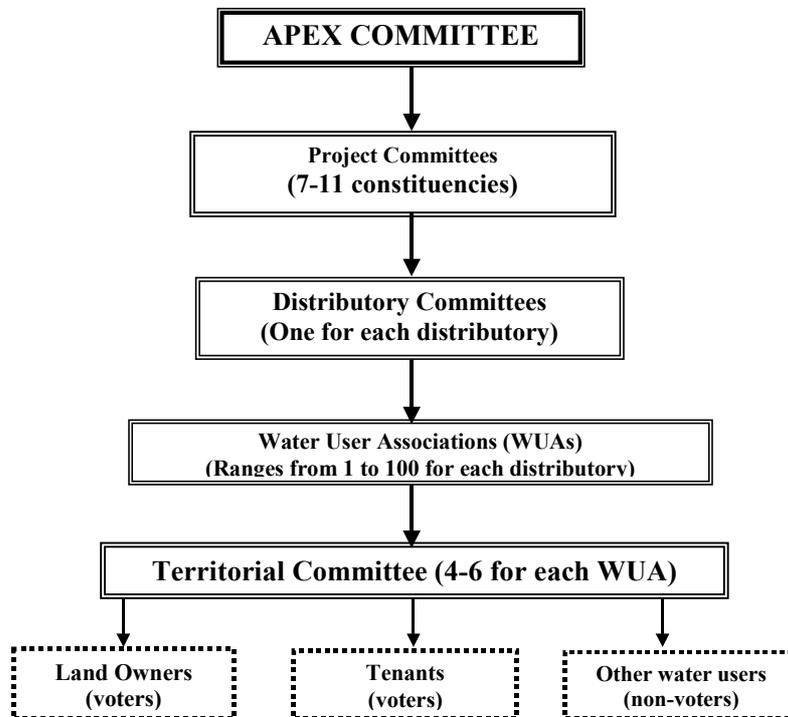
Name of the District	Total No. of WUAs Notified			Total Notified (2+3+4)	Elections conducted			Total (6+7+8)	Elections to be held (10)	Total No. of WUAs (9+10)
	Major	Medium	Minor		Major	Medium	Minor			
(1)										
Adilabad*	35	27	221	283	35	27	212	274	9	283
Anantapur	46	7	305	358	46	4	302	355	3	358
Chittoor	0	51	644	695	0	48	616	664	31	695
Cuddapah	74	8	276	358	74	8	259	341	17	358
E. Godavari #	106	12	225	343	106	12	215	333	10	343
Guntur	245	8	81	334	239	8	76	323	11	334
Karimnagar	249	10	586	845	849	10	571	830	15	845
Khammam	51	5	181	237	50	5	180	235	2	237
Krishna	189	12	288	489	166	12	256	434	55	489
Kurnool	116	12	153	281	114	12	145	271	10	281
Mahabubnagar	21	31	478	530	21	29	473	523	7	530
Medak	0	12	585	597	0	12	551	563	34	597
Nalgonda	91	45	541	677	91	44	541	678	1	677
Nellore	110	58	695	863	100	57	612	769	94	863
Nizamabad ^	78	13	267	358	78	13	228	319	39	358
Prakasam	124	5	317	446	113	4	291	408	38	446
Rangareddy	0	3	165	168	0	2	165	167	1	168
Srikakulam	37	28	459	524	37	28	442	507	17	524
Visakhapatnam**	28	18	375	421	28	18	369	415	6	421
Vizianagaram	0	22	439	461	0	21	422	443	18	461
Warangal	29	18	683	730	28	18	623	669	61	730
W. Godavari	71	6	217	294	70	6	205	281	13	294
<b>Total</b>	<b>1700</b>	<b>411</b>	<b>8181</b>	<b>10292</b>	<b>1645</b>	<b>401</b>	<b>7754</b>	<b>9800</b>	<b>492</b>	<b>10292</b>

Notes: \*Includes 9 WUAs under Vattivagu & Chelamalavagu. \*\*Includes Tandava (Part only)

#Includes 12 WUAs under Tandava. ^Includes 7 WUAs under Koulsanala., conduct of elections signifies completion of the formalities of WUAs. Source: Department of irrigation, Govt. of Andhra Pradesh.

Water User Associations are the primary structures of irrigation water users. Number of WUAs under each scheme depends on the size of the irrigation scheme, which ranges from one to a few hundreds of WUAs across the schemes. The main role of WUAs is to regulate and distribute water within its command area. The total command area will be divided into 4-10 Water User (WU) constituencies. Each WU constituency will elect a member of the WUAs managing committee and directly elect the president of the WUA. All the landholders, title holders as well as tenants, within localised / authorised area are members of the WUAs with voting rights. All other water users will be co-opted members without voting rights. A group of WUAs under a distributory or a small group of distributaries comprises a distributory committee (DC), which will look after the distributory related issues. All the WUA Presidents are members of the DC and they elect the managing committee and the president of the DC. All the DC Presidents will be members of the project committees (PC). PCs are in-charge of the entire project command area, which is often divided in to 7-11 constituencies. The members of the PC will elect the president and 7-11 managing committee members from each constituency. Above all, an apex committee headed by the minister for major and medium projects shall be constituted to formulate broad policy guidelines and to resolve disputes.

**Figure 1**  
**Structure of the Participatory Irrigation Management in Andhra Pradesh**



The election procedure of the WUAs has been changed during 2003. According to the new procedure: There are twelve territorial WU constituencies in each of the Water User Association of Major and medium irrigation systems and six in the case of minor irrigation systems. Every WUAs shall consist of the following members:

- All the water users who are land holders in water users area,
- All other water users co-opted in a water user area
- Members specified in above shall constitute the general body for a Water Users Association
- A person eligible to become a member of more than one territorial constituency of a water users association under above shall be entitled to be a member of only one territorial constituency and he/she shall exercise his/her option of membership.
- Members specified in above shall alone have the right to vote

There shall be a managing committee for each Water Users Association, comprising members of the territorial constituencies elected directly by the water users from their respective territorial constituencies. The managing committee for water users association shall be a continuous body, with one third of its members retiring every two years. The term of the office of the members of the territorial constituencies is expected to be six years from the date of first meeting of the managing committee (Provided that at the first election, all the territorial constituency members shall be elected at one time, out of which, one third of the members thereof shall retire as soon as may be on the completion of two years, another one third members are expected to retire after completion of four years, and the remaining one third shall retire after completion of six years in office and their terms of retirement shall be decided by drawl of lots).

An ordinary election is expected to be held for the purpose of constituting water users associations in major, medium and minor irrigation systems. The election of territorial constituency members, President and the vice-president of the water users association may be either through raising of hands or through voting slips. The election officer shall ascertain the opinion of the voters present in respect of their choice of electing the president whether by rising of hands or through voting slips. The election officer shall follow one of the above two methods as agreed upon by the majority of the voters present. The president and the vice-president of the managing committee of water users association shall, if not recalled or removed or disqualified by the provisions of the Act, be in office for a period of two years from the date of election or his tenure as member of territorial constituency, which ever is earlier.

Functions of these bodies include preparation of operational plans at the beginning of each season, maintain an inventory of irrigation systems such as tanks, ponds, wells, etc., within the command area, maintenance of records, plan and execute the distributory and drainage systems maintenance, water budgeting, resource mobilisation, conflict resolution, etc. One interesting feature of the WUAs is the right to recall the president if his functioning is not satisfactory. The general body can remove him with one-third majority. However, the institutional structure misses out on some important aspects that are necessary for the success and sustainability of the institutions. There is an in-built bias against minor irrigation, as the minister for major and medium irrigation is heading the apex committee though there is separate ministry for minor irrigation. The apex committee provides the broad policy frame and hence it is but natural to favour major irrigation. This may reflect in the performance of the WUAs in the two sectors. All the rights in WUAs are given to land owning and tenant cultivators to the neglect of land less and other water users such as land less women, fishermen, etc. This denies equitable access to a common pool resource. As a result, the huge public investments in this sector benefit only a section of the community, though in a majority. Equal distribution of water rights is seen as vital for sustaining water institutions (Deshpande and Reddy, 1990).

### ***Financial Aspects***

The whole process is funded through external funding. Under the Andhra Pradesh Economic Restructuring Programme each WUAs and DC got Rs. 50 per acre during the first year (1998-99) and Rs. 100 per acre in the second year (1999-00). Of this, WUAs at the minor level get 60 per cent, DC gets 20 per cent and PC gets 20 per cent share. Though the allocations look small on per acre basis, at the aggregate level, this could be any where between Rs. 50,000 to 8,00,000 per WUA in the canal commands. Where as in the case of tank WUAs, the amount would be below Rs. 5000 per WUA in majority of the cases. During the year 1998-99 Rs. 1070 million were spent of which Rs. 1030 million were spent just in 45 days. This has led to rent-seeking attitude at the department level as every bill has to be passed by the accounts officer before going to the WUA. Besides, every year WUAs in the major canal commands receive Rs. 200 per acre (Rs.100 per acre for WUA and Rs. 100 per acre for the DC). Under this during 1999-2000 Krishna delta got Rs. 123.6 million; Nagarjuna Sagar left canal Rs. 60 million; medium projects got Rs. 3 million; and minor projects got Rs. 10.4 million (Raju, 2000). Moreover, in the canal WUAs entire money is spent on repairing the distributory network while in the case of tank WUAs tanks as well as the distributaries requiring more investment for restoration. Present funding when compared to the actual requirement for tank restoration is grossly inadequate (see later section). This clearly reflects the bias in favour of canal WUAs.

As indicated earlier the PIM programme is entirely funded by external sources. Though user contribution of 15 per cent is imbibed in the PIM act there is no evidence of any contribution from farmers so far. In fact, there are no efforts to collect this contribution. However, it is expected that WUAs would become self-sufficient over time through hike in water rates coupled with better recovery. As a first step water rates were raised by 3 times during 1996-97 (Table 1.2). After the revision, it was reported, water fee collection has increased by 9 per cent from 54 per cent to 65 per cent during 1997-98 (Raju, 2000). But, this is not reflected in any way in the budget figures during or after the year 1997-98 (Reddy, 2003). Such idiosyncrasies could be due to the absence of devolution of powers to the WUA level. As per the act, WUAs are expected to become self sufficient in managing their affairs. They are expected to assess the command area and collect the water cess. Since the entire fee is retained at WUA, DC, PC and local body level there is no incentive for under reporting of area. The proposed revenue sharing pattern is presented in Table 1.3. The first step in this direction was initiated during the year (2001-2002) though the approach is cautious. Initially, the plan was to plough back 50 percent of the revenue collected to WUAs (25 per cent) and DCs (25 per cent). But, irrigation department is still carrying out the collection of water charges. The impact of this new system is yet to reflect in the data. However, it is a long way before the devolution of financial power takes place. Till then the PIM in Andhra Pradesh would have to sustain, which is the main focus of this study.

**Table 1.2: Revised Water Rates for Different Crop Categories**

Crop Category	Type of source wise water rates per acre in Rs.			
	Category I		Category II	
	Old	New	Old	New
1. First / Single wet crop	60	200	40	100
2. 2 <sup>nd</sup> and 3 <sup>rd</sup> wet crop	60	150	40	100
3. 1 <sup>st</sup> crop irrigated dry	40	100	20	60
4. 2 <sup>nd</sup> and 3 <sup>rd</sup> irrigated dry crop	40	100	20	60
5. Two-season crops per year	120	350	80	350
6. Aquaculture per year	00	500	00	500

Note: old rates with effect from July 1986 and the new rates from July 1996.

Source: APERP Project Implementation Plan, 1998.

**Table 1.3: Proposed Revenue Sharing Pattern Among the PIM Structures (Per cent of total)**

Level	Major	Medium	Minor
Water User Association (WUA)	50	60	90
Distributory Committee (DC)	20	30	—
Project Committee (PC)	20	—	—
Local Government	10	10	10

### III Framework and Approach

Collective action framework is the most appropriate to study and understand the Common Pool Resources (CPRs) situations. Several authors have documented the case studies of CPRs and other rural institutions. Different approaches are used to explain various institutional arrangements existing in rural areas. These approaches include: property rights approach, game theoretic approach, transaction costs and limited information approach of new institutional economics. Property rights approach focuses on different institutional arrangements- ranging from private property rights to common property rights. The property rights school argues that private property rights, rather than community property rights, would result in an efficient allocation of resources and their management, while there is enough empirical evidence to support the contrary. The game theoretic approach emphasizes understanding the individual's behaviors and the strategies followed in various CPR situations. The new institutional economics, unlike neo-classical economics, treats institutions as central to development process and explain their growth and efficiency in terms of transaction costs. However, none of these approaches on own seem to explain the diverse CPR situations characterized by the complex attributes of collective action in developing economies like India. The main bottleneck of these approaches is their emphasis on individual rationality while CPR management is based on collective action. Recent attempts to provide a theoretical framework for collective action have tried to draw support from various disciplines and put it under the framework of Institutional Analysis and Development (IAD) (Ostrom, Gardner and Walker, 1994; Bromley, 1992; Ostrom, 1990). This approach is comprehensive and, in fact, fairly successful in explaining the success stories of collective action situation and has led to a shift in focus away from the so-called "tragedy of the commons". However, given the limited number of successful cases compared to failures makes it a specific rather than a general framework. More importantly, though it explains the institutional sustainability part very well, its applicability is limited as far as institutional innovation and changes are concerned. The latter are equally important, if not more, for understanding institutional success and failure in CPR management.

Number of studies tried to explain the causes of poor performance of WUAs through identifying the factors that characterise successful WUAs (for a detailed review of studies see Meizen-Dick, 1997). These studies identify, among other factors, social capital, group size, homogeneity, leadership, operational rules, etc., as important factors in explaining the success stories. The existing theories of collective action are based on these success stories. Moreover, they have not helped much in formulating policies for effective participatory irrigation management (PIM). It is observed: “currently dominant institutional-economic models fail to grasp the cultural specifics of irrigation as social practice and are a poor guide to the meanings and motivations of local institutional development” (Mosse, 2003, p.287). While the evolution of PIM may depend on policy support and external funding, its sustainability critically hinges on the effective support from the political networks and irrigation bureaucracy. “PIM cannot become a reality nor it become self sustaining without restructuring of the State irrigation departments. However, the irrigation bureaucracy is unlikely to initiate such change. The record of last 20 years standing against it.” (Singh, 2000, p.698). Historically WUAs are political institutions (Mosse, 2003). Local leaders compete for control over these institutions, as these new institutions tend to become financially stronger. The situations do not vary much between resources (irrigation or watershed development) or locations (Tamilnadu or Andhra Pradesh) (Mosse, 2003; Reddy, 2003). As Bardhan (2004) puts it “In most poor countries, there are massive costs of collective action in building new economic institutions and political coalitions, and in breaking the deadlock of incumbent interests threatened by new technologies” (p.481). Therefore, evolving, sustaining and replicating WUAs or PIM is not easy given the socio-cultural and political dynamics in countries like India. The present study analyse the issues at hand in the collective action framework.

This study is carried out at theoretical as well as empirical levels. As a first step, a thorough review of literature on participatory development and collective action in the context natural resource management in general and irrigation in particular was carried out. This review is used as a background for drawing testable insights and hypotheses as a second step. Finally, the empirical analyses are used to verify the hypotheses and develop a more generalized and practicable framework for irrigation management.

At the empirical level, our approach is to study the problem extensively as well as intensively. At the extensive level a sample of 222 WUAs were selected from 22 districts (10 WUAs in each district) in the State (details are presented appendix table 1). A detailed WUA schedule was canvassed among these 222 WUAs in order to examine their structure and functioning. At the intensive level a sample of 6 WUAs representing the three agro-climate regions of the State viz., Coastal Andhra, Rayalaseema and Telangana regions were selected (Table 1.4). The selection was

purposive to cover the canal and tank systems, though the selection of districts was based on the concentration of WUAs in each category (canal and tank). From each WUA a sample of fifty farmers, representing head-middle-tail ends of the distributory systems and different socio-economic sections of the community was drawn using the probability proportionate sampling method for an in-depth survey. In all 300 farmers will be studied intensively using the survey method with the help of a detailed household level schedule. Prior to the sample survey Participatory Rural Appraisal (PRA) exercises were conducted in the sample villages in order to draw qualitative inferences about the village community. PRA was also helpful in designing the questionnaire. Besides, focus group interviews were held with the office bearers of the WUAs and irrigation department officials.

**Table 1.4: Details of Sample Selection of the WUA Households**

Region	District	Mandal	Name of the Village/ WUA	Source of Irrigation	No. of Households Selected by Location of their land			Total Number of Sample Households Selected
					Head	Middle	Tail	
Rayalaseema	Chittoor	Nagula-Palem	Rajula-Kandriga	Big Tank	15 (60)	20 (83)	15 (59)	50 (202)
		Nagari	Mangadu	Small Tank	10 (16)	17 (26)	23 (36)	50 (78)
Telangana	Nalgonda	Anumala	Ibrahim-patnam	Head Reach (Canal)	26 (198)	8 (61)	16 (121)	50 (380)
	Khammam	Pallipadu	Singaraya-Palem	Tail End (Canal)	10 (187)	12 (225)	28 (525)	50 (937)
Coastal Andhra	East-Godavari	Katreni-Kona	Pallem-kuru	Canal	14 (565)	18 (725)	18 (725)	50 (2015)
	Srikanthkulam	Laveru	Marupaka-II	Tank (Medium)	20 (56)	16 (45)	14 (39)	50 (140)

Note: Figures in brackets are the actual number of households in the respective category. Selection of Households within the Head reach, Middle and Tail end was based on the proportion of number of farmers in the respective location i.e., Head, Middle and Tail end to the total number of farmers in the respective WUA in the Village.

Figures in parentheses are total number of farmers in the respective WUA.

#### **IV Organisation of the Study**

This report is organized in six chapters. While the present chapter sets the background to the study, chapter two reviews the existing literature on irrigation management and reforms. Chapter three assesses the formation, structure and functioning of the WUAs in Andhra Pradesh at the macro level. The analysis here is based on the information collected at the WUA level. The household level data was analysed in an attempt to understand the primary stakeholders perspective on the reform process and presented in chapter four. Chapter five presents a comparative analysis of formal and informal institutions in irrigation management in A P. And the last chapter presents the concluding remarks and policy implications of the study.

## CHAPTER II

### Participatory Irrigation Management (PIM): An Analytical Review

#### I Introduction

Water is an enabling and critical resource for augmenting agricultural productivity and thereby overall economy. Realising the importance of this input, irrigation development policy has undergone striking changes across the globe during the last ten years. As Meinzen-Dick et al (1997) point out that the earlier approaches to irrigation development were based on the assumption that a combination of “correct” technology, “efficient” markets, and “capable” agencies (government departments) would yield best possible results. However, in most of the cases the combination of technology, markets and agencies proved to be a failure to provide effective irrigation services. It is difficult for these agencies to be omnipresent in dealing with the problems at micro level, as the irrigation systems have expanded enormously. Added to this, operation and maintenance costs of the irrigation structures increased manifold leading to escalating allocations and resulting fiscal crises in the State budget. Hence, if a system has to be made more effective, participation of the beneficiaries at the local level with necessary sense of ownership among themselves becomes a pre-requisite. One of the outcomes of the Earth Summit held in Rio de Janeiro in 1992 was, that water should be treated as an economic good and its management should be decentralized. The summit also observed that farmers and other stakeholders should play an important role in the management of natural resources, including water (Keating, 1993). Increasingly, local management activities are being sought for global problems of food and for resource problems (Ostrom, 1990).

Participatory irrigation or irrigation management transfer, has become a widespread strategy in Asia, Africa, and Latin America. In more than 25 countries, governments are reducing their role and enhancing the role of primary stakeholders in irrigation management, and in turn reducing the expenditures on irrigation resulting in improvement in productivity and stabilizing the deteriorating irrigation systems. The overall experience has been varied and mixed, in the approach adopted in designing and implementing the reform, the extent of the reform, and the impacts of reform on the performance of irrigation system as well as on farmers. The driving force behind the reform is the need to reduce the government’s recurring expenditure on irrigation, improving the cost-efficiency of operation and maintenance (O & M), and increasing the productivity of irrigated agriculture. Early efforts to transfer

irrigation management from government to the farmers' organizations occurred in the USA, France, Colombia, and Taiwan during the period 1950s through the 1970s. However, irrigation management and transfer became a national strategy in most of the developing countries only in the 1980s and 1990s. World Bank's water Resource Management Policy (1993) also recognises user participation as a key element: "Participation is a process in which stakeholders influence policy formulation, alternative designs, investment choices, and management decisions affecting their communities and establish the necessary sense of ownership. As communities increase their participation in managing water resources, project selection, service delivery, and cost recovery are likely to be improved. Therefore, the Bank will encourage the participation of beneficiaries and affected parties in planning, designing, implementing and managing the projects it supports".

## **II Spread and Experience of PIM**

The International Irrigation Management Institute (IIMI) compiled information from several countries and found that efforts to induce 'participation and involvement of farmers' in agency controlled irrigation systems had failed as this concept was too weak. The report concludes that participation must go both ways i.e., government side as well as farmer side (Vermillion, 1991). A growing body of literature documents the role of farmers' organizations in irrigation management and agricultural development (Uphoff, 1986; Cernea, 1985; and Cernea and Meinzen-Dick, 1992). In an irrigation system, canals or branches physically convey water to farmer fields. But in a social system that ultimately determines how productively the water flowing through the irrigation system will be managed (Byrnes, 1992). These social systems may be traditional forms of farmer organization or more contemporary forms such as the Water Users' Association (WUA). For instance, in Indonesia, irrigation has been treated as a mix of engineering and sociology subjects; in Philippines, Mexico and Japan, it is being managed through a community initiative; and in USA, the water users are in a defined hydrological zone and have a formal association with an elected management, which arranges the needed technical professionals. In most of the countries, majority transfer units are subsections of main irrigation systems that are managed by farmer organizations while the main system continues to be managed by a government authority. Most of these transfer units in developed countries tend to be water users' associations that take over O & M responsibility directly. However, in some of the countries such as in some parts of India, USA, Mexico, Japan, and Taiwan, the farmer-elected bodies handle large-scale post-transfer governance. These countries have stronger legal systems and local institutions that are more capable of handling management at large scales of complexity. But most parts of Asia and Africa often lack legal powers of rights and ability to enforce rules. Most of the cases involve only partial transfer of control over irrigation O & M, especially for larger systems. The evidence on the benefits of these WUAs in various countries indicate: i) efficient water delivery

services to suit the local needs, ii) increase in the area irrigated and productivity, iii) reduced financial burden on the State, and iv) reduction in the adverse environmental effects.

There were also evidences relating to Asian countries showing that private irrigation from groundwater and surface water bodies is far more productive and financially viable compared to public irrigation systems (Shah et al, 1993, Lowdermilk et al 1994, Tang 1992, Lam et al 1993, Brown and Nooter, 1992). Vermillion (1996) observed that farmer management of public irrigation systems would enhance their performance and bring about wide-ranging socio-economic changes that would enable farmers to substantially improve farm income besides improving cost-effectiveness of operation and maintenance. Though global experience with irrigation management transfer is far from uniform especially in low-income societies, it is successful in Turkey, Mexico, USA, and New Zealand. Philippines, a pioneer in irrigation management transfer programme for the last 20 years, recorded significant improvement in performance of collecting irrigation charges. Irrigation management transfer has tended to be smooth, effortless and successful where average farm size is large and significant proportion of farmers in the command area are operating like a agri-businessman; strong and well developed forward backward linkages and the cost of self-managed irrigation was an insignificant part of the gross value of the product of farming. These conditions prevail in Mexico, Turkey, USA, and New Zealand. On the other hand, literature shows that management transfer tend to be successful where large number of farmers are possessing land less than 5 hectares and mostly growing commercial crops for the external market.

In the Indian context, there is no historical evidence of management of irrigation system by farmers alone. Chanakya, the author of Arthasasthra urged the rulers to assist the farmers in the construction of irrigation works besides extending various incentives. During the period 13<sup>th</sup> –16<sup>th</sup> century in the Vijayanagar empire (now part of Karnataka), a series of canals were built by rulers in which farmers participated voluntarily in the construction and maintenance though there were conflicts among the farmers. Similar is the case during the regime of Chola, now Tamilnadu (Joshi 1997). During the colonial period, irrigation was the exclusive responsibility of the civil engineering department because of certain historical conditions. The profits were conceived, executed, and managed as top-down engineering projects (Stone, 1984). In South India, after the tanks were taken over by the State administration and a large number were in disuse due to neglect by the indigenous management of irrigation systems. The British administration hardly conceived of communal or local water rights not just in India but also in other parts of the world.

In India, small tanks irrigate about four million hectares. The functioning of these old irrigation systems has been examined by several studies in recent years (Oppen and Rao, 1987; Rung, 1987; Meinzen-Dick, 1984, Vani, 1992). In Himachal Pradesh, out of 1,00,000 irrigated hectares; 70,000 hectares are managed by communal systems called khuls (Coward, 1990). The irrigation rights documented by the British era provide much of the social glue required for operating and sustaining these systems. Their cohesion now is dependent ultimately on property rights legitimised by the State rather than by local custom. In Madras, an office of Superintendent of Tank Repairs was formed in 1809 and staffed by a civil engineer. In 1858 Public Works Department (PWD) has been created and put into operation. The PWD tried to induce Kudimaramat (people's maintenance through free labour) by enacting laws to make it mandatory. Five successive irrigation acts were passed to try to force farmers to maintain the tanks (Vani, 1992). But government kept asserting its own powers by saying that the maintenance of the tanks is the obligation of the villagers but not their right. In 1920, the Madras village panchayat Act was passed and tank irrigation was handed over to panchayats. Under this act panchayats were given few powers including the right to enforce kudimaramat. This also was not successful because the government did not give the panchayats, the right to tax citizens for public works. During British period, irrigation was treated primarily as a means to protect crops from drought. Irrigation systems were designed to provide small amounts of water over large areas (Randhawa, 1983).

Since Independence, Indian engineers have followed the same principles designed by the British. Maloney, Raju (1994) and Sengupta (1991) have documented the farmer management of tank irrigation in South India. In the case of large-scale canal systems, it was assumed that farmers would take responsibility for management, and often the construction of the lower levels of the irrigation systems specifically the channels below the outlet (Stone, 1984; Chambers, 1988). The central and State governments of independent India inherited the idea that most water rights belong to the State (Stone, 1984). But this trend has been changed in recent years where, many State governments have adopted the principle of participatory irrigation management through government orders. The Command Area Development (CAD) programme operational in the year 1973 became the major effort towards improving water use efficiency and productivity of irrigated agriculture (Sivamohan and Scott, 1994). According to Wade (1978), irrigated agriculture specialists felt that the greatest opportunities lay in improving the portions of irrigation systems managed by farmers, i.e., "below the outlet". Therefore, WUAs is one of the elements included in the CAD. Recognizing the importance of users in management to solve the main problems faced by the government in managing the irrigation systems, some States adopted participatory management policies though the policies differed from State to State (see Appendix Table 2).

In Bihar, the two tier WUAs exists at village and at the level of distributary channel. Entire O & M responsibilities are vested with the distributary channels and below to these WUAs. The associations are authorized to collect irrigation fees and in return they can keep 70 percent of the collected amount. In Haryana, legal and government irrigation arrangements are based on precedents set by the Moghul emperors and by the British government and the basic irrigation management system is warabandi. The State is considering a policy to create WUAs at outlet level and assign full O & M responsibilities below the outlet, including maintenance of lined water courses. It is also contemplated that the WUAs collect irrigation fees in return for keeping a small commission. Gujarat has a reputation for innovation in irrigation management based on a number of well-publicized experiments since 1978. However, only in 1995 the State declared a policy of management transfer. It stipulates creation of WUAs for a block of 500-hectare and transfer full O & M responsibilities for minor and smaller channels within the blocks to the WUAs. WUAs have to pay the price for water on the basis of the volume of water actually taken. The State is also planning to invite NGOs, to carry out the work of creation of WUAs in cooperation with the personnel of Water Resource Department. The policy made provision for incentives, including channel repairs, rebates for prompt payment of irrigation fees, and maintenance grants.

Maharashtra has the long history of development and management of private irrigation schemes. The irrigation department manages the State's canal systems and the basic irrigation management approach is called *shejpali* although alternatives exist. It adopted a policy to create WUAs at minor canal level (with average command of 500 ha.); transfer O & M responsibilities for the minor and smaller channels to the WUAs; allocate water to the WUAs through five-year agreements and charge WUAs for water on the basis of the volume actually taken (Volumetric pricing). This new system will replace *shejpali*. Like Gujarat, Maharashtra also envisaged incentives for farmers. In Tamil Nadu, Kerala and Orissa the present transfer of irrigation management to WUAs are creating a three-tier system of management organization including WUAs at the outlet and 500 hectare command levels and a joint management committee (including representatives of the WUAs and of key government agencies) at project level, and transferring O & M responsibilities fully or partially to these bodies.

Turning to Andhra Pradesh, Irrigation and Command Area Development (CAD) Act that was enacted in the year 1984 imposed the creation of command area development authorities and 'Pipe Committees'. These 'Pipe Committees' proved to be quite ineffective as the delivery of water at the outlet was quite unrealistic leaving no scope to the pipe committees to effect any improvement in the distribution of water. The Pipe Committees had no role in the maintenance and their responsibilities were not defined and hence were non-functional (Joshi 1997). The

State through another act in the year 1997 called “The Andhra Pradesh Farmers’ Management of Irrigation” created a three-tier WUAs system at hydraulic level, Distributory Committee and Project Committee. More than 10,000 WUAs have been created with a clearly specified responsibilities and powers. A provision was also made to provide financial assistance for those WUAs that enhance water fee collections in their commands (Brewer et al. 1999). But due to the absence of effective water regulation, this financial incentive was not so effective. One of the case study on the performance of formal WUAs brings out that it would be too early to talk about impact of formal institutions while informal or socially embedded institutions are more effective (Reddy and Reddy 2002). The reason being that informal institutions reflect commitment and cohesion, as it is evolved from within the system. More importantly, it is flexible in adapting to the changing situations. On the other hand, formal institutions are rigid and rule bound. The study of Koppen et al (2002) indicate that higher proportion of small farmers depend on canal water but the concentration of their plots, mainly in the tail ends, poses a disadvantage regarding canal water accessibility. The study also brings out that most of the small farmers are unaware of WUAs. It was also observed that with the gains due to transfer of irrigation management in their relatively small sample, if extrapolated and applied to more than ten thousand WUAs the results of gain would be significant.

### **III Impact of PIM (WUAs)**

The experience of irrigation management transfer in various countries revealed a mixed picture. The transfers tend to be smooth, relatively effortless and successful where irrigation is central to a dynamic and performing agriculture, i.e., like agribusinessman. Further, backward forward linkages with input supply and output marketing systems are strong and well developed, the costs of self managed irrigation are an insignificant part in the gross value of the farm output. These conditions prevail in Mexico, Turkey, USA and New Zealand.

The study in Sri Lanka found no detectable change in irrigated area, crop patterns, cropping intensity or yields as a result of transferring management of distributory canals to farmers. The transfer neither improved nor interfered with agricultural productivity (Douglas L. Vermillion, 1997). In the Columbia Basin (USA), management transfer has apparently had little or no effect on the quality of irrigation service received by farmers. There was a gradual shift to higher value, less water intensive crops after management transfer, but this was primarily the result of changing market prices and a shift from furrow and basin to sprinkler irrigation. However, the evidence on the positive impact in various countries revealed that:

- More efficient water delivery services and the design and construction of irrigation projects better adapted to local needs and constraints;

- Expansion in the areas irrigated, and increased crop productivity and higher farm incomes,
- The reduced financial burden on the State, and
- Reduced adverse environmental effects. (See Annexure 1)

### *Trends in Productivity*

The impact of management transfer on agricultural productivity and farm incomes is unequivocal. In the Dominican Republic, farmers realized increased yields of 40 per cent while there was no change in Mexico and in Senegal valley. Improved water delivery to middle-reach and tail end farmers was reported in the Kano Project in Nigeria and in the State of Bihar, India in the early years after transfer leading to an increase in the productivity of middle reach and tail end farmers. In Indonesia's 10-year old program of turning over small-scale pump irrigation schemes in west and Central Java, where agricultural productivity was already quite high (with paddy yields ranging from 5.2-6.2 tons/ha.), the evidence revealed that the management transfer neither increased irrigation costs to farmers nor lead to a decline in the quality of irrigation service and significant productivity improvements.

However, there are situations where irrigation management transfer seems to have succeeded and also marked by highly unequal distribution of land ownership. In Colombia, where irrigation management transfer has been successful, farmers mostly grow commercial crops (mainly banana and oil palm) for the external market. About 66 per cent of the farmers in this region possess land of 5 hectares or less. However, some 40 per cent of the land is owned by 2.8 percent of the farmers each owning 50 hectares or more. In Turkey, 40 per cent of the irrigated area consists of farm holdings ranging 5-20 hectares and where farmers cultivate high-value crops for exporting to Europe. The irrigation management in this country succeeded because there was a 40-year tradition of farmer participation in the maintenance of the canal system through informal village-level organizations (Svendson and Nott, 1996). In South Asia, where smallholder farming dominates, the experience is mixed. In Nepal, following irrigation management transfer, the area under command increased to 600 hectares against the design command of 420 hectares while prior to transfer the area commanded was only 270 hectares. Farmers participating in the scheme perceive that crop yields increased after transfer. The area under cash crops too increased. A notable development following the transfer was the increase in farmer participation at all levels in decision-making and management. In general, irrigation management transfer has worked in situations where individuals' stakes are high and the irrigation community has been able to take the additional burden of self-management, financial and administrative, in its stride.

In Indonesia, water and land resources were already being intensively exploited. Cropping intensities are relatively high and water is generally recycled and reutilised between systems along river courses. The potential for improving productivity and profitability of irrigated agriculture through changes in irrigation system management is therefore, relatively limited, and this is a key reason for the lack of substantial improvement in agricultural productivity (Douglas. L, Vermillion, Samad, M, Suprodjo Pusposutardjo, Sigit S. Arif, and Saiful Rochdyanto, 1999). In practice, the irrigation management may or may not include replacement of agency staff with local people hired by the WUA, transfer of control over the intake or main canal, and full financial responsibility for future rehabilitation and modernisation. Reportedly, WUAs were neither given extensive training nor empowered fully. The Indonesian small-turnover program involves only a limited degree of devolution of authority. The WUAs has the mandate to operate and maintain the irrigation system from the intake, or the main canal to the drains. But it does not have a formal water right and does not hold the irrigation infrastructure.

#### *Efficiency and Financial Viability*

Most of the studies suggest that significant subsidies that existed before the transfer, if dropped, the cost of irrigation to farmers may rise substantially. Where there is little or no change in subsidies, transfer may lead to a decrease in irrigation costs to farmers. Lift irrigation systems seem to be the most financially vulnerable after transfer. Two studies reported that tube wells were not financially viable after transfer without government subsidy (IIMI and BAU, 1996). In Senegal, reports indicate that after transfer of lift irrigation schemes, supervision of pumps by farmer-hired staff improved, which reduced over pumping (Meizen-Dick et al, 1997). Broadly, privatization of irrigated agriculture in the Senegal Irrigated Valley led to a 78 per cent increase in the cost of rice production for farmers between 1980 and 1993, due to primarily discontinuance of subsidies for credit, investment provision, and irrigation.

In the Columbia Basin Project (USA), farmers were paying close to the full cost recovery of O & M before transfer. Following transfer, the irrigation districts have diversified their revenue sources in an effort by farmer-elected board members to keep water charges as low as possible. In short, the government used the transfer to discontinue subsidies and remove its own staff from the districts. The districts responded by significant reductions in costs and water charges. In Colombia, after transfer the WUA board responded to farmer demands to reduce the cost of irrigation. In Sri Lanka, there has been a pronounced decline in government expenditure for O & M beginning well before transfer and continuing thereafter (Douglas L. Vermillion, 1997). There was a mixed response regarding the impact of transfer of irrigation management to farmers in Sri Lanka. The reform itself did not cause the decline in

government expenditure but was part of the overall strategy of reducing government investment in irrigation.

#### *Sustainability of Irrigation Infrastructure*

In the Columbia Basin, USA, the aim of the IMT was to contain costs of management. It was reported that the cost containment policy was gradually compromising the long-term sustainability of infrastructure. This suggests the cost cutting measures compromising the quality of maintenance overtime, while still holding the line against significant disrepair. There is reason to doubt the sustainability of infrastructure maintenance after transfer of irrigation in both Colombia and Sri Lanka. The IMT has no significant impact in Sri Lanka. In Hakwatuna Oya (Sri Lanka), government expenditure for maintenance remained about the same before and after transfer. Farmers slightly increased their investment in maintenance after transfer to the level of \$2.50 per hectare.

#### *Impact of WUA in India:*

The larger objective of the States in transferring responsibilities to user-managed associations is reduction in the financial burden of the State, improvement in irrigation efficiency, equity and productivity. More specifically the States are interested in

- Limiting its expenditure on management and maintenance of irrigation systems;
- Increasing the physical life of these systems by encouraging users to invest in repair and maintenance of a part of the system;
- Increasing water use efficiency;
- Moving towards more realistic and volumetric pricing for water on a bulk sale basis;
- Improving recovery rates;
- More equitable water distribution and better water control by farmers;
- Cropping decisions by farmers.

Based on these objectives most of the studies on impact of WUAs in Gujarat, Maharashtra and Tamil Nadu focus the study on understanding the transfer processes rather than measuring the extent of benefits and costs. Moreover the results are in preliminary stage (see Annexure 2) and only qualitative assessments of outcomes have been provided. The significant outcomes observed at these sites are: increased availability of water, improved reliability of supply and flexibility in cropping pattern.

The farmer could be able to save considerable time to obtain water and reduction in hassles to pay for water. There has also been somewhat equitable water distribution and reduction in conflicts.

Early arguments in favour of irrigation transfer were based, (in part) on the reported successes with private irrigation. It is widely documented in Asia that, private pump irrigation from groundwater and surface water bodies is far more productive and financially viable compared to public irrigation systems (Shah, 1993). Many others have shown that private small-scale pump irrigation – from ground water and surface water sources- is several times more productive compared to canal irrigation and is always financially viable and self governing (Lowdermilk et.al. 1994). There are also examples of privately catalysed collective management: Farmer-Managed Irrigation Schemes (FMIS) in tube well companies in North Gujarat, lift irrigation schemes built and managed by sugar cooperatives in Maharashtra, which show that well-managed collective irrigation by farmers lies at the heart of a process of transforming their livelihoods. In more recent years, management transfer was considered to be beneficial even if it just saved the public investment, improved cost-effectiveness of operation and maintenance (Vermillion, 1996).

In Maharashtra (Naik and Kalro 1998) the impact of WUA were changes in the cropping pattern. The area under sugarcane has increased from 15 per cent to more than 50 per cent of the command area. Sugarcane has replaced mainly wheat, oilseeds (sunflower and groundnut) and cereals (jowar, and bajra). But the recovery rate in the form of water charges has increased marginally over the years. The recovery rate increased from 75 per cent earlier to 85 per cent during 1992-93. Most of these results are in preliminary stage but the results indicate that, in proper situations, participatory management leads to significant increases in the efficiency of water use and the value of irrigated agricultural production. The outcomes observed in these sites include increased availability of water, improved reliability of supply and flexibility in cropping pattern. In Tamil Nadu, Bihar, Haryana and Kerala, the impact was primarily in terms of improved maintenance of the systems. Though the IMT policy was implemented long back but the expected results are yet to be realized in these States (Brewer, J. et. al, 1999).

The results of Gujarat (van Koppen, Parthasarathy and Safiliou, 2002) depict impressive and better access to water since IMT was reported by both small and large farmers in tail, middle and head reaches of the command areas. But when compared with Andhra Pradesh, the access to canal water in Gujarat is higher after initiation of IMT. But, in both the States area under cultivation has increased due to R & R work. The average size of land gained was 0.66 ha per farmer in Andhra Pradesh and 1.1 ha per farmer in Gujarat. In case of cost recovery and water distribution in Gujarat the collection of water charges from farmers was not so

effective due to lack of organizational capabilities and awareness of WUAs. A recent study found that the informal institutions and organizations for water management are active at the local level and not expanded for beyond the pilot sites (Meinzen-Dick et.al, 2002). Their results indicate that organizations are more likely to be formed in larger commands and in those that are closer to market towns. Besides, leadership represented by influential persons from the local area and also represented by college graduates can play an important role.

Most of the studies available on the experience of WUAs are early assessments, as the process of implementation is just falling in line. While some of the early studies indicate the positive aspects of the programme, majority of them raise questions on the sustainability of the programme once the external funding dries up. But, by then the WUAs are expected to be financially self sufficient, socially stronger and politically united to manage the systems efficiently. Therefore, it would be hasty to brand the PIM in Andhra Pradesh as a success or failure<sup>4</sup>. The impact appears to differ between canal WUAs and tank WUAs. The impact of canal WUAs has been positive, especially in terms of providing irrigation to tail end farmers who were not getting water for the past 5-10 years (Raju, 2000; Jairath, 2001). The tangible benefits include: a) area under irrigation has increased mainly in the tail reaches by 10-15 per cent due to the increase in carrying capacity of canals by 20-30 per cent; b) increase in paddy yields from 2.5 tonnes per acre to 3.5 tonnes per acre; c) increase in revenue collections by 20 per cent (Raju, 2000).

These are some of the aggregate level observations while the micro level reality is different. In a detailed study of water user associations located in three different regions of Andhra Pradesh (Parthasarathy and Joshi, 2001), it was revealed that the performance of WUAs has only a limited success in terms of participation as well as impact. This is mainly due to the fact that these WUAs were too young to be evaluated. In fact, majority (51.5 per cent) of the households are not even aware of WUAs though there are variations across the regions. Participation levels are very low. The highest participation is in the WUA election, which stands at 7 per cent followed by R & R work (5.8 per cent), motivation (2.5 per cent), etc. Only about 17 per cent of the households are contributing labour as their share. And most of this contribution comes from small farmers and tail end farmers. Only 13 per cent of the households participate in the annual general body meetings. Majority of the tail ender farmers attend the meetings when compared to head reach farmers despite greater awareness of the WUAs among the head reach farmers. On the other hand, participation among the committee members is quite high. This clearly indicates the absence of general awareness and interest regarding the WUAs.

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<sup>4</sup> To capture both the views see Pangare (2002), Jairath, (2001), Raju (2000), Reddy (1999) and Peter and Pingle (1999).

The impact of the WUAs is marginal if one looks into participation as an indication. Only 2 per cent of the sample households reported increase in area under irrigation, which is consistent across the regions. Even after 5 years of WUAs functioning above 60 per cent of the farmers are reporting deficit in water supplies. In coastal Andhra Pradesh 85 per cent of the farmers are complaining about the distribution. Interestingly, small farmers and tail end farmers are reporting better access to canal water. For, these farmers report using more number of irrigations and lower proportion of these farmers report severe shortages when compared large farmers or head reach farmers. It is somewhat puzzling, as the data does not clearly indicate whether the prevailing situation is due to the advent WUA. It is unlikely that head reach farmers use less number of irrigations leave alone facing severe shortage of water when compared to the tail end farmers. The study on PIM in Andhra Pradesh (Jairath, 1999) looked in to the supply-side efficiency of the WUA, viz., de-silting, construction of lining, drops pipe outlets, clearing of weeds, strengthening of embankments of channels, etc. The impact of this effort is that the water wastage due to reduction of conveyance losses has been reduced, increasing the efficiency of water use at a macro level and improved the status of water reach further down the channels towards the tail end. Increase in area irrigated during the post-reform period was established but extent of area was not well documented.

These findings, however, indicate that WUAs seem to be especially in the canal commands. In majority of the cases it is observed that tail-end locations are getting sufficient water for the first time in five years. Apart from this the success of WUAs is attributed mainly to the availability of external funding and the sustainability of the programme is critically linked with the availability of resources (Raju, 2000). Besides, investments may not bear any fruit, as this money is not productively invested in terms of social capital development. This, in turn, blocked the hard decisions envisaged in the reforms, such as implementation of user charges effectively.

#### **IV Emerging Issues**

The introduction of the entire structure of participatory institutions and capacity to initiate these reforms takes much time and needs political will and determination to implement it in a sustained manner. The effectiveness of participatory irrigation management can be measured from the extent to which successfully maintained the irrigation system and helped the tail enders. Evidence suggests that transfer of irrigation management targeting the objectives was not so effective. The literature has shown that the representatives elected to the WUAs possess weak organizational capabilities, resulting in low profile success of these WUAs. However, there is ample evidence of expenditure incurred on the repairs and rehabilitation work done throughout the country and spread over different projects. Number of factors have motivated in the smooth running of the WUAs. These are: water distribution and

system maintenance at outlet levels, financial status of WUAs after transfer of irrigation management, performances of WUAs, incentives for farmers and its impact. The review also identified some gaps that include: i) lack of proper maintenance of the system, ii) time-overruns to utilize the funds, iii) no planning of the works to be undertaken, iv) lack of convergence between Project Committee-Executive Committee and WUA, v) no powers to WUAs for the collection of Water tax (Revenue department is having major role in collection of water tax and the role of WUAs is restricted only for helping the revenue department) and vi) lack of irrigation regulatory committee consisting of the personnel from agricultural department, revenue department, irrigation department and farmer representatives for control, advice, monitoring, needs in the necessity of irrigation water and on available water resources. The review brought out other issues pertaining to role of collective action and social capital in PIM. Some of the important issues/hypotheses include (a) socially embedded or formal institutions are more effective than informal institutions, (b) leadership is critical for the success of institutions, (c) homogeneous vis-à-vis heterogeneity in the local communities, (d) nature/type of the common resources, etc. Some of hypotheses would be verified in the following chapters based on the primary data.

**Annexure 1: Irrigation Management Transfer in Various Countries**

Country	Transfer unit	Size of transfer unit (ha)	Management	Functions transferred		Ownership of assets
				O&M	Finance	
1	2	3	4	5	6	7
Philippines	1.Entire scheme 2.Distributary canal	150-<5000	WUA	Partial	Partial	Govt
Indonesia	Tube well	5-200	WUA	Partial	Full	Govt
Vietnam	Pump scheme	n.a.	Parastatal	Full	Full	Govt
China	Scheme	5000	Irrigation District	Full	Full	Govt
Bangladesh	Tube well	<100	WUA	Full	Full	Private
Nepal	1.Entire scheme		WUA	Full/ Partia	Full/ Partial	Govt.
	2.Tube well	120-8700			1	
	3.Irrigation System					
Sri Lanka	1.Distributary canal 2.Field channels	50-260	WUA/ Agency	Partial/ Full	Partial	Govt.
India	1.Tube well 2.Distributary canal 3.Minor canal 4.Lift schemes	50-14000	1.Co-operative 2.Inter-village Committee 3.WUA	Partial/ Full	Partial	Govt.
Egypt	Field channel	20-60	WUA	Full	Partial	Govt.
Sudan	Pump scheme	80-4000	Private Company/ WUA	Partial	Partial	Govt.
Turkey	Scheme and sub units	50-34000	Municipal govts	Full	Full	Govt.
Nigeria	Distributary canal	126-271	Agency/ WUA	Partial	Partial	Govt.

**Annexure 1: Irrigation Management Transfer in Various Countries (Contd...)**

Country	Transfer unit	Size of transfer unit (ha)	Management	Functions transferred		Ownership of assets
				O&M	Finance	
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>
Senegal	Lift Schemes	20	WUA	Full	Full	Private
Dominican Republic	Federated	5240-9240	WUA	Partial	Partial	Govt.
Colombia	1.Irrigation district 2.Schemes	1000-25000	WUA/ District	Partial/l Ful	Full	Govt.
Mexico	Blocks	5000-30000	WUA	Full	Full	Govt.
USA	Irrigation District	77000	WUA/ district	Full	Full	Govt.
New Zealand	Schemes	2000	Mutual Company	Full	Full	Private

**Annexure-1****Continued..**

Country	Impacts
	<b>8</b>
Philippines	Reduced cost to farmers, 75% drop in budget. Fee collection rates rose from 20% to 80%, Reduction in Agency field staff, Diversification of revenue sources. Water distribution became less equitable (O). Maintenance was worsened. Improved water distribution equity; expansion of dry-season irrigated area. No increasing trend in service area. Increasing in Cropping intensity. Rice yields increased in both wet and dry seasons.
Indonesia	Cost of water pumped increased five to seven times. Deterioration of pump sets accelerated.
Vietnam	Water consumption per hectare dropped, Area irrigated increased. Cropping intensity increased from 170-250%. 14% increase in area cropped. Yield increased 13%. Annual incremental benefits increased.

## Annexure-1

## Continued..

China	Per hectare cost of water to farmers rose 2.5 times. Growing importance of sideline enterprises after reform. Reduction in water duty. Grain yields increased modestly. Cases of both increase and decrease of net income.
Bangladesh	O&M costs remained similar after privatization, though loss of subsidies meant increased costs to farmers. Diesel deep tube wells not financially viable without subsidy. Declining numbers of farmers reporting adequate and timely water delivery (O). Higher breakdown rates in smaller pumps; spare parts and repair easier (M). Slight increase in crop intensities. Mixed results for yields. Small farmers becoming a growing share of pump owners and of expanding irrigated area.
Nepal	Cost of water decreased 40-50%, Cash and labour value raised from farmers increased. Drop in water consumption by 50%. Irrigation discharge increased fourfold and inflow increased (O). Rice and Wheat yields increased.
Sri Lanka	Government subsidies for O&M continued, Farmer organizations invested mainly in input provisions and marketing, not in O&M. Annual government costs decreased, Diversification of revenue sources. Quality of water distribution did not change, Improved equity of water distribution (O), Maintenance activity and investment increased. Cropping intensities increased from 138-200%. Gross annual value of output increased.
India	50% reduction in the cost of water. Budget deficits converted to surplus, Increased costs and time required for farmers. Improved rate of recovery for water charges. No decline in Government expenditures for O&M. Reduced average irrigation time, Improved equity; 27% more water to tail end; 20% increase in irrigated area in the dry season, Adequacy and reliability of water distribution improved, as reported qualitatively (O), Maintenance work increased. Increases in crop intensities and crop diversification. No change in yields.
Egypt	Dramatic decline in maintenance costs. Per hectare pumping costs declined after rehabilitation and IMT. Reduced irrigation time; better water adequacy (O). 10-16% increase in main crop yields. Increase in farm incomes.

## Annexure-1

## Continued..

Sudan	Timeliness and water adequacy worse in schemes turn over. High yields per unit of water in parastatal schemes versus turned-over schemes. Gross margin three times higher in parastatal than in turned-over schemes. Productivity of land and water higher in parastatal than in turned-over schemes.
Turkey	Increase in average water fee collection rate after IMT, in first year, area served increased.
Nigeria	water fee collection rate rose after IMT, Improved equity; 12% more water reached middle and tail reaches. Increase in dry-season cropped area by 80%.
Senegal	Expansion of areas irrigated. Cropping intensity rising and falling in different locations. Cost of irrigated rice production increased 78%.
Dominican Republic	water fee collection rate rose after IMT, Delivery efficiency improved 25-30%.
Colombia	44% average decline in total staff. Farmer emphasis on cost cutting. No long term major change in cost of irrigation. Cost of water relative to production fell 27%. Diversification of revenue sources, from 10% to 20% of revenue other than fees. Budget deficits converted to surpluses. More responsive operations. Water adequacy satisfactory. 40-45% of farmers say operations improved. Temporary inefficiencies after IMT. Expansion of area irrigated (O). Good maintenance; 92-98% of farmers report quality of maintenance has not changed. Rice yields sustained after IMT. Cultivated area continued to expand. More crop diversification. Net farm income rose 23%. Economic return to irrigation was increased. Gross value of output increased 400%. Cost of water relative to cost of rice production increased marginally.
Mexico	45-180% increase in water charges. Increase in fee collection rates. Shortfall in financing declined nationally. Local self-reliance increased. No change in water delivered per hectare or in area irrigated. No change in cropping intensity or Yields. Annual Economic returns remained same or declined.
USA	Decrease in government staff. Farmer emphasis on cost cutting. Volumetric charges reduced. Diversification of revenue sources. Farmers raised capital replacement fund. More responsive

**Annexure-1****Continued..**

New Zealand	<p>operations. Efficiency did not change. Equity improved slightly (O). Good but decline trend detected. Shift to less water-intensive crops but more due to changing water application technology and markets. Average farm incomes rose 15% due to reduction in water cost.</p> <p>Farmer emphasis on cost cutting. Average operational cost declined. After IMT, water charges were a quarter to a half of the pre-IMT level.</p>
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*Source: Douglas L. Vermillion, 1996*

**Annexure II: Irrigation Management Transfer in India**

State	WUA organisation	Transferred responsibilities	Water supply	Water distribution
Andhra Pradesh	Three tiers: 1) Village (outlet) WUA, 2) WUA for distributary Channel command 3) Project Committee.	<ul style="list-style-type: none"> <li>- O&amp;M below the outlet</li> <li>- Maintenance of the distributary</li> <li>- Collection of govt. irrigation fees.</li> </ul>	Assured water supply through WUAs	Full power including punish of rules-breaker
Bihar	Two tiers: 1) Village (outlet) WUA, 2) WUA for distributary Channel command of over 10000 ha.	<ul style="list-style-type: none"> <li>- Distribution to outlet on the distributary</li> <li>- Maintenance of the distributary</li> <li>- Collection of govt. irrigation fees.</li> </ul>	No power	Full power including punish of rules-breaker
Haryana	Outlet level WUAs	<ul style="list-style-type: none"> <li>- O&amp;M below the outlet</li> <li>- Collection of govt. irrigation fees</li> </ul>	No power	Responsibility but limited or no power of punishment.

**Annexure II: Irrigation Management Transfer in India (Contd...)**

<b>State</b>	<b>WUA organisation</b>	<b>Transferred responsibilities</b>	<b>Water supply</b>	<b>Water distribution</b>
Maha-rashtra	Contact (Cooperative WUA for minor canal about 500 ha.)	- O&M with the WUA area - payment of volumetric fee to the agency	Assured water supply through contract	Full power including punish of rules-breaker
Gujarat	Contact (Cooperative WUA for minor canal about 500 ha.)	- O&M with the WUA area. - payment of volumetric fee to the agency	No power	Full power including punish of rules-breaker
Tamil Nadu	Three tiers: Outlet WUA, WUA at 500 ha. Level, System level Joint management (JMC)	Maintenance within the WUA area, advise on operations at all levels through WUAs and JMCs	Influence over water supply through JMCs	Responsibility but limited or no power of punishment.
Kerala	Three tiers: Outlet WUA, branch canal JMC, System level Joint management (JMC)	Advise on operations at all levels through JMC	Influence over water supply through JMCs	Responsibility but limited or no power of punishment

**Annexure II: Irrigation Management Transfer in India (Contd...)**

State	Maintenance	WUA finance	State fee	Transfer means
Andhra Pradesh	Full responsibility for maintenance within WUA area	Full: powers to collect fees and spend funds but not to set water fees.	Paid by individual farmers through WUAs based on area assessments.	Incentives, Govt. initiation, Not decided fully
Bihar	Full responsibility for maintenance within WUA area	Partial: powers to collect fees and spend funds but not to set water fees.	Paid by individual farmers through WUAs based on area assessments.	Not decided
Haryana	Full responsibility for maintenance within WUA area	No power over finances	Paid by individual farmers through WUAs based on area assessments	Not decided
Maharashtra	Full responsibility for maintenance within WUA area	Full: including power to set and collect water fees and spend funds.	Paid by WUAs to State based on volume of water used.	Incentives, NGOs initiation and publicity.
Gujarat	Full responsibility for maintenance within WUA area	Full: including power to set and collect water fees and spend funds.	Paid by WUAs to State based on volume of water used.	Incentives, Govt. initiation, NGOs initiation and publicity.
Tamil Nadu	Full responsibility for maintenance within WUA area	Partial: powers to collect fees and spend funds but not to set water fees.	Paid by individuals to State through land-tax	Govt. agency
Kerala	Full responsibility for maintenance within WUA area	Partial: powers to collect fees and spend funds but not to set water fees.	Paid by individuals to State through land-tax	Govt. agency

Source: Brewer.J et al. 1999

## CHAPTER III

### Water Users' Associations in Andhra Pradesh: A Macro View

#### I Introduction

The formation of formal WUAs is complex. But, in a pioneering effort the Government of Andhra Pradesh has initiated irrigation reforms on a large scale, which is unprecedented. In fact, these reforms are ranked very high even at the global level and expected to be a future model in irrigation management. The State has shown the way that political will is the main ingredient for such initiatives. The most interesting feature of these reforms is that they are 'top down' with a 'bottom up' approach. It has the advantage of greater reach (possible due to 'top down') and intensity through involvement of the community (possible under 'bottom up'). These reforms under the guidance of some committed officials at the State level have taken off in good spirit and received good support at the farmer level. Though, one may argue that flow of funds is the main factor in generating such response, it is necessary to support the ailing systems in order to generate trust among beneficiaries. For, over the years farmers have lost the trust in the government and in no position to respond to false promises. Therefore, the initial boost was necessary to regain the lost credibility and build the trust. Once this is in place institutional reforms from top could become smooth and easier. Further, it is necessary to understand the direction in which the reforms are progressing. This direction would ultimately determine the strength and sustainability of the reforms. In this chapter an attempt is made to understand the structure, organization and functioning of WUAs in a macro perspective. That includes analysis of the institutional structure, composition, management of funds, people's participation, works carried out and the perceived impact at the WUA level.

The analysis is based on the information collected from 222 WUAs across the 22 districts in the State. Ten sample WUAs were selected randomly from each district irrespective of the actual number of WUAs exists in the district, though eleven WUAs were selected in two of the districts (Table 3.1). Broadly, these WUAs are distributed between canal and tank systems. About 63 per cent of them pertain to tank systems (Table 3.1). Within the canal systems, the sample WUAs were distributed among head, middle and tail reaches and in the case of tanks they are distributed between percolation and irrigation tanks. In the cases of canal WUAs 66 per cent of the sample WUAs are located in the middle reaches followed by 18 percent in the head reaches and 16 per cent in tail ends. Where as in the case of tank

systems 92 per cent of the sample WUAs pertains to irrigation tanks. The purpose of percolation tanks is to stabilise the groundwater levels, rather than providing direct irrigation. However, in the present case the area served under each percolation is taken into account and the area irrigated by wells in the command area is taken as area irrigated under the system.

## II Coverage and Funds of WUAs

Average area per WUA varies across systems and locations (Table 3.2). WUAs in the head reaches are bigger in terms of command area and area irrigated when compared to middle and tail end WUAs. Canal WUAs are larger than tank WUAs by a factor of more than ten i.e., 4900 in the head reaches to 268 acres in the Tank WUAs. In most of the cases area under WUA, command area of WUA and area irrigated under WUA are co-terminus. The size of WUA affects the fund allocations, as the fund allocations are on per acre basis.

**Table 3.1: Number of Sample WUAs Distributed by Source and Location**

District	Canal			Tank		Total
	Head	Middle	Tail end	Irri- gation	Per- colation	
Srikakulam	-	1	3	6	-	10
Vijayanagaram	-	-	-	10	-	10
Visakhapatnam	-	-	-	10	-	10
East Godavari	2	8	-	-	-	10
West Godavari	-	4	6	-	-	10
Krishna	1	9	-	-	-	10
Guntur	-	10	-	-	-	10
Prakasam	1	8	1	-	-	10
Nellore	-	-	-	10	-	10
Chittoor	-	-	-	10	1	11
Anantapur	1	3	-	5	1	10
Cuddapah	-	-	-	10	-	10
Kurnool	1	3	-	6	-	10
Mahaboobnagar	-	-	-	7	3	10
Nalgonda	-	-	-	10	-	10
Khammam	4	1	-	6	-	11
Warangal	-	3	-	7	-	10
Karimnagar	3	1	-	6	-	10
Adilabad	1	1	1	7	-	10
Nizamabad	1	2	2	5	-	10
Medak	-	-	-	10	-	10
Rangareddy	-	-	-	4	6	10
Total	15 (18)	54 (66)	13 (16)	129 (92)	11 (08)	222

**Table 3.2: Total and Average Area (in acres) under Canal and Tank Systems by Location in Andhra Pradesh**

Area	Canal						Tank			
	Head		Middle		Tail-end		Irrigation Tank		Percolation Tank	
	Total	Average	Total	Average	Total	Average	Total	Average	Total	Average
WUA	73465	4897	185714	3439	43723	3363	34578	268	2781	253
Command area	73465	4897	186443	3452	43723	3363	35565	275	2802	254
Irrigated area	73465	4897	185714	3439	43723	3363	34578	268	2781	253

While canal WUAs get anywhere between Rs. 2 to 3 lakhs per year the tank WUAs get between Rs. 50,000 and 70,000 (Table 3.3). On per acre basis tank WUAs are getting more money when compared to canal WUAs due to the limited coverage of tank systems. While tank WUAs got above Rs. 200 per acre per year, canal WUAs got about Rs. 100 per acre per year. Though tank WUAs received substantial higher allocations (2-4 times in 6 years) when compared to canal WUAs, the amounts are much lower than the requirement for tank restoration. The estimates for repairs range between Rs. 3000 - Rs. 7000 per acre depending on the tank size without desilting (Reddy, 2002). The low allocations are mainly due to the reason that funds are allocated for canal repairs rather than restoration of tanks. This approach suits well in the canal systems, as the major working problem is canal maintenance. Where as in the case of tank systems the length of the distributory canals or feeder channels is not much. Moreover, the requirement of tank systems is the repair of tanks in terms of repairing the breached bunds, de-silting, etc. In the absence of funds for such activities tank WUAs may not be effective. The variations in allocations are due to the reasons: a) funds are allocated on demand, works carried out and collection of water cess, hence expenditure depends on how active a WUA is? and b) political affiliation of the WUA.

Major source of funding is from the government followed by water cess collected by WUAs. The share of water cess is about 50 per cent in the case of canal head reaches while it is 30 per cent in tail ends and only 19 per cent in the middle reaches. In the case of tank WUAs government contributes about 90 per cent and the share of water cess is less than 2 per cent. However, the difference between government contribution and water cess is not clear as the sharing of water cess between the WUA and other institutions was initiated only recently. Hence, these two categories could be treated together as external funding. On the other hand, people's contribution is less than 4 per cent in the case of canal WUAs and less than 6 per cent in the case of tank WUAs. This clearly indicates that the mandatory 10 per cent contribution in the works is not adhered to in the entire sample WUAs.

**Table 3.3: Funds ( in Rs.) from Various Sources to WUA under Canal and Tank Area by Location in Andhra Pradesh During the Period 1997 to 2002**

Sources of revenue	Canal						Tank			
	Head		Middle		Tail-end		Irrigation Tank		Percolation Tank	
	Per WUA	Per acre (Irr. Area)	Per WUA	Per acre (Irr. Area)	Per WUA	Per acre (Irr. Area)	Per WUA	Per acre (Irr. Area)	Per WUA	Per acre (Irr. Area)
Govt.	975921	199 (48)	1669620	485 (76)	916500	272 (46)	385276	1437 (90)	288201	1140 (90)
Water-cess	283065	208 (50)	425435	124 (19)	601879	179 (30)	9851	37 (02)	3999	16 (01)
Contribution	23441	5 (02)	33904	10 (02)	69598	21 (04)	22051	82 (05)	20553	81 (06)
Others	2804	0.60	61203	18 (03)	397521	118 (20)	12749	48 (03)	6432	25 (03)
Total	1285231	412.6 (100)	2190162	637 (100)	1985498	590 (100)	429927	1604 (100)	319185	1262 (100)
Avg./year	214205	69	365027	106	330916	98	71655	267	53197	210

Note: Figures in brackets are respective percentages to total.

As mentioned earlier majority of the work were carried out on repair of canals followed by formation and rising the height of the bunds and removal of silt and maintenance of structures (Table 3.4). In the case of canals, works mostly pertain to canal cleaning and repairs (removal of silt and maintenance of structures) followed by construction of culverts / check dams. In the case of tanks, the distribution of works is more even across the type of works. In terms of fund allocations raising the height of tank bunds account for 42 per cent of the expenditure followed by tank repairs and deepening. In the case of canals, cleaning and repairs account for 81 per cent of the expenditure. It is clear from the expenditure, repairs to the distribution systems is the priority in the case of canals while it is the raising and repairing the tank bund in the case of tank WUAs. Desilting of tanks is not a priority work. As observed earlier, major funding for these works comes from the government. It is reported that in more than 90 per cent of the WUAs the accounts were audited. It is often argued that contractors have benefited most from the WUA works. Moreover, it is observed that in some cases WUA Presidents have turned into contractors. Our data indicates that role of contractors is not that over whelming, though their presence is observed in some of the important activities (in terms of expenditure), especially in the case of canal WUAs (Table 3.5). Most of the works are carried out by the WUA itself. The involvement of contractors is much less in the case of tank WUAs.

**Table 3.4: Works Carried-out and Expenditure in Canal and Tank WUAs  
During the Period 1997-2002**

Type of Work	% of Works Carried out		
	Canal	Tank	Total
1. Repair of Canal/Tank pipelines	15 (1.5)	85 (13)	100 [95]
2. Digging/Repair of Canal/Tank	39 (13)	61 (15)	100 [238]
3. Construction of Culvert/Check dams	34 (05)	66 (09)	100 [80]
4. Formation /raising the height of bunds	13 (03)	87 (42)	100 [182]
5. Cutting trees, plants/weeding	20 (01)	80 (05)	100 [45]
6. Deepening of Canal/Tank	24 (08)	76 (13)	100 [96]
7. Formation of Ayacut/Tank bed road	67 (0.50)	33 (Neg.)	100 [3]
8. Removal of silt and maintenance of Structures	88 (68)	12 (02)	100 [155]

Note: Figures in ‘()’ are respective shares in expenditure. Figures in ‘[]’ are the total number of works carried out.

**Table 3.5: Work Carried-out by Different Agencies (WUA & Contractor)  
(Per cent of works carried out)**

Type of work	Canal		Tank	
	WUA	Contractor	WUA	Contractor
1. Repair of Canal/Tank pipelined	100	0	96	4
2. Digging/Repair of Canal/Tank	69	31	90	10
3. Construction of Culvert/Check dams	96	4	84	16
4. Repair/formation /raising the height of bunds	91	9	94	6
5. Cutting trees, plants/weeding	56	44	97	3
6. Deepening of Canal/Tank	100	0	97	3
7. Formation of Ayacut/Tank bed road	100	0	100	0
8. Removal of silt and maintenance of Structures	77	23	89	11

### III Structure and Functioning of WUAs

Governance aspects pertaining to socioeconomic and political composition, functioning, etc., are critical for effective running and sustenance of the WUAs. Appropriate governance structures and practices strengthen the social capital, which is more sustainable than the target oriented economic impacts. The socioeconomic composition of WUA members reflects not only the socioeconomic milieu of the community but also the political economy dimensions of the institutional innovation and development. In the sample WUAs the executive members are spread evenly across socioeconomic groups in terms of their representation in the committee in relation to their actual population (Table 3.6). In fact, the lower social and economic groups have better representation in the WUA executive. But, in the case of the highest position (the President), they are grossly under represented. The large farmers and communities the highest social hierarchy usually hold the position of the President. Their representation at the highest office clearly indicates the elite capture. This not only supports the findings from the earlier studies on WUAs in AP (Reddy, 2001) but also reflects the general picture pertaining to the recently evolved parallel institutions in AP (Reddy and Jenkins, 2004). This elite capture of parallel institutions is attributed mainly to: a) elite are not able to get into PR bodies due to reservation policy and, b) parallel institutions are financially stronger than the PRIs. The political affiliation of the members and the Presidents reflects the popularity of the then ruling Telugu Desam Party (Table 3.7).

**Table 3.6: Socio-economic Composition of WUA Executive Members in Canal and Tank WUAs**

Caste	Canal			Tank		
	President	Members	% to population	President	Members	% to population
<b>Social Composition (%)</b>						
SC/ST	01	11	10	04	14	12
BC11	32	30	43	54	52	
OC88	57	60	53	32	36	
<b>Economic Composition (%)</b>						
0.10-2.50	03	12	11	19	31	29
2.51-5.00	09	30	27	25	27	27
5.10-10.0	49	42	43	30	26	26
10.1& above	39	16	19	26	16	18
All	100 (1.2)	100 (0.1)	100	100 (1.4)	100 (2.5)	100

Note: Figures in brackets are proportion of females in the respective category.

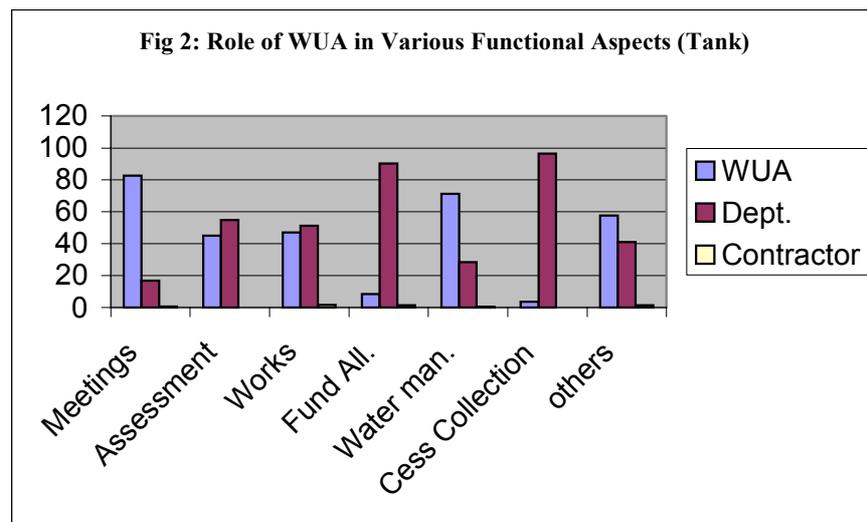
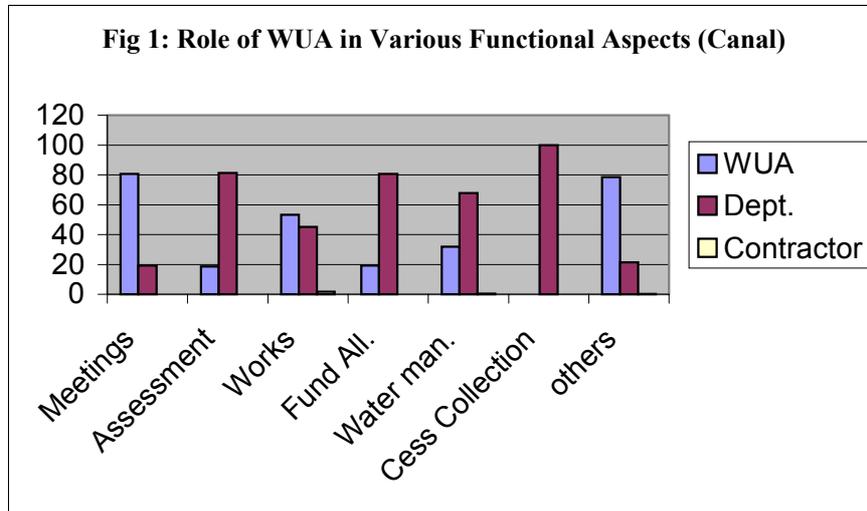
**Table 3.7: Political Composition of WUA Executive Members in Canal and Tank WUAs**

Party	Canal		Tank	
	President (%)	Members (%)	President (%)	Members (%)
Congress	37.7	39.7	36.4	36.1
TDP	52.5	53.0	57.1	51.2
Others	9.8	7.3	6.4	12.6

As per the guidelines two general body meetings should be held in a year i.e., one each before starting of the kharif season and the rabi season, whereas, the executive committee meets as and when necessary. During the past six years (1997-2002) experience indicate that GB meetings are not held twice a year, though more number of GB meetings are held in the head reaches (Table 3.8). This could be due to lack of irrigation water in some of the systems during the last two years. The frequency of EC meetings was more in tail end WUAs followed by head and middle WUAs. This indicates that middle reach WUAs face less number of problems when compared to head and tail reaches. EC meetings are more frequent even in the case of tank WUAs. The Presidents of WUAs reported that participation (above 80 per cent in the case of canal and above 90 per cent in the case of tank WUAs) and co-operation (above 95 per cent in canal and tank WUAs) of members in the EC meetings is quite high.

**Table 3.8: Number of WUAs Meetings (General Body & Executive Committee) Held During 1997-2002**

Number of WUAs Meetings	Canal						Tank			
	Head		Middle		Tail-end		Irrigation		Percolation	
	GB	EC	GB	EC	GB	EC	GB	EC	GB	EC
	10	30	9	18	8	35	8	27	8	30



While general body discusses the overall situation and the general approaches to water management, the EC discusses and takes decisions on important issues such as conducting meetings (GB and EC)' assessment of land, works to be carried out, fund allocations to works, water management, cess collection, etc. It is proposed that the responsibility of carrying out all these activities will be shifted to WUAs (EC) in a gradual manner. But, even after six years of existence the only activity carried out predominantly by the WUAs is conducting the meetings (Figs 1 and 2). The only important activity in which the WUAs have say in majority of the cases is regarding the works. The dominance of the

department is clearly seen in the most important aspects like assessment, fund allocation, cess collection and water management, though the involvement of WUAs is better in the case of tank WUAs (Fig. 2). Despite the promises the devolution of powers has not taken place even in the case land assessment, let alone fund allocation and collection. This is one of the main bottlenecks for the sustenance of the WUAs. On the other hand, the role of contractors appears to be marginal even in the case of works (see Appendix table 1).

**Table 3.9: Opinions of the Presidents on the WUAs**

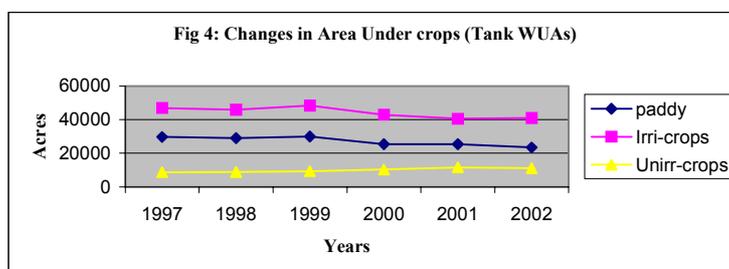
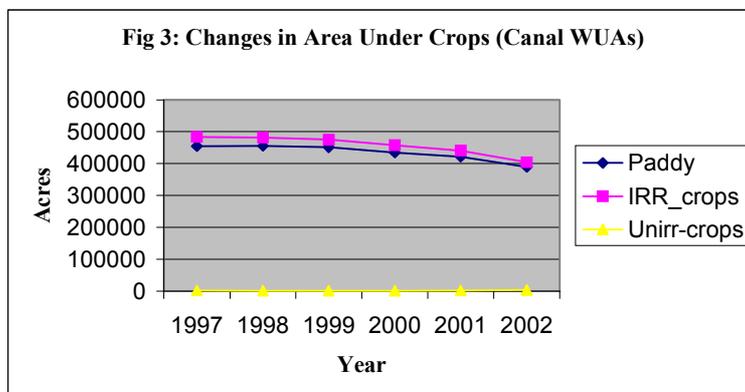
Opinion	Canal	Tank
a. Purpose of WUA		
Clear	37 (45.1)	60 (44.8)
Partial	44 (53.7)	71 (53.0)
Not clear	1 (1.2)	3 (2.2)
b. Role of WUA		
Aware	33 (40.2)	78 (59.5)
Partial	49 (59.8)	53 (40.5)
c. Effectiveness of WUA		
Can't Say	2 (2.4)	19 (14.5)
Very Effective	74 (90.3)	91 (69.5)
Not effective	6 (7.3)	21 (16.0)
d. Funds Sufficiency		
Sufficient	52 (63.4)	52 (38)
Insufficient	30 (36.6)	82 (62)
e. Problems Associated with WUA		
No problems	55 (67.1)	91 (74.6)
Problems with some minor issues	15 (18.3)	31 (25.4)
Not responded	12 (14.6)	-
f. Suggestions for improvement		
Proper repair/management of Canal/Tank	10 (12.2)	75 (59.5)
No suggestions	1 (1.2)	6 (4.8)
Devolution of powers	55 (67.1)	20 (15.9)
Financial/revenue related solutions	4 (4.9)	4 (3.2)
Other solutions	12 (14.6)	21 (16.7)
g. Relationship with village Panchayat		
Very good	78 (95.2)	119 (91.5)
Not satisfactory	1 (1.2)	7 (5.4)
Moderate	2 (2.4)	4 (3.1)
Not responded	1 (1.2)	-

Note: Figure in parenthesis are percentages in the respective category

In the absence of devolution of powers there is no clarity even on the part of WUA Presidents regarding the purpose and role of WUAs. Only 40 per cent of Presidents are aware of the WUAs role in the canal systems while 59 per cent of them are aware in the case of tank systems (Table 3.9). Only 45 per cent of them are clear about the purpose of the WUAs in both the cases. Nevertheless, 90 per cent of the Presidents in the case of canals and 70 per cent in the case of tanks endorse effectiveness of WUAs. This is mainly attributed to the insufficiency of funds, as fund insufficiency is reported in 62 per cent of the tank WUAs as against 37 per cent in the case of canal systems. This re-emphasises our earlier argument that fund allocations to tanks are not according to their requirement. Though there are no serious problems associated with WUAs, there appears to be scope for improvement in the functioning of the WUAs, according to the perceptions of the Presidents. Devolutions of more powers to the WUAs are expected to improve the performance in 67 per cent of the canal WUAs. On the other hand, repairs to main systems (tanks) would improve the performance in 60 per cent of tank WUAs. These are consistent with our earlier observations. As per the relationships between the constitutional (Panchayati Raj) and parallel (WUA) institutions they are cordial in more than 90 per cent of the cases. That is there are no conflicts, though they are not working in tandem-a case of passive or indifferent attitude of the PRIs (Reddy and Jenkins, 2004).

#### **IV Impact of WUAs on Area Irrigated**

At the moment the performance of WUAs is observed to be mixed. They seem to be working well in the canal commands while their impact is not so conspicuous in tank irrigation regions. While these observations are vindicated as far the institutional aspects are concerned, the economic impact of the WUAs needs to be established. Hitherto studies observed that tail-end locations are getting sufficient water for the first time in five years. However, this is not coming out from the data at the WUA level (Table 3.10). For, the data on area under paddy (irrigated) and other irrigated crops shows a declining trend over the period of six years in both canal and tank systems (Figs 3 and 4). This could be due to poor rainfall and water shortages during the last 2-3 years. Even after taking out the extreme drought year (2002), area under irrigation has declined though the decline is not of very high magnitude. In the case of canals, decline is observed in irrigated as well as unirrigated area, while in the case of tanks the decline in irrigated area is compensated by an increase in the unirrigated area. The decline in area under canal irrigation at the State level over the last decade commensurate with this, it may not be fair to attribute these changes (decline) to the WUAs. Moreover, the improvements could in qualitative terms such number of irrigations, productivity, etc. More detailed analysis of the impact is carried out at the household level in the next chapter.



**Table 3.10: Changes in Area Irrigated and Crops under Canal WUAs During the period 1997-2002**

Year	Paddy		Other food Crops	Sugar cane	Cotton	Horti-culture & Vegetables	All crops	
	Irri-gated	Un-irri-gated					Irrigated	Un-irrigated
<b>Canal WUAs</b>								
% Change (1997-02)	-14	#	63	-81	-12	32	-16.1	47
% Change (1997-01)	-07	-25	66	-07	-18	12	-09	-13
<b>Tank WUAs</b>								
% Change (1997-02)	-70	482	-12	14	-77	-12	-13	28
% Change (1997-01)	-21	354	06	28	-10	-0.5	-14	28

Note: # indicates decline from positive to '0'.

## **VI Conclusions**

Evolution of WUAs is focused on operation and maintenance of the existing systems. Though the initial success of WUAs is linked with the funding, our analysis brings out clearly that little effort is being made to make them self-sufficient or financially independent. On the contrary, external fund flows have made them elite and ruling party capture. Women representation is very poor. As a result, cooperation and collective action potential at the village level received a set back. There is limited awareness about the WUAs even among the Presidents. This is mainly attributed to the absence of devolution of powers. The responsibilities of WUAs include: a) maintaining irrigation system within its command area, b) preparation of operational plans at the beginning of the crop season, c) ensuring equitable distribution of water and resolving the conflicts among members, d) maintaining records, collection of water charges, etc. Further, WUAs are given power to raise funds locally for its activities. Of these only in the case of works the WUAs have some say. It is clear that when WUA is not familiar with its command area it is unreasonable to expect them to ensure equitable distribution of water, which is still in the hands of the irrigation department.

On the other hand, the funding arrangements and the works carried out are not very appropriate in the case of tank WUAs. Tank restoration is the major work in the case of old tanks, which require substantial funding. Meager spending on repairs of channels and bunds with out addressing the main issue is proving to be ineffective. User contribution has not really materialised, as the share of contribution is less than 10 per cent in all the cases though little better in the case of tanks. As a result, user involvement, stake and economic efficiency get least priority. The result: sustainability of WUAs is in danger once the funds dry up. Approach of the State is not to build social capital by making the best use of the available resources, but to dilute it by giving political colour. This would come only through devolution of powers to the WUAs. Consequently, neither the bureaucracy nor the beneficiaries are motivated enough to sustain these institutions. Note that the analysis in this chapter is based on the information collected from the office bearers (Presidents) of the WUAs, who have some stakes in the WUA. The perceptions of the households (primary stakeholders) could be different, which forms the basis for the analysis in the next chapter.

**Annexure III**  
**Table A1: Functional Aspects and Decision Makers of WUAs Under Canal and Tank Areas in Andhra Pradesh**

Functional aspects	Canal			Tank				
	WUA	Irri.Dept / MRO	Contractor	Total	WUA	Irri.Dept / MRO	Contractor	Total
Organisation of meetings	92 (80.7)	22 (19.3)	0	114	152 (82.6)	31(16.8)	1 (0.6)	184
Assessment of Command Area	19 (18.6)	83 (81.4)	0	102	83 (45.1)	101 (54.9)	0	184
Work Related	269 (53.3)	228 (45.1)	8 (1.6)	505	325 (47.2)	352 (51.1)	12 (1.7)	689
Funds Allocation	18 (19.4)	75 (80.6)	0	93	12 (8.4)	129 (90.2)	2 (1.4)	143
Water Management	73 (31.9)	155 (67.7)	1 (0.4)	229	256 (71.3)	102 (28.4)	1 (0.3)	359
Collection of Water Charges	0	81 (100)	0	81	4 (3.6)	107 (96.4)	0	111
Others	381 (78.6)	103 (21.2)	1 (0.2)	485	287 (57.6)	204 (41.0)	7 (1.4)	498

Note: Figure in parenthesis indicate respective percentages (row)

## CHAPTER IV

### Functioning of WUAs in AP: A Household Level Assessment

#### I Introduction

The aim of WUAs is to improve the water management system in terms of equitable and just distribution of water, financial sustainability of the system, to promote self-management of the systems, etc. The macro picture in the previous chapter indicated that in their present State the WUAs are far from achieving these objectives. What emerged from the macro picture reflected the institutional strengths and weakness of WUAs, but could not provide evidence regarding water management in terms of equitable and just distribution. This chapter intends to highlight this issue. Though the idea is not to evaluate the impact of WUAs, it is necessary to understand whether there is any improvement in the water availability and distribution. Equitable and just distribution of benefits (here water) is crucial for the success of collective action strategies (WUAs). For this, we need to examine the changes in water availability and the locations and people that benefited more or less from the improved access and distribution of water.

For this purpose detailed data was collected from individual households in the sample WUAs. Fifty households from each WUA were selected randomly. The sampling was carried out at two levels. First, the sample of 50 households was distributed among head, middle and tail reaches of the WUA in proportion to the actual number of households in the respective location. The sample then divided among marginal, small, medium and large size class farmers in proportion to their actual population in the respective location. Distribution of the households by size classes and location is presented in table 4.1. This distribution indicates that greater proportion of marginal and small farmers are located in tail reaches in majority of the cases when compared to large and medium farmers. This pattern is observed both in canal and tank WUAs, though not very systematic or conspicuous. However, before going in to the details of water distribution let us examine the functioning of the WUAs, as perceived by the households.

Table 4.1: Distribution of WUA Households by Farm size and Location

Name of the District/ WUA	Marginal (1.0-2.5 acres)			Small (2.51-5.0 acres)			Medium (5.1-10.0 acres)			Large (>10 acres)			All		
	H	M	T	H	M	T	H	M	T	H	M	T	H	M	T
	Chittoor-(Big Tank)	32	34	34	25	63	12	25	50	25	0	0	0	30	40
Chittoor- (Small Tank)	16	29	55	25	50	25	25	50	25	1	0	0	20	34	46
Nalgonda-(Head -Canal)	52	13	35	42	16	42	70	20	10	40	20	40	52	16	32
Khammam-(Tail end-Canal)	14	25	61	38	13	49	26	22	52	33	33	34	20	24	56
E. Godavari- (Canal)	28	37	35	25	25	50	0	0	0	0	0	0	28	36	36
Srikakulam (Tank-Medium)	37	38	25	23	23	54	43	43	14	83	17	0	40	32	28

Note: H= Head reach; M= Middle reach and T= Tail reach.

## II Functioning of the WUAs

Functioning and effectiveness of WUAs mostly depend on the process of their evolution. Both pre and post implementation process play an important role in this regard. Very few farmers are involved in the pre-planning phase of the WUAs, though a majority of them expressed that the formation of WUAs is appropriate to solve the problems of irrigation (Table 4.2). The involvement of local community was much less in the middle and tail reaches of canal system and almost zero in the case of tank systems. In the absence of local community participation, the main lacuna observed in the pre-planning process was: limited devaluation of powers to the WUAs and selection good leaders. It is observed that caste, gender and activity did not play an important role in the formation of WUAs. As seen in the previous chapter, the proportion women members in the WUAs are very marginal, as there is no provision for reservation for them.

The awareness regarding the WUAs is quite high among the communities. Greater awareness in the tank communities could be due to the smaller coverage, often pertaining to one village. Within the canal systems the awareness is higher in the head reaches compared to middle and tail reaches (Table 4.3). However, the 'high awareness' is not due to any systematic campaigning by the department or village panchayats. This coupled with poor pre-implementation involvement of communities, results in to poor but due to involvement of farmers in the programme. Irrespective of the system and location most of the people remained as passive observers rather than participating actively in the process. Though elections are inherent in the design of the WUAs, it is reported that farmers have elected the WUA members and the president in majority of the cases, elections were hardly conducted in the case of canal systems. Presidents were unanimously elected in more than 80 per cent of the cases in canal systems while it is above 50 per cent in the case of tank systems. Unanimous choice was more prevalent in the head and middle reaches than in tail reaches. This could be due to the social nexus between the village elite (social or political or economic) and the members of WUAs. Interestingly, political interference is observed in substantial number of cases, though these institutions are expected to be apolitical entities. Interferences are reported to be high in the canal systems when compared to tank systems.

Democratic process is measured in terms of conducting, attending meetings and decision-making process (collective / majority). Though GB meetings should be held once in a year and EC meetings twice in a year, these are not conducted on a regular basis. While GB meeting was conducted only in the beginning of the WUA, on an average only one EC meeting was conducted in a year (Table 4.4). EC meets whenever the need arises. Participation in the meetings is quite poor, and the issues discussed mainly pertain to crop or system development. Democratic decision-making is more or less absent in the canal systems. Important issues like fund

Table 4.2: Pre-Implementation Planning of WUA

Pre-Implementation Planning of WUA	Canal			Tank		
	Head	Middle	Tail	Head	Middle	Tail
1. Were you informed/involved in pre-implementation planning of the WUA	Yes	6 (12)	3 (8)	2 (3)	0	0
	No	20 (40)	35 (92)	37 (60)	37 (82)	45 (87)
2. Do you think that WUA planning was proper for village common/Pvt. Land	Yes	26 (52)	37 (97)	39 (63)	22 (49)	43 (83)
	No	0	1 (3)	0	15 (33)	2 (4)
3. Do you suggest any improvement in the planning of WUA in future	Yes	20 (40)	13 (34)	11 (18)	3 (7)	4 (8)
	No	19 (38)	25 (66)	33 (53)	35 (78)	42 (81)
4. If Yes, give details	Needed full powers to solve the problems by themselves	11 (22)	2 (5)	3 (5)	2 (4)	2 (4)
	Needed good workers and participating voluntarily	5 (10)	10 (26)	3 (5)	1 (2)	6 (12)
Irrigation channels development	3 (6)	1 (3)	2 (3)	0	0	0
Needed more funds for development	0	0	2 (3)	0	0	1 (2)
Qualified persons should be elected	1 (2)	0	1 (2)	0	1 (2)	0

Note: Figures in parentheses are respective percentages to the total sample households.

Table 4.3: Formation of the WUAs

Formation of Water User Associations	Canal			Tank		
	Head	Middle	Tail	Head	Middle	Tail
<b>1. Are you aware of WUA</b>						
Yes	49 (98)	26 (68)	48 (77)	44 (98)	51 (96)	50 (96)
No	1 (2)	12 (32)	14 (23)	1 (2)	2 (4)	2 (4)
<b>2. Who informed you first about WUA</b>						
Sarpanch	10 (20)	3 (8)	13 (21)	13 (29)	16 (30)	21 (40)
Fellow farmer	31 (62)	18 (47)	31 (50)	15 (33)	27 (51)	20 (38)
Irrigation Officials	7 (14)	4 (11)	4 (6)	2 (4)	1 (2)	0
<b>3. Your role in WUA activities</b>						
Active	13 (26)	10 (26)	11 (18)	9 (20)	4 (8)	8 (15)
Passive	23 (46)	28 (74)	39 (63)	30 (67)	14 (26)	37 (71)
<b>4. Who elected the members to the WUA</b>						
Farmers	35 (70)	31 (82)	35 (56)	33 (73)	40 (75)	28 (54)
Presidents	8 (16)	4 (11)	10 (16)	10 (22)	5 (9)	11 (21)
Village leaders	7 (14)	3 (8)	4 (6)	2 (4)	5 (9)	5 (10)
<b>5. What is the process of election</b>						
Voting	0	0	0	12 (27)	10 (19)	28 (54)
Nominated	2 (4)	3 (8)	0	2 (4)	1 (2)	0
Unanimous	48 (96)	35 (92)	49 (79)	31 (69)	42 (79)	24 (46)
<b>6. Is there any political interference in the process</b>						
Yes	24 (48)	8 (20)	23 (37)	8 (18)	18 (34)	7 (13)
No	26 (52)	31 (80)	39 (63)	37 (82)	35 (66)	45 (87)

Note: Figures in parentheses are respective percentages to the sample households. If the percentages do not add up to 100, the remaining should be taken as non-response.

collection and allocation are hardly discussed. Even on the simple issues, decisions were made either by irrigation department or the Presidents themselves in majority of the cases. In the case of tank systems also the Presidents mainly took decisions, though democratic process was adopted in some sporadic instances, and the role of department is marginal in the tank systems when compared to canal systems. This could be mainly due to the reason that the WUAs have limited powers in canal system. Nevertheless, in most cases farmers expressed that decisions taken in the meetings are implemented.

When enquired about the functioning of the WUA, the opinion of the sample farmers is divided. In the case of canal systems middle and tail farmers seem to be satisfied than their counter parts in the head reaches (Table 4.5). In comparison, tank WUAs seem to be faring better in satisfying their members. In the case of tanks head and tail reach farmers are more satisfied than those in the middle reaches. Political interference appears to be the dominant reason for the member dis-satisfaction, especially in the canal systems. On the contrary more members are happy about the performance of the previous Presidents in both the cases and across the locations. This indicates the unanimous selection process of the Presidents is not very faulty. The limited dissatisfaction with the previous Presidents was mainly incompetence. The difference of opinion between the WUA and President performance could be more due to the institutional aspects, like devolution of powers. In the absence of relevant powers the functioning of WUA functioning cannot be satisfactory, and the president would perform better, as the powers are limited. As revealed in the previous chapter, here also sample farmers have indicated that WUA powers are limited to conducting meetings and development of irrigation channels (Table 4.5). There are disputes among WUA members of canal systems regarding works carried out and distribution of water. Greater number of disputes are reported in the middle reaches when compared to head and tail reaches and irrigation department plays an important role in the solving the disputes. This indicates that the involvement and influence of the department has not declined. Interestingly, majority of the farmers do not have any suggestion for improving the performance of the WUAs, though some of them expressed the need for cooperation among the farmers. This clearly reflects the poor awareness and commitment of the farmers, indicating weak institutional structure in terms of social capital.

Lack of commitment and ownership also comes out clearly from the farmer's involvement in the maintenance of the systems. Farmer's involvement is limited to participation in elections, attending general body meetings (conducted only once) and to some extent water distribution. Their involvement in the important works like rehabilitation and resettlement and joint assessment survey is found to be marginal (Table 4.6). In the case canal systems, less than 20 per cent of the farmers contributed to the maintenance works, either in cash or kind (Table 4.6). Interestingly,

Table 4.4: Process of Decision Making in the WUAs

Participation	Canal			Tank		
	Head	Middle	Tail	Head	Middle	Tail
<b>1. Do your WUA conducted meetings</b>						
Yes	12 (24)	24 (63)	25 (40)	18 (40)	11 (21)	26 (50)
No	14 (28)	14 (37)	14 (23)	18 (40)	6 (11)	19 (37)
<b>2. If Yes, how often meetings took place</b>						
Quarterly	0	0	0	3 (7)	0	2 (4)
Yearly	0	0	1 (2)	2 (4)	2 (4)	1 (2)
When necessary	11 (22)	24 (63)	24 (39)	12 (27)	9 (17)	23 (44)
<b>3. No. of EC meetings held last year (Average)</b>						
Yes	1	1	1	1	1	1
No	5 (10)	6 (16)	2 (3)	16 (36)	5 (9)	11 (21)
<b>4. Do all the WUA members participate in the implementation</b>						
Yes	26 (52)	32 (84)	39 (63)	21 (47)	13 (25)	34 (65)
No	0	3 (8)	1 (2)	0	0	0
<b>5. What sort of issues generally were discussed in the meetings</b>						
Funds collection and development	13 (26)	22 (58)	23 (37)	19 (42)	12 (23)	29 (56)
Tank/ Canal/ Crop development	9 (18)	16 (42)	23 (37)	24 (53)	12 (23)	22 (42)
<b>6. Who took the decision in various activities</b>						
President	1 (2)	1 (3)	0	9 (20)	3 (6)	16 (31)
Democratic process	16 (32)	20 (53)	16 (26)	1 (2)	2 (4)	3 (6)
Irrigation officials	13 (26)	24 (63)	24 (39)	16 (36)	10 (19)	23 (44)
Yes	0	1 (3)	0	3 (7)	2 (4)	6 (12)
No						

Note: Figures in parentheses are respective percentages to the sample households.

Table 4.5: Functioning and Powers of the WUAs

	Process of Water User Associations			Canal			Tank		
	Head	Middle	Tail	Head	Middle	Tail	Head	Middle	Tail
<b>1. Are you satisfied with the functioning of the WUA</b>									
Yes	21(42)	24(63)	29(47)	35(78)	17(32)	39(75)			
No	22(44)	6(16)	21(34)	6(13)	15(28)	6(12)			
<b>2. If no, Why</b>									
Presently not functioning	4(8)	1(3)	4(6)	0	2	0			
Political Interference	17(34)	4(11)	15(24)	5(11)	11(21)	5(10)			
<b>3. Are you happy with Ex. WUA President</b>									
Yes	21(42)	23(61)	31(50)	33(73)	14(26)	32(62)			
No	5(10)	15(39)	8(13)	3(7)	3(6)	13(25)			
<b>4. If No Why</b>									
Incapable Person	5(10)	15(39)	8(13)	2(4)	3(6)	5(10)			
Selfish	0	0	0	1(2)	0	2(4)			
<b>5. What are the powers of WUA</b>									
Conducting meetings, training, programme and make suggestions	18(36)	7(18)	12(19)	4(9)	6(11)	2(4)			
They can develop irrigation channels like tank, canal etc.	11(22)	27(71)	10(16)	31(69)	17(32)	42(81)			
Getting funds from the government	5(10)	5(13)	1(2)	4(9)	8(15)	3(6)			
<b>6. Were there any disputes/conflicts among the WUA members</b>									
Yes	13(26)	19(50)	15(24)	0	1(2)	0			
No	13(26)	18(47)	24(39)	37(82)	18(34)	44(85)			
<b>7. If Yes, how did they resolve</b>									
Involvement of department	9(18)	11(29)	2(3)	0	4(8)	3(6)			
President and other elders	4(8)	2(5)	1(2)	0	0	3(6)			
<b>8. Any suggestions for effective implementation</b>									
Equal distribution of water	1(2)	1(3)	12(19)	2(4)	5(9)	9(17)			
Deepening of the Tank and raising the height of tank	0	0	0	8(18)	11(21)	10(19)			
Needed cooperation and Coordination by the farmers	14(28)	10(26)	20(32)	8(18)	9(17)	5(10)			
No Suggestions	30(60)	23(61)	28(45)	22(49)	21(40)	27(52)			

Note: Figures in parentheses are respective percentages to the sample households. If the percentages do not add up to 100, the remaining should be taken as non-response.

more people contributed in the head reaches when compared to middle and tail reaches though the differences are marginal. More farmers contributed in the case of tanks. The reasons for lack of contribution are mainly due the reason that nobody asked them in the case of tank systems. This indicates low emphasis on collecting contributions in the tank systems. In the case of canal systems three main reasons are indicated i.e., a) no demand, b) lack of money and c) nobody was contributing. As per their opinion on the maintenance works, majority of them are not satisfied, especially in the case of canal systems. However, maintenance works appear to be satisfactory in majority of the cases in tail reaches. This is true in the cases of canal and tank systems. Despite the low satisfaction levels majority of the farmers indicated that they are getting sufficient water in canal systems. However, majority of the farmers in the tank WUAs are not getting sufficient water. Differences between the reaches indicate that water availability in the tail ends is not satisfactory.

**Table 4.6: Farmers Involvement in Maintenance of WUAs**

Maintenance of WUA	Canal			Tank		
	Head reach	Middle reach	Tail reach	Head reach	Middle reach	Tail reach
<b>1. Contribution to the maintenance of the irrigation system</b>						
Yes	10 (20)	7 (18)	10 (16)	14 (31)	19 (36)	18 (35)
No	38 (76)	26 (68)	49 (79)	34 (76)	34 (64)	31 (60)
<b>2. If no, why</b>						
No body asked me (no demand)	7 (14)	5 (13)	9 (15)	23 (51)	20 (38)	24 (46)
Not contributed due to lack of money	8 (16)	5 (13)	15 (24)	1 (2)	1 (2)	3 (6)
Not contributed because others have not contributed	9 (18)	5 (13)	12 (19)	1 (2)	2 (4)	1 (2)
<b>3. If yes, what were the forms of contribution</b>						
Cash	2 (4)	4 (11)	7 (11)	6 (13)	10 (19)	5 (10)
Labour	6 (12)	1 (3)	3 (5)	3 (7)	6 (11)	10 (19)
Both	2 (4)	1 (3)	2 (3)	1 (2)	1 (2)	0
<b>4. Is the contribution for maintenance is based on per unit of cropped area</b>						
Yes	10 (20)	9 (24)	9 (15)	15 (33)	29 (55)	24 (46)
No	38 (76)	18 (47)	51 (82)	20 (44)	16 (30)	15 (29)

**Table 4.6: Farmers Involvement in Maintenance of WUAs (Contd...)**

Maintenance of WUA	Canal			Tank		
	Head reach	Middle reach	Tail reach	Head reach	Middle reach	Tail reach
<b>5. Were you satisfied with the maintenance of the system</b>						
Yes	16 (32)	10 (26)	31 (50)	24 (53)	28 (53)	32 (62)
No	34 (68)	18 (47)	21 (34)	21 (47)	24 (45)	19 (37)
<b>6. If no, give reasons</b>						
No progress in work	13 (26)	9 (24)	10 (16)	9 (20)	12 (23)	9 (17)
Lack of improvement of the system	5 (10)	5 (13)	4 (6)	3 (7)	1 (2)	3 (6)
President has become contractor	10 (20)	2 (5)	5 (8)	2 (4)	4 (8)	1 (2)
<b>7. Have you got sufficient water from the Canal/Tank</b>						
Yes	32 (64)	27 (71)	31 (50)	14 (31)	19 (36)	15 (29)
No	18 (36)	8 (21)	29 (47)	31 (69)	34 (64)	37 (71)
<b>8. Participation in Election</b>	33 (66)	16 (42)	36 (58)	1 (2)	1 (2)	1 (2)
<b>9. Participation in R&amp;R works</b>	0	2 (5)	2 (3)	2 (4)	1 (2)	1 (2)
<b>10. Water Distribution</b>	25 (50)	25 (66)	28 (45)	1 (2)	0	0
<b>11. Farmer participating in GB</b>	50 (100)	32 (84)	62 (100)	9 (20)	13 (25)	15 (29)
<b>12. Farmer participating in Joint Survey</b>	1 (2)	2 (5)	1 (2)	1 (2)	0	0

Note: Figures in parentheses are respective percentages to the sample households.

Low availability of water in the tail reaches is also reflected in the quality of works carried out. Over all less than a quarter of the works are observed to be of good quality in the case of canal systems, while it is more than 60 per cent in the case of tank WUAs (Table 4.7). The quality of works decline as we move from head to tail reaches. However, the better quality works in the tank WUAs is not translated into improved irrigation facility. This could be due to absence of tank renovation and the absence of sufficient water storage facility. In the case of canal tail reaches substantial number of farmers (37 per cent) has reported improved irrigation facility. But, the impact on equity in the distribution of water and awareness is marginal. Political interference appears to be the major demerit of the WUAs, especially in

the canal systems. One important indicator of social capital development is capacity building at the local level. Here capacity is measured in terms of training and exposure visits. Only a quarter of the sample farmers have reported the capacity building activities that too in the canal systems. Capacity building is less emphasized in the WUAs under tanks. In both canal and tank systems capacity building is concentrated in the head reaches. The major activity in capacity building is better water management practices (Table 4.7).

**Table 4.7: Farmers Views on WUA Functioning—Merits and Demerits**

Merits	Canal			Tank		
	Head reach	Middle reach	Tail reach	Head reach	Middle reach	Tail reach
1. Good quality work Done	15 (30)	12 (32)	8 (13)	28 (62)	35 (66)	31 (60)
2. Improving of irrigation facility	11 (22)	18 (47)	23 (37)	1 (2)	0	1 (2)
3. Equal Distribution of water	0	2 (5)	0	0	0	0
4. Increased public awareness	0	0	0	4 (9)	4 (8)	2 (4)
<b>Demerits</b>						
1. Increase of political Interference	13 (26)	15 (39)	13 (21)	5 (11)	12 (23)	6 (12)
2. Increase of internal Conflicts among members	8 (16)	5 (13)	3 (5)	4 (9)	5 (9)	11 (21)
3. Funds are misutilised by the dept.	4 (8)	7 (18)	2 (3)	7 (16)	2 (4)	2 (4)
4. No encouragement from the dept.	3 (6)	1 (3)	2 (3)	1 (2)	0	0
5. All works on Contracting system	6 (12)	3 (8)	2 (3)	4 (9)	2 (4)	2 (4)
6. Capacity building	14 (28)	10 (26)	11(18)	10 (22)	5 (9)	4 (8)

Note: Figures in parentheses are respective percentages to the sample households.

### III. Impact of WUAs

It is clear from the above analysis that the performance of WUAs' is not up to the mark. But, due to the improvements in the distributory systems and better availability of water there is bound to be some impact on irrigation and related indicators. However, the unprecedented drought situation and shortage water even in major systems like Nagarjunasagar has left the farmers high and dry for two years i.e., 2002-03 and 2003-04. This factor needs to be taken into account while assessing the impact of WUAs. Keeping this in view we have assessed the impact between 1997-98 and 2001-02, though we have collected the data till 2002-03. The year 1997-98 is the starting year of the WUAs and hence provides the 'before' scenario and the year 2001-02 provides 'after' scenario with a span of five years.

Assessing the impact of any particular programme or initiative is complex. In the case of WUAs, the focus is mainly on improving the availability and management of water. Hence, the advent of WUAs is expected to have a direct bearing on the water availability and crop production. In the event of positive impact on these indicators, there is possibility of secondary impacts like employment, income, etc. Similarly, some environmental impacts are also expected in the nature of water logging and salinity (direct) and availability of drinking water (indirect). But, attributing all these impacts to WUAs is difficult. Therefore, here an attempt is made to examine some of the important impacts from the farmers' perspective. That is sample farmers were specifically asked whether there is any change in the indicators due to WUAs and the answers are analysed here in the following five components.

#### *a) Water Availability and Crop production*

Better water delivery / distribution is assumed to be an important indicator of the efficient functioning of any WUA. Water delivery performance can be estimated on the basis of area irrigated, number of waterings and crop productivity (here paddy, the main irrigated crop). Between 1997-98 and 2001-02 there has been an increase in average area irrigated of the sample households in the canal systems (Table 4.8). But, tank WUAs have recorded a sharp decline. Though, tank irrigation is experiencing a secular decline in the recent decades, the advent of WUAs could not check this decline. Added to this is the drought situation. If the 2002-03 figures were to be taken, even the canal systems would have shown a decline. Between 1997-98 and 2001-02 the increase in area irrigated is more in the case middle and tail reaches indicating that these areas were suffering more water shortages prior to the advent of WUAs. Improved irrigation conditions in these areas also benefit the marginal and small farmers, as their concentration is high in these reaches.

**Table 4.8: Changes in Area Irrigated (acres/hh) During the Period 1997-98 to 2001-2002 by Location**

Year	Canal			Tank			All		
	Head	Middle	Tail	Head	Middle	Tail	Head	Middle	Tail
1997-98	3.81	4.01	2.61	2.71	2.15	1.43	3.30	2.86	2.10
1998-99	3.73	4.06	3.54	1.86	1.56	1.12	2.86	2.52	2.49
1999-00	3.89	4.16	2.79	1.80	1.50	1.05	2.92	2.52	2.04
2000-01	3.93	4.11	2.78	1.77	1.53	0.99	2.93	2.52	2.00
2001-02	3.88	4.21	2.69	1.92	1.55	1.05	2.98	2.57	1.98
2002-03	1.31	2.31	0.57	0.67	0.43	0.52	1.01	1.16	0.55
% Change (over 2001-02)	1.8	4.8	3.0	-41.1	-38.7	-36.2	-10.7	-11.3	-6.1

Source: Survey data

The adequacy of water reaching the farmers at the end of the canal / tank i.e., the number of days that sufficient water reached to the tail reaches of the canal / tank is measured in terms of number of actual waterings in comparison with water requirement. The analysis from the sample WUAs indicates that there are differences in the number of irrigations required and actual number of waterings for Paddy, a water intensive crop. The difference between different reaches under tank WUAs is more when compared to canal WUAs. The continuous failure of monsoon may be one of the reasons for the considerable decline in the available number of waterings during the period 1997-98 and 2001-02 especially under tanks (Table 4.9). The differences between requirement and actual use of water has narrowed down, especially in tail reaches only after the year 2000-01. This re-emphasises the improved availability of irrigation water in tail reaches due to the advent of WUAs.

While the impact on area irrigated is more in the middle and head reaches, qualitative impact appears to be more in the middle and head reaches. Qualitative impact is observed in terms of improved productivity of paddy. Canal systems in all the locations have experienced increased productivity of paddy, while tank WUAs have experienced negative growth (Table 4.10). Within the canal systems the rate of change is higher in the middle reaches followed by head and tail reaches. Middle reaches appear to have benefited most in quantitative and qualitative terms. However, this may not be directly attributable to the WUAs, as the productivity changes could be due to various reasons. The cost-returns data indicates that returns to agriculture are positive (on operational cost) in majority of the cases in all the locations (Appendix Table 1).

**Table 4.9: Water Requirement and Availability for Paddy During the Period 1997-98 to 2002-2003.**

Water Distribution	Canal			Tank		
	Head	Middle	Tail	Head	Middle	Tail
<b>1997-98</b>						
No. of Watering Requirements	105	105	103	120	120	120
No. of actual Watering	104	103	99	107	107	101
<b>1998-99</b>						
No. of Watering Requirements	108	105	105	120	115	115
No. of actual Watering	105	103	98	105	100	100
<b>1999-2000</b>						
No. of Watering Requirements	107	107	100	120	110	115
No. of actual Watering	105	105	94	108	105	98
<b>2000-2001</b>						
No. of Watering Requirements	107	105	105	115	110	110
No. of actual Watering	105	105	104	108	105	100
<b>2001-2002</b>						
No. of Watering Requirements	105	105	105	120	110	110
No. of actual Watering	105	105	102	107	103	100

In line with the policy of transfer of management responsibilities to WUAs and making WUAs more financially sustainable, it was recognised that the water users have to pay the actual O & M costs for the irrigation service. The results indicate that since 1997, farmers were paying only 3 per cent of the total cost of cultivation (2 to 1.5 per cent in total gross value of output) in different locations viz., head, middle and tail end reaches of the canal system; while 1 to 1.5 per cent of the total cost of cultivation (1.5 per cent in total gross value of output) in different locations of the tank areas (Appendix Table 1). It is also observed that there is a shift from cereal crops to cotton, castor, other cash crops like papaya, banana and mango especially in different locations of the tank areas. However, the shift to higher value crops is driven by prices, and influence of other factors and not entirely due to the irrigation reforms. In general there is an increase in income from all sources and in all locations (Appendix Table 2).

**Table 4.10: Average Productivity of Paddy (Yield in Quintal per Acre)  
During the Period 1997-98 to 2002-2003.**

Year	Canal			Tank			All		
	Head	Middle	Tail	Head	Middle	Tail	Head	Middle	Tail
1997-98	23.1	23.1	21.0	22.1	19.0	14.5	22.6	20.8	18.3
1998-99	23.8	25.0	22.4	12.3	13.0	11.1	18.5	18.4	18.0
1999-00	25.9	26.3	23.4	11.0	9.3	10.0	18.9	16.9	17.9
2000-01	26.2	27.1	23.1	11.1	10.1	9.1	19.1	17.7	17.3
2001-02	22.4	23.4	20.8	11.6	10.6	10.2	17.3	16.4	16.4
% Change (over 2000-01)	11.8	14.8	9.0	-99.1	-88.1	-59.3	-18.3	-17.5	-5.8

### *Employment*

Employment is one of the important indicators for the sustainability of WUAs. Availability of regular and sustainable employment is crucial. This study examines the changes in employment at the household level before and after the formation of WUAs across different reaches of the canal / tank areas. The focus in this study is on seasonal employment as it reflects the stability and sustainability of employment. It was observed that the number of days of employment increased in both the seasons i.e., kharif and rabi of different reaches in canal areas (Appendix Table 3). While in tank areas this trend is negative in case of kharif season and positive in rabi season. But in summer, there is a considerable decline in employment days, perhaps due to continuous drought prevailing in the State.

### *Household Income*

Impact on household income due to formation of WUAs can be attributed to number of factors. Some of them include cropping pattern, animal husbandry and employment diversification. Cropping pattern in turn is governed by involvement of risk and prices of different crops in the market. Animal husbandry is an alternative livelihood, which is mostly influenced by availability of CPRs in that area and suitability of weather conditions. In the study regions agriculture is the dominant source of income, followed by livestock in both the canal and tank areas of different reaches (Appendix Table 2). The relative shares of income have positively changed after the introduction of irrigation reforms not only from agriculture, livestock, horticulture but also from labour in different locations of the canal and tank areas of farmers. However, one should not attribute this positive trend entirely to the irrigation reforms, as other factors also contribute in this regard.

*Drinking water*

One of the important environmental impacts expected from any reforms are the improvement in and accessibility of drinking water facility. In the recent past, the prevailing drought conditions have negatively impacted the environment, such as decline of livestock population, depletion of fodder availability and fuel, and also depletion of groundwater as well as drinking water. A major impact of this would be on the sources of drinking water, depth of the water and time spent on fetching water. This study examined the impact in terms of availability of drinking water. As far as the sources of drinking water are concerned, the number of sources such as open wells and tanks have come down drastically while public taps and tube wells increased in different locations of both canal and tank areas (Appendix Table 4). Accessing the public taps and tube wells is one way of going for safe drinking water, but the concern here is depletion of ground water though it is not unique to the sample villages. Time spent on fetching water also has gone up especially under tank areas indicating the gravity of the situation.

*Water Logging and Salinity*

Water logging and Salinity was the major problem facing the farmers across the canal areas. After formation of Water User Associations, one of the major problem faced by the WUAs in the regions of East Godavari head reaches is the water logging and salinity. Most of the sample households are aware of this and opined that the WUAs can solve the problem of water logging and salinity by constructing field channels (6 to 20 per cent), drainage channels (4 to 16 per cent), and pipelines (2 to 10 per cent). From the farmer's point of view, the major steps to tackle these problems are clearing the weeds / debris in the field (2 to 14 per cent), digging the drainage channels (2 to 8 per cent), and inter plantation through field / drainage channels for income generation to WUAs (2 to 14 per cent). But many farmers are unhappy that the present WUAs are not showing much concern to this problem of water and sanitation (4 to 6 per cent) and no proper action with respect to field channels and drainage problems were taken up by the WUAs (Appendix Table 5).

**IV Conclusions**

The main objectives of irrigation reforms in AP include a) improving the irrigation water management through involvement of farmers and other stakeholders, b) reducing the burden, financial as well as administrative, of the irrigation department by shifting part responsibilities to the farmers. Our analysis in this chapter attempted to assess the situation from two angles at the household level, viz., institutional strengths of WUA in terms of sustainability and incentives structures for collective action. While the former is assessed in terms of stakeholder involvement, commitment, adoption of democratic process in the functioning of WUAs and devolution of powers to the WUAs, the later is assessed in terms of benefit flows to the households due to the advent of collective action institutions.

Farmers are positive about the benefits from the new institutional arrangements, though the benefits appear to be more in quality terms. On the other hand, the benefits are limited to improved water availability in the canal systems only and failed to make any dent in the case of tank systems. Even in the canal systems the benefits are strictly limited to water availability and failed in addressing other important and related aspects of water logging, salinity, drinking water, etc (environmental issues). Though these positive benefits are an incentive for collective action, the magnitude of the benefit is too small to sustain the collective action in the long run. This is mainly due to the failure of the initiative to create and strengthen the social capital that would have helped in taking the initiative forward. In fact, very little is done in this regard. Poor awareness, marginal commitment and low involvement of the primary stakeholders even after 5 years of the initiative talks volumes and questions the seriousness and commitment of the implementers. In the absence of devolution of powers to the WUAs, people consider as one those government programme and runs only with government funds. There were no serious attempts to involve the primary stakeholders in terms of their involvement in contributions and decision-making process. Farmers felt that WUAs have only limited powers and hence the continuation of the initiative is linked to the fund flows. All the important activities like assessment, fee collection and fund allocations are with irrigation or revenue department leaving little in the hands of WUAs. The nexus between political and department people has further alienated the farmers.

## Annexure IV

**Table 1: Cost of Cultivation and Returns of Paddy of the Sample WUA  
Households by Size Class (Per Acre)**

Farm Size/Cost/Returns	Canal			Tank		
	Head	Middle	Tail	Head	Middle	Tail
<b>Marginal</b>						
Electric Charges to total cost (%)	0.2	0.4	0.1	6.1	3.6	4.6
Water Cess to total cost (%)	3.1	2.9	2.7	2.7	0.5	1.3
Total Cost (Rs.)	604	585	672	623	616	578
Gross Returns (Rs.)	1122	1012	942	954	885	921
Net Returns (Rs.)	518	428	270	331	270	343
Benefit Cost Ratio of Gr.	1.9	1.7	1.4	1.5	1.4	1.6
Benefit Cost Ratio of Nr.	0.9	0.7	0.4	0.5	0.4	0.6
<b>Small</b>						
Electric Charges to total cost (%)	0	0	0	9.0	13.0	5.4
Water Cess to total cost (%)	3.1	2.9	2.7	2.7	0.5	1.3
Total Cost (Rs.)	742.2	724.6	585.2	659.1	523.0	654.7
Gross Returns (Rs.)	830.2	1043.1	955	969.0	1161.3	849
Net Returns (Rs.)	87.9	318.5	370	310.3	638.3	194.2
Benefit Cost Ratio of Gr.	1.1	1.4	1.6	1.5	2.2	1.3
Benefit Cost Ratio of Nr.	0.1	0.4	0.6	0.5	1.2	0.3
<b>Medium</b>						
Electric Charges to total cost (%)	0.2	0	0	5.1	10.3	6.8
Water Cess to total cost (%)	1.9	3.1	2.4	0.9	0.7	0.8
Total Cost (Rs.)	821	569	793	765	629.4	648
Gross Returns (Rs.)	907	1027	1088	687	940	958
Net Returns (Rs.)	86.2	458	296	-78.0	311	310
Benefit Cost Ratio of Gr.	1.1	1.8	1.4	09	1.5	1.5
Benefit Cost Ratio of Nr.	0.1	0.8	0.4	-0.1	0.5	0.5
<b>Large</b>						
Electric Charges to total cost (%)	0	0.1	0	6.6	3.7	0
Water Cess to total cost (%)	2.8	2.9	2.5	0.2	1.0	0
Total Cost (Rs.)	645	635	754	709	818	421
Gross Returns (Rs.)	1109	1128	1188	747.5	767	1378
Net Returns (Rs.)	464	493	435	39	-51	956
Benefit Cost Ratio of Gr.	1.7	1.8	1.6	1.1	0.9	3.3
Benefit Cost Ratio of Nr.	0.7	0.8	0.6	0.1	-0.1	2.3

**Table 2: Income From Different Sources (Average per household)**

Income from different sources	% Change					
	Canal			Tank		
	Head	Middle	Tail	Head	Middle	Tail
Agriculture	24	31	16	46	52	46
Live Stock	20	10	25	18	49	6
Horticulture	37	27	-67	10	10	29
Labour	52	60	74	23	20	40
Others	22	41	29	25	44	39

**Table 3: Changes in Employment Generation of WUA Households Number of Days Employed/Year**

Season	% Change					
	Canal			Tank		
	Head	Middle	Tail	Head	Middle	Tail
Kharif	23	1	5	-9	-11	-14
Rabi	7	7	6	7	10	7
Summer	-100	-200	-85	-67	-44	-32

**Table 4: Changes in Drinking Water Situation in WUA Locations**

Sources of drinking water	% Change					
	Canal			Tank		
	Head	Middle	Tail	Head	Middle	Tail
<b>Sources of Drinking Water</b>						
Public tap	32	33	17	29	-	33
Well	-9	-60	-15	-58	-34	-54
Tank	-100	-50	-100	-50	-	-100
Tube well	17	33	25	14	-	20
Quantity of drinking water (Liters)	17	-10	8	9	38	-25
Time Spent (hrs.)	0	0	0	0	50	50
Depth of water table (in ft.)	75	71	63	76	71	67



## CHAPTER V

### Irrigation Institutions: Informal Vs. Formal

#### I. Introduction

Though the large-scale initiative of irrigation institutions in AP makes a sound policy sense, the effectiveness and sustainability of these formal institutions, as revealed in our analysis, is rather marginal. Even after five years, their sustainability is critically linked with external fund flows in the absence of devolution of powers regarding assessment, fee collection and fund allocations. On the other hand, there exists some informal arrangements in irrigation management that are sustaining themselves for decades. Moreover, these informal institutions seem to have over the problems associated with formalisation of irrigation institutions. Some important questions in this regard are: how effective are these informal institutional<sup>5</sup> arrangements at the village level when compared with formal ones? What are the missing aspects that need to be addressed in order to make the formal institutions effective? This chapter makes an attempt to compare the formal and informal institutional arrangements in irrigation management in Andhra Pradesh.

The analysis included here is based on the information collected from two neighbouring villages, which are located on the tail end of the channel of the Kurnool Cuddapah canal<sup>6</sup>. These two villages are located in Kurnool district of the Rayalaseema region. Both the villages are covered under the WUA legislation. These villages are Karimaddela and Erraguntla. One of the villages (Karimaddela) happened to be the one surveyed by Robert Wade during the early 1980s<sup>7</sup> (Wade, 1988). Interestingly, the earlier institutional arrangements narrated by Wade are still existing and effective in Karimaddela though the formal institutions (WUAs) have come in and play only a supportive role. Despite the success and sustainability of the institutional arrangements in irrigation management in Karimaddela, such institutional arrangements are absent in the neighbouring villages. In fact,

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5 Informal institutions are also termed as socially embedded institutions (Cleaver, 2002).

6 The rationale for selecting the location is that this system is among the better performing irrigation systems in the State. Details on divisional information are avoided due to space limitations.

7 Though Wade used pseudonyms to protect the identities of villages, we identified the village with the help of information provided in his book and later confirmed in the village.

Karimaddela remains to be a lone village in this regard for the last two decades. However, some changes have taken place in the nature of adapting to the socio-political dynamics over the period. In the other village, no informal institutions were in operation and the formalised WUA is the only institution functioning. A comparison of the two villages provides insights into the process and effectiveness of the formal and informal institutional arrangements.

Both qualitative and quantitative information were elicited in order to examine the effectiveness of the two different types of institutional arrangements. Qualitative information is elicited with the help of Participatory Rural Appraisal (PRA) exercises such as focus group discussions, key person interviews like senior citizens, officials in the irrigation department, office-bearers of WUAs, etc. Two structured questionnaires, one pertaining to WUAs and another pertaining to households, were canvassed to gather quantitative information. Fifty sample households in each village, covering all the important socio-economic groups, were selected for an intensive interaction. Before and after scenarios were used to assess the impact as there is no possibility for with and without scenario, as all the farmers getting irrigation water are covered under WUA in each village. The fieldwork was conducted during the month of June 2002. Before going into the detailed analysis, it would be pertinent to present the structure of the irrigation institutions in the sample villages.

## **II Institutional Structure: Formal Vs Informal**

Both the sample villages are similar in many aspects of socio-economic and demographic conditions. These villages are of the size of 500-600 households with a population of about 3000-3500. Social structure is dominated by forward castes. The similarities in socio-economic conditions in the village are reflected in the household sample (Table 5.1). There is a positive relation between farm size/social category and their income level. Both the villages are located at the tail reach of the 35 km distributory canal<sup>8</sup>. Both the villages face water problems due to their location. Groundwater is used to complement the canal water in scarcity conditions. In the absence of proper management of canal systems, Erraguntla depends more on groundwater, as the canal water does not reach the village.

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<sup>8</sup> The reason for selecting the tail-end villages is that some of the earlier studies indicated that the benefits of WUAs are conspicuous in tail-end locations of the distributory systems (for review, see Reddy, 2002).

**Table 5.1: Village wise and Category wise Number of Sample Households and Income**

Category	No. of sample households		Average household income (Rs./year)	
	Karimaddela	Erraguntla	Karimaddela	Erraguntla
Scheduled caste (SC)	2 (4)	2 (4)	26,461	16,491
Backward caste (BC)	21 (42)	20 (40)	50,903	44,827
Other caste (OC)	27 (54)	28 (56)	65,998	68,119
Marginal farmers < 2.47 acres)	10 (20)	10 (20)	27,148	19,978
Small farmers (2.48-4.94 acres)	8 (16)	10 (20)	40,252	25,519
Semi-medium farmers (4.95-9.88 acres)	12 (24)	10 (20)	48,382	52,860
Medium farmers (9.99-14.83 acres)	5 (10)	9 (18)	56,891	84,952
Large farmers (>14.83 acres)	15 (30)	11 (22)	96,353	98,976
All size categories	50 (100)	50 (100)	58,076	56,737

Note: Figures in parentheses are respective percentages

About 45 per cent of the cropped area is under irrigation in both the villages. However, water scarcity is reflected in the cropping pattern. While paddy is the single largest crop in Karimaddela, it is Jowar in Erraguntla. The other important crops include pulses, sunflower, groundnut, cotton, etc. In Erraguntla, canal water is used whenever it reaches the village. No particular efforts are made, formally or informally, to access the canal water. Here we present the structure of the irrigation institutions separately for formal and informal institutions. The formal institutions have a standard structure for all the associations in the State (see chapter 1). On the other hand, the informal institution in Karimaddela was initiated in the late 1970s, which has undergone some changes.

This structure is followed across board, though there would be variations in terms of composition of members in the given socio-economic and political context. The WUAs have two types of members. One is the general membership and the other is the membership of Management Committee headed by the president. While the former reflects the land ownership in the command area, the latter is the executive body with powers to take decisions including financial contracts. In both the sample villages there is a bias towards upper classes, social and economic, with regard to

**Table 5.2: Structure of WUAs in the Sample Villages (per cent)**

Per cent of WUA members belonging to	Karimaddela	Erraguntla
Scheduled castes/tribes	15 (21)	13 (26)
Backward castes	27 (42)	37 (36)
Forward castes	58 (37)	50 (38)
Marginal farmers	50 (47)	31 (30)
Small farmers	25 (19)	35 (32)
Medium farmers	13 (31)	29 (33)
Large farmers	12 (03)	05 (05)

Note: Figures in parentheses indicate the percentages of the respective categories in the total population

**Table 5.3: Structure of Management Committee Members in the Sample Villages**

Name	Designation	Caste	Size-class	Village
<b>Karimaddela WUA</b>				
1. U. Viswanantha Chetty	President	O.C	FS-5	Karimaddela
2. K. Gangamma	Member	O.C	FS-1	Paramatur
3. K. Ramalingeswara Reddy	Member	O.C	FS-5	Pesaravai
4. K. Venta Siva Reddy	Member	O.C	FS-3	Karimaddela
5. S. Chandrasekarhara Reddy	Member	O.C	FS-5	Karimaddela
6. N. Dalaiah	Member	B.C	FS-3	Karimaddela
7. G. Chandrasekhar Reddy	Member	O.C	FS-5	Karimaddela
<b>Erraguntla WUA</b>				
1. Sainatha Reddy	President	O.C	FS-5	Bheemavaram
2. N. Srinivasa Reddy	Member	O.C	FS-5	Karimaddela
3. AV Subba Reddy	Member	O.C	FS-4	B. Atmakur
4. G. C. NagaMa	Member	B.C	FS-3	Karimaddela
5. Vacant	Member	Vacant	-	Vacant
6. Vacant	Member	Vacant	-	Vacant
7. Vacant	Member	Vacant	-	Vacant

Note: Farm Size-5 represents the highest size-class and FS-1 represents the lowest size class.

both types of membership (Tables 5.2 and 5.3). This is a common phenomenon observed at the aggregated level also (Reddy, 1999). The number of villages covered under each WUA is reflected in the representation of the members from these villages in the management committee. Karimaddela WUA covers the villages of Pesaravoy (upstream), Karimaddela and Paramatur (near Karimaddela with a small ayacut). Erraguntla WUA covers Karimaddela, Bandi Atmakur, Erraguntla, Kakanur and Bheemavaram. Bheemavaram and Kakanur are tail-end villages of Erraguntla WUA channel but these villages get water from other branch of K.C. canal also and hence not very much interested in Erraguntla channel. It may be noted that none of the farmers from Erraguntla have come forward to become members of the management committee (Table 5.3).

Both the WUAs have received funds from the department on the basis of the size of command area (Table 5.4). However, the funds are released according to the collection of irrigation charges from the year 2000-01. The low allocation to Erraguntla despite greater command area under WUA is due to the reason that it has less of wet crops and more of irrigated dry crops compared to Karimaddela (Table 5.4). This reflects the poor performance of the Erraguntla WUA. Though these amounts are spent on repair works, farmers in Erraguntla feel that more money is required for rehabilitating all the distributary systems serving the village. It is reported that they are not even paying their due (water charges) let alone generating extra funds. This is mainly attributed to the lack of involvement and unity among the villagers. On the other hand, Karimaddela has stronger institutional arrangements, as explained later, for collecting the money.

**Table 5.4: Expenditure on WUAs and Their Command Area in the Sample Villages**

Year	Karimaddela			Erraguntla		
	Expenditure (Rs.)	Command area (acres)		Expenditure (Rs.)	Command area (acres)	
		Wet	Irrigated dry		Wet	Irrigated dry
1997-1998	50,000	1,193	1,851	50,000	780	2,927
1998-1999	1,44,600	1,193	1,851	1,00,000	780	2,927
1999-2000	2,55,000	1,193	1,851	2,00,000	780	2,927
2000-2001	75,000	1,193	1,851	78,000	780	2,927

Note: WUAs have not received any amount for the year ending 2002. Money was mainly spent on culverts, mories, sidewall to the channel, drainage channel, etc.

*Informal Institutions*<sup>9</sup>

Villages in this region are often faction ridden, dominantly family feuds. Our sample villages are no different. But the irrigation institution initiated in the late 1970s in Karimaddela village is devoid of these factions. The anecdotal evidence suggests that the institution was a result of the severe shortage of water at that time and in fact it was the idea of an irrigation engineer. Over the years the institution has undergone some changes (Table 5.5). These changes are only constitutional mainly adapting to the political changes that have taken place in the State during the 1980s and 1990s. The smooth transition of these changes reflects the flexibility in the structure. These changes were necessitated in order not to antagonise the political dynamics at the village level.

In comparison with the formal WUAs, the informal institution is more complex, given the fact that it is only at the village level, but it has better role clarity and is more systematic. It takes care of all the aspects of water management, including rent seeking. For instance, a substantial share in the money collected is spent on bringing irrigation officials (by hiring a jeep), entertaining them whenever necessary and to get the work done. Equity in water distribution is maintained by following rotational system and compliance is ensured through the appointment of external agents (irrigators and field guards). Besides, incentive structures are in place in order to make the system more effective. Though cost-based contribution is the norm, other sources of income are effectively used to complement the irrigation charges. In fact, new methods of raising income were introduced. The farmers pay over and above the irrigation charges despite the three-fold increase in the rates indicating the high willingness to pay for better service. This institutional structure represents the effective integration of market-based instruments with the institutional approaches. This dimension is lacking in the formal WUAs. Moreover, the rights and responsibilities of WUAs are yet to be defined clearly. This gets clearly reflected in the effectiveness of these institutions in achieving their objectives, which is taken up in the next section.

**III Effectiveness of WUAs: Formal Vs. Informal**

As our analyses in the previous chapters revealed that though there is some positive impact of WUAs their sustainability is rather doubtful in the absence of external funding. In this section, we discuss the effectiveness of WUAs based on the information from our sample villages. It may be noted that here we are not presenting the changes due to the WUAs, as we have observed no changes, whatsoever, in both the villages due to the advent of formal WUAs. Moreover, these villages have

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<sup>9</sup> For more details on the earlier situation, see Wade (1988).

**Table 5.5: Changes in the Structure of Informal Institutions**

Details	1980 (Wade's survey)#	2002
Administrative	<p>(a) Village council comprising 9 members chosen every year by village elders. Normally accommodating both the factions. But representation of factions 'or caste groups was not very important, as there was no interference from the factionaries.</p> <p>(b) No president. One accountant treasurer.</p> <p>(c) Village contractor, normally council member, is given the responsibility of dealing with the irrigation officials and supervises the maintenance works.</p>	<p>(a) Factions are replaced by political parties. Now only 8 members are chosen giving equal representation to both the political groups. Now political and caste representation are very important.</p> <p>(b) No president. Two accountants treasurers representing both the groups. Each has a key for the double lock money safe.</p> <p>(c) Village council members attend to works themselves. Official WUA president is responsible for taking up the repair works as per government orders. Beyond that, village council will attend to the works.</p>
Source of finance	<p>(d) Council meets as and when necessary.</p> <p>(a) In addition to the charges (Rs. 41/ acre) by the department, per acre flat rate is fixed every year as per the need.</p> <p>(b) During <i>rabi</i> season an extra 20 per acre and grain of 5- 10 kg of paddy per acre was collected in order to ensure timely supply of water.</p> <p>(c) Auctioning of sheep grazing land (shared between shepherd and the council).</p> <p>(d) Liquor licensing.</p>	<p>(d) Council meets as and when necessary.</p> <p>(a) Allocations from WUA.</p> <p>(b) Auction of the right to collect the commission on the sale of produce in the village. .</p> <p>(c) Auctioning of the village fields (private and common) for grazing to shepherds.</p> <p>(d) Collection of per acre charges as and when necessary in addition to the charges (Rs. 200 acre) by the department.</p>

**Table 5.5: Changes in the Structure of Informal Institutions (Contd...)**

Details	1980 (Wade's survey)#	2002
Water management	(a) Depending on the necessity 12-13 common irrigators are appointed to irrigate the fields.	(a) Same procedure.
	(b) Four field guards to guard the crops during harvest season. They undertake small repairs of the channels, village roads, etc. They are responsible for collecting the fines.	(b) Same procedure.
	(c) Only dominant and influential people were selected.	(c) Now diluted. Caste/group influences the appointment.
	(d) Irrigators are paid 4-5 kg of paddy per acre of command area. Field guards are paid Rs. 60-80 per month. Besides, field guards will get 25 per cent share in the case of bigger fines collected by the council, as an incentive.	(d) Irrigators are paid 10 kgs of paddy per acre of command area. Field guards are paid one kg of paddy per acre of command area (works out to Rs. 500 per month). The entire fine will be shared equally between the field guards.
	(e) Rotational irrigation schedule is followed.	(e) Same procedure.
	(f) Fines and severe punishment for non-compliance.	(f) Only fines.
	(g) All the conflicts are resolved by the council.	(g) All the conflicts are resolved by the council. If necessary ex-council members are also involved.

Note: #Taken from Wade (1988).

never faced serious water problems due to the availability of groundwater though availability of canal water is a problem. Therefore, we present the situation in both the villages in terms of availability of canal irrigation, which reflects the effectiveness of WUA. The effectiveness of WUAs differ between WUAs of informal nature (Karimaddela) and formal nature (Erraguntla). It may be noted that the formal WUAs in Karimaddela play a supportive role to the existing informal institution in getting the funds and supervising the engineering works.

As mentioned earlier, Erraguntla hardly receives any canal water. This is mainly attributed to the absence of full-scale maintenance of the distributory systems. Though the WUA provides some funding for this purpose, funds are not sufficient to carry out the works. There is need for complementary contribution from the users, who are not coming forward. The works could have been carried out in a phased manner but the villagers do not seem keen in carrying out the works at all. On the other hand, Karimaddela gets assured water supplies due to the community efforts. In Karimaddela, funds are raised not only through user contributions but also through other avenues. The collections through various methods (indicated in Table 5.5) range between Rs. 1.50 lakhs and Rs. 3.00 lakhs per year, which are often more than the formal allocations from the WUA. This is mainly due to the active involvement of the community, which may be due to the socially embedded nature of the institutional arrangements. The formal WUA could not penetrate the existing inactive community in Erraguntla village. Another important reason is that there are no serious economic losses to the community for being passive in the institutional process. Though less water intensive crops are grown in Erraguntla, the net returns to farming are comparable with that of Karimaddela with respect to all crops, except paddy (Table 5.6). The farmers in Erraguntla pay more in terms of irrigation charges for paddy and groundnut crops grown under canal, as they use more of groundwater rather than canal water (Table 5.7). But the higher irrigation expenses do not have much adverse impact on the net crop returns or average overall income. This clearly indicates that economic incentives are weak to promote collective action and community participation, which is reflected in their non-participation in the WUA activities.

**Table 5.6: Average Yield And Net Returns Per Acre of Important Crops**

Crops	Karimaddela		Erraguntla	
	Yield (qtl.)	Net Returns (Rs.)	Yield (qtl.)	Net returns (Rs.)
Paddy	23.23	12,397	20.95	8,674
Black gram	3.33	2,086	3.20	3,006
Groundnut	8.87	5,970	9.35	6,481
Sunflower	4.80	3,269	5.48	4,381
Jowar	-	1,969	7.95	4,340
Cotton	8.10	4,941	-	-

Note: Sunflower and Jowar are the regular crops in Erraguntla due to the lack of assured canal irrigation.

**Table 5.7: Source Wise and Crop Wise Irrigation Expenditure (Rs. /acre)**

Crop/source	Karimaddela	Erraguntla
<b>Paddy</b>		
Canal	268	714
Well	1,080	646
<b>Groundnut</b>		
Canal	383	518
Well	1,209	618
<b>Sunflower</b>		
Canal	350	-
Well	500	600
<b>Cotton</b>		
Canal	200	-
Well	500	-

*Note: Irrigation expenditure for canal irrigation is relatively high in Erraguntla as it includes both charges paid to the government and hire/electric charges paid towards motors, as the canal water is insufficient and will not be available for the entire crop period. Canal water is available only if there were excess rains and if the farmers of Karimaddela release water.*

#### **IV Reasons for not getting the Canal Water in Erraguntla**

Our discussions with the WUA managing committee members (including the president) of Erraguntla, farmers who are having land under the command and irrigation officials revealed the following reasons for not getting the canal water in Erraguntla.

- (1) There is no unity among the farmers that too in the forward castes. The reasons being, almost all the farmers are having tubewells / open wells and many have lift irrigation from *Galeru Vaagu* (stream), which is passing through the fields of Erraguntla. With the help of tubewells / lift irrigation farmers grow second crop, though they have to spend more money towards electricity / diesel.
- (2) Farmers of Erraguntla tried for unity and everybody came forward to work united to get water. When the elders decided to collect money on per acre basis to meet their expenditure, most of them backed out and refused to pay. Hence, the efforts turned futile.
- (3) Erraguntla farmers expressed that many of the channels in the villages have not been repaired, hence it may not be possible to get water to all the farmers.

Only a few channels in the nearby villages, or some road culverts got repaired. Huge money is required to repair the channels, which they do not want to spend.

- (4) Further, they are of the opinion that the present WUA president was nominated and belong to a smaller village. As a protest, no farmer came forward to become a management committee member though Erraguntla was having higher number of voters as well as ayacut area.
- (5) It was revealed that during the year 1997-98, when the formation of WUAs took place, passbooks on land records were not issued to the farmers in Erraguntla. Hence, correct voter list of WUA could not be prepared at that time. The officials from the revenue department confirmed this.
- (6) Farmers of Erraguntla opined that they are not at all aware of the meetings conducted by the WUA since its inception and the president of WUA is worried about the contract works only. This year, certainly there would be a contest for the president's post of WUA. But the president says that they have conducted the meetings and few members who are interested in channel repairs attended the meetings, which reflects the mood and interest in the WUA.

## CHAPTER VI

### Irrigation Reforms in A P: A Missed Opportunity

It is often argued that the reason for the ills of irrigation management is the alienation of farmers from the process of planning and implementation. Maintenance and management of irrigation systems through user societies and participatory process is expected to bring in efficient and equal distribution of water resources. But such processes often remained at micro level as experiments and often found to be difficult to replicate. The State of Andhra Pradesh has, however, shown the way to scaling up of participatory irrigation management through formalising the irrigation institutions. The most interesting feature of these reforms is that they are 'top down' with a 'bottom up' approach. It has the advantage of greater reach (possible under 'top down') and intensity through involvement of the community (possible under 'bottom up'). These reforms under the guidance of some committed officials at the State level have taken off in good spirit and received good support at the farmer level. Though one may argue that flow of funds is the main factor in generating such response, it is necessary to support the ailing systems in order to generate trust among beneficiaries. For, over the years, farmers have lost the trust in the government and are in no position to respond to the false promises. Therefore, the initial boost was necessary to regain the lost credibility and build the trust. Once this is in place, institutional reforms from the top become smooth and easier. But it is necessary to understand the direction in which the reforms are progressing. This direction would ultimately determine the strength and sustainability of the reforms.

The present study is an attempt to understand the direction in which irrigation reforms in AP are progressing. While substantial amounts of money was spent on the reform process, the money was used mainly for improving the ailing irrigation systems rather than making an effort to transfer the irrigation management to farmers. Our study clearly brought out the lopsided approach of the reforms. The main lacunae in the reforms are at two levels: a) conceptual or formulation level, and b) implementation level.

At the formulation level, tank and canal systems are treated as similar in fund allocations, while the degenerated tanks needed more allocation for rehabilitation. The allocations under WUA were based on the command area, this has led to under funding and resulted in little improvement in the systems *per se* and availability of water. For, unless water storage of the tanks is improved there is no gain in improving the distribution systems. Our analyses clearly brought out that there is hardly any

improvement in the tank systems. As per official estimates about 69 per cent of the tanks in the State are in disuse (Reddy, 2003). And farmers are asking for more funds / works pertaining to tank deepening and strengthening the bunds. Another issue in this regard is that groundwater resources, the single largest source of irrigation, are completely left out of the purview of the WUAs. That is irrigation reforms are neither comprehensive nor followed an integrated water resource management approach. Though it would be extremely difficult to bring groundwater under the purview of WUAs, it is necessary given the magnitude and importance of the resource. Moreover, the inter-linkages between tank and groundwater resources call for treating these two resources as complementary rather than substitutes. The irrigation reform process is placed under the ministry of major and medium irrigation, showing an inherent bias against minor irrigation.

At the implementation level, an important aspect revealed in the present study is the 'elite capture' of the WUAs. As in the case of most of the parallel institutions initiated in AP (Reddy and Jenkinns, 2004), forward castes and large farmers are occupying the position of president disproportionate to their actual populations. This is mainly due to the reason that they are loosing their positions in the constitutional bodies of PRIs due to the positive dissemination policy. Moreover, parallel institutions are financially stronger when compared to PRIs. All the rights in WUAs are given to land owning and tenant cultivators to the neglect of land less and other water users such as land less women, fishermen, etc. This denies equitable access to a common pool resource. As a result, the huge public investments in this sector benefit only a section of the community, though in majority. Equal distribution of water rights is seen as vital for sustaining water institutions (Deshpande and Reddy, 1990). One of the recent demands is to make women participation mandatory (see post script below).

One of the main ideas of initiating parallel institutions in AP, by passing PRIs is that these institutions would be apolitical and focus on delivery. But, the emphasis on elections has resulted in the fight between parties to capture the power, which makes people insensitive to common good. Besides, the WUA election is one among the five / seven such committees electing their office bearers every five years. Party politics has already made a dent in the village unity. The frequent elections to the newly created institutions would aggravate the situation. The indications already exist especially in the case of watershed committees. Though it is a healthy democratic process, it goes against the basic philosophy of participatory development and management. Moreover, these institutions are providing backdoor entry to the power monging elite, which lost power due to constitutional obligations. These institutions in their present form tend to dilute the social capital rather than strengthening it.

The irrigation reforms in AP, through external funding, have provided an opportunity to revive and strengthen the ailing irrigation systems. The improved systems are expected to enhance the credibility of the department in providing assured water supplies, a precondition for increased water tariff. The funding is expected to help in building the necessary social capital for sustaining the reform process. Strengthening the social capital is a prerequisite for the reforms that aim at transferring irrigation management to farmers. Reforms also focus on financial sustainability through price reforms. Though water rates were increased initially by 3 times, they are still short of O&M expenditure. Moreover, increased prices are not translated into revenues due to weak institutional structures (Reddy, 2003). Though user contribution of 15 per cent is inherent/included in the PIM act there is no evidence of any contribution from farmers, as revealed in the study. In fact, there are no efforts to collect this contribution. The main reason, as revealed in the present study, is that little effort is made in the direction of strengthening the institutional structures. It is clearly brought out in our analysis that awareness is low, primary stakeholders involvement in the process of management is low, commitment and contribution to the cause are lacking. This is mainly due to the fact that irrigation department is not willing to devolve powers. All the major activities are still carried out by irrigation and revenue departments, leaving only the responsibilities of water management to the WUAs. This is not done even after five years of WUAs, though devolution of powers pertaining to assessment, fee collection and fund allocations are in the main agenda of reforms. Reform process would have been more meaningful if it had moved towards devolution of powers to farmers instead of tinkering with the election process. The only development in five years is to share the 50 per cent of water fee with the WUA. This makes the WUAs more dependent on the department funds, as the assessment is still carried out by the irrigation department and the revenue department collects fee. The result, as observed by an official, “even for small works of canal clearing, which they used to do on their own prior to the WUAs, now farmers are asking for funds from the department”. This clearly indicates that irrigation reforms are also seen as one of the many government programmes. And there is no commitment or sense of ownership among the farmers. Interestingly, they are becoming a political lobby group and demanding their political and financial share (see post script below).

### ***Strengthening of irrigation institutions***

Our study clearly brings out that the major benefit from the formal WUAs is improved irrigation facility, quantitatively as well as qualitatively. Though some benefits in terms of increased area under irrigation in canal systems and improved quality of irrigation is evident, the sustainability of these benefits is rather uncertain in the absence of efficient institutional structures. While it appears that an opportunity to build stronger and sustainable irrigation institutions is floundered, the opportunity

is not totally lost, as the WUAs are still in place. There is a greater need to strengthen them in terms of people's participation and involvement. The immediate focus should be on increasing the awareness about the WUAs and the advantages of these institutions. Based on our comparative analysis of formal and informal WUAs in chapter five we discuss here some pointers for strengthening and sustaining this important policy initiative.

Our study indicated that informal or socially embedded institutions are more effective than the formal WUAs. The reason being that informal institutions reflect commitment and cohesion, as it is evolved from within the system. More importantly, it is flexible in adapting to the changing situations. On the other hand, formal institutions are rigid and rule bound. In the present case the president of WUA was nominated from a smaller village, which received irrigation from another channel. As a result, the president of WUA was least interested in the distributary that served the other villages. This has diluted the interests of the farmers to participate in the WUA activities. In fact, farmers demand the split of WUA in order to serve their interests. This raises the question of viability of the size of WUAs.

In the case of informal institutions, equity in water distribution is taken care of through rotational systems. Independent third party supervision mechanisms are in place to safeguard the effectiveness of the system. Proper incentive (positive and negative) structures were designed to support rule compliance. No such systems are present in the case of formal WUAs. Under the present circumstances, the WUAs cannot guarantee equity, especially under scarcity conditions. Why should everybody co-operate for the benefit of the few? In fact, the formal WUAs have no powers to do anything in this regard.

Self-sufficiency and resource strength is central to the sustainability of the institutions. The formal institutions are yet to generate their own funds, while informal ones have succeeded in generating surplus funds. Lack of proper devolution of powers to local level is hindering the progress in this direction. Transfer of powers and responsibilities to the WUAs at the minor level should be done effectively though in a phased manner. Only under such circumstances innovations at the community level would become possible. It finally seems that hitherto, the WUAs are entrusted with responsibilities without any rights.

The main reason for the ineffectiveness of the formal WUAs is that lack of co-operation and interest among the farmers. This is mainly attributed to the insignificant economic incentives. It appears that institutions would be effective if the economic gains are substantial. Though this may be a typical case, economic gains from canal irrigation are low as the prices of alternative sources of water such as groundwater or complementary inputs like electricity, does not reflect their true scarcity values.

Reforms should initiate the process to convert all forms of water into an economic good through introduction of cost-based pricing as per volume and use (priority). This would help in realising the relative importance of each source of water. This calls for an integrated approach towards water resources planning and management. In this context, bringing groundwater under the purview of WUAs would go a long way.

However, lack of interest among farmers in the WUA activities need not be taken as an indication of failure of WUAs. Attempts should be made to understand the reasons behind such apathy. Our study indicates that the farmers are not against the concept of WUA but their understanding of the WUA is quite limited. Therefore, efforts should be made to increase the awareness of the farmers about the benefits of WUA. Devolution of powers to the local level and making the WUA structure more flexible would go a long way in addressing the awareness problem. Further, there is need for exploring the possibility of integrating the Panchayati Raj institutions into the reform process for sustaining the reforms in the long run. For, these local bodies are totally bypassed by the new initiatives. But, there are indications that there is a move in the opposite direction (see the post script below).

### *Post Script*

Since the completion of our fieldwork number of important changes pertaining to WUAs as well political dynamics at the State level have taken place. At the time of fieldwork the status of WUAs was that second term elections were postponed due to various reasons such as lack auditing of accounts of the WUAs. The actual reason could be political, as we found in our study that auditing of accounts was carried out in majority of the cases. Nevertheless, special officers were posted in the place of Presidents to carry out the functions of the WUAs. Subsequently, elections were conducted in 13 districts during October 2003. In nine districts, elections were not conducted, as there was no water in the canals. Elections in these districts are yet to be conducted. The election process has been changed substantially. Now the term of the President is only for two years. Every two years election will be conducted for one third of the posts. Election procedure is also made simple by raising hands or voting slips instead of formal secret ballot system. This is mainly to cut the costs.

In the mean time the government at the State level has changed after the elections in April 2004. A new government was formed after a gap of ten years. The new government seems to be going against some of the initiatives of the earlier government. In fact, one of the parallel institutions, education committees, at the village level was abandoned immediately after the new government was formed. But, the new government appears to be keen in continuing the irrigation reforms. A meeting of the WUA Presidents (33 newly elected) representing all the districts

was organized during August 2004 to discuss the modalities for improving the functioning of WUAs. The meeting was attended by the Minister for major irrigation, indicating the commitment of the new government to take forward the reforms, attended the meeting.

One of the main demands of the WUA Presidents was to revert back to the election procedures of the original act 1997. Their main contention was that 2 years is too short a period to make any meaningful contribution. And, they prefer direct elections to the WUAs, DCs and PCs. They expressed that the confusion about the existence of WUAs, created during the 18 months period between the elections, continues among farmers. Awareness about the WUAs, therefore, is a major problem. Devolution of powers to the WUA level in terms of assessment, defining the boundaries of the WUA and also demarcation of encroached common lands. The boundaries of WUA should be on hydraulic basis, and not on ayacut basis. The role of women is observed to be insignificant in AP when compared to other States. It is proposed that GB should co-opt 2 women members to the EC in the case of major and medium irrigation and 1 women member in the case of minor irrigation.

The present funds/revenue sharing arrangement that provides 50 per cent of water cess to WUA is enough and hence they demand enhancement of this share further by 10 per cent can be considered. It is opinioned that WUAs can collect the water charges with the assistance from revenue officials. They also propose to enhance the financial viability of the WUAs through plantation and horticultural crops on common riverbeds, canal banks, etc. Further, social forestry can be taken up on the encroached lands. They also demand that the WUA should conduct the auction of fisheries. This may go against the interests of the fishing community. Presidents of small tanks of 100-150 acres are demanding more funds for repairs.

Regarding water management, it is proposed that irrigation department should be decentralized in terms zone, district and project wise for efficient management of water resources. The co-operation and co-ordination between president, EC and irrigation engineers should be strengthened. The quantity and distribution of water shall be carried out by PCs, DCs and WUAs through general body according to the availability of water. In the absence of PC/DC WUA will be responsible. Vice-president shall be made convener of the water management committee and he should implement all the decisions taken by the management committee. Lascars should be placed under the direct control of the WUAs. GB should have the authority to appoint the lascars in places where they are not there. All works should be carried out by the WUA strictly adhering to the tender system. Quality control will be with a sub-committee of the WUA.

Interestingly, the federation of WUA Presidents put forth two peculiar demands. One is delinking of WUAs from the village PRIs. Two, WUAs should be represented in the legislative council (proposed to be revived soon in AP). These two demands reflect the interests of the Presidents in making the WUAs as local power centers. The rationale for the first demand is that in canal regions WUAs are often larger than the village panchayats and hence PRI cannot control WUAs. Another reason could be that the elite dominance in WUAs should go unchallenged from the local PRIs. Their interests appear to be more in terms of acquiring political clout than to demand more powers to strengthen the institution itself.

Most of the demands and requests, especially in the context of institutional strengthening, of the WUA Presidents reemphasized our findings. Their demand for more autonomy in assessment and management is very much valid. On the other hand, the approach of WUAs appears to become financially strong to the neglect of other stakeholder interests like fishermen. And the proposal of making it as an alternative power center cutting off from the PRIs is far fetched. However, these proposals need to be considered and approved by the government, which will set the next course of direction in the process of irrigation reforms. Long way to go with an opportunity to take it forward. But, this optimism can be realized only and if only there is political will and willingness on the part of irrigation department to reform itself in terms of sharing its responsibilities, duties and rights. Looking at the history of irrigation reforms in the country, many may consider it as too optimistic.

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