

THE CO-OPERATIVE AS AN INSTITUTION TO MANAGE WATER DISTRIBUTION FOR IRRIGATION: LESSONS FROM THE CHANDA EXPERIMENT IN MAHARASHTRA, INDIA.

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Abstract

The paper looks at the potential of co-operatives as an institution to manage water distribution for irrigation by studying the Chanda village in Maharashtra. The study concludes that the co-operative approach to distribution of canal water can not only be an efficient and equitable system of water distribution as against the earlier centralized government system, but it also has the potential to be applied to more such areas of public goods, especially natural resources which need to be conserved or used judiciously.

1. INTRODUCTION

Government played a major role in the developmental effort in India in 1960s and 1970s. This was especially the case for provision of public goods like roads, water, electricity, ports, communications, banking etc. Along with this governmental initiative, the cooperative model too was used extensively in India to ensure peoples participation in solving their problems, rather than relying only on the state. Cooperative has been used in various different areas like credit, dairy, sugar, consumers, marketing and fishing. These endeavors were mostly restricted to areas of private goods provision where the implementation was successful. Co-operatives for the provision or distribution of public goods or common property resources were rare. Most of the public goods provision was in the hands of the state. Even if co-operatives for the provision of public goods existed, they are not very prominent or extensive.

Over the period of the 1980 to 2000, there has been a paradigm shift in the Indian policy making. The past two decades have seen the emergence of the market mechanism as a favored instrument to initiate and maintain the developmental pace. Currently, a massive wave of privatization is sweeping across the economy. Public policies are increasingly based on the acceptance that markets are better suited to initiate development. (Taimni K.,1999). This policy change is reflected in lot of areas of state intervention being privatized, such as roads, ports, airlines, telecom, power etc. (Datta and Sundaram, 2004).

To aid the increasing privatization of public utilities in India, public-private partnerships are now being promoted in various public utilities. There is an emphasis on increasing people's participation in solving economic and social problems of provision, pricing and distribution of goods and services and resources. The co-operative model too is being used wherever possible. This is a hitherto unexplored area for the co-operative in India. Given this, it is interesting to see how the co-operative as an institution can contribute to the complex question of producing and distributing common property resources or how the co-operative can be used in the provision and distribution of public goods. As stated before, co-operatives in the field of public goods provision were rare but of late, some effort in this direction can be seen.

Water supply, one area that has so far been in the realm of the public sector in India, is now being mooted for privatization. (Dharmadhikary S, 2002). Here, the co-operative model, in the form of Water User Association (WUA) too is now being actively promoted specially in the area of canal water distribution, which so far has been in the hands of the state and is in the nature of a public good. Earlier, the co-operative model was being used to manage lift irrigation schemes (well irrigation), but this particular application (in canal water distribution) is an altogether new application of the co-operative. A co-operative meant to distribute canal water

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from dams to farmers would necessarily be much larger spatially and more complex than lift irrigation societies. Hence, a cooperative venture in this area becomes a unique experiment, which calls for analysis and study.

Water being a national property, its harnessing and distribution is in the hands of the government. However, there has been considerable disenchantment with the performance of the public sector with respect to surface irrigation development. The main problems here were that the government could not collect the water dues and maintenance of the irrigation system too was lacking (Narain, 2003). According to official estimates, fiscal recovery from surface water irrigation services (dam water distribution) in Maharashtra state was only about 40% to 50%. Moreover, the irrigation service delivery too was not satisfactory.

This has led to the recent attempts to address this problem through instituting water user associations (WUAs). A pioneering effort in this direction was attempted in the nature of a pilot project at the Chanda village of Ahmednagar district in Maharashtra state way back in 1989. Seeing the success of this experiment, many more WUAs came up at other places in Maharashtra especially in Nashik. In fact, by 2003, 534 WUAs were in operation in Maharashtra. Seeing this, the state government has given the WUAs statutory status through an Act. This is called the “Maharashtra Management of Irrigation Systems by Farmers Act” (MMISFA) 2005. By this act, the government has laid down the condition that surface water irrigation systems in the state will be managed through these WUAs. Hence, the government can sell canal water only to WUAs and not to individual farmers.

2. OBJECTIVES OF THE STUDY

Given the above scenario, the present study aims to examine the co-operative venture in this green-field area of surface water distribution for irrigation. The objectives of the study are to understand the working of the government system, the problems therein, the design and the working of the co-operative and to glean from this important lessons for better working of the co-operative. Mainly, the objective is to see if the co-operative as an institution can contribute to bringing about a more efficient and equitable allocation of a public good.

2.1 Structure of the Paper

The study is divided into the following subsections:

1. What were the problems with the government system in the provision of the canal water for irrigation?
2. What led to the emergence of a co-operative in the area of canal water distribution?
3. What were the distinctive features of this unique co-operative? How was its mechanism designed to ensure that it would carry out its functions as best as possible?
4. What was the experience in the actual working of the system?
5. What are the experiences of other such cooperatives that have come up?
6. What are the lessons to be learnt from the observation of the working of these cooperatives?
7. Are co-operatives in this area viable? What needs to be done to make them viable?

2.2 Emergence of Cooperative Venture in Canal Water Distribution/Surface Water Distribution in Chanda Village

The Water User Association at village Chanda, district Ahmednagar, in Maharashtra state of India is a pioneering effort in Maharashtra. Chanda is a small agricultural village, which relies for its water needed for irrigation, on rainfall, underground water (wells) as well as on the government canal irrigation/surface irrigation. It falls under the command area of the Mula river and is served by the canal named “Minor 7”.

3. WORKING OF THE GOVERNMENT SYSTEM

Before the advent of the WUA at Chanda, the government canal irrigation system worked somewhat as follows: The farmers had to fill in a form, specifying the water they would require from the canal in the coming

agricultural season. This requirement of water had to be specified in terms of the acreage and the type of crop they would be cultivating, for instance, 5 acre farm cultivating sugarcane crop, or 4 acres of wheat etc. This annual cultivation pattern had to be communicated by all farmers who wanted to use the surface irrigation in the coming season. All these demands of the various farmers would be put together, and on the basis of this, the irrigation department would allocate the amount of water to the village and also prepare a schedule for its release in the canal. The schedule was notified to the farmers in the section office of the irrigation department near the village. Based on this schedule the farmers had to prepare their fields accordingly to receive the water.

The water from the main canal would be released according to this schedule prepared by the irrigation department officials. This release of water at the minor level/village level was handled by one government official who is called “patvari” in the local language.

The rates at which water usage was charged to the farmers were decided at high level government committees at the state government level. The water rates were set on the basis of the acreage of crop with different rates for different crops: food crops attract lower rates than cash crops. For instance, the canal water rates for sugarcane were fixed by the state government at Rs. 1200 for 2.5 acre or approximately at Rs. 400/acre. Water rates for other crops like wheat, jowar, harbara (staple cereals) were lower at around Rs. 60/acre.

These government prices were set so as to cover the operation and maintenance cost and the salaries of the maintenance personnel of the irrigation departments. Capital costs of the irrigation system or its depreciation were not considered. If capital costs were also to be covered the prices would be too high for the farmers, it was felt. Thus, government prices were subsidized prices.

3.1 Problems in the Existing System

This was broadly the existing system before the advent of the WUA. The water rates in this system were found to be too high (especially for sugarcane cultivation) by the farmers and therefore a parallel market in water had emerged here. The local government officials and the village farmers were reportedly trading in canal water at rates much lower than those prescribed by the government. This led to very low revenue trickling in, in the government coffers, although water from the canal was being lifted. So, the government faced a major problem in terms of recovery of dues. Moreover, since the farmers were getting the water at much lower rates it led to wasteful and inefficient use of water in the village.

Secondly, all farmers could not participate in this parallel market. Specifically, in the dry periods when water was scarce, the trade was restricted to between the rich farmers and government officials; the poorer/small farmers could not get water. Thus, there was exclusion in the market. Also, the one man in charge of the distribution of the water to different users, the patvari, could not handle and control so many users and their varied requirements. This used to lead to a lot of theft of the water and resulted in inequitable distribution of water in the village.

Another problem faced by the farmers in using the government managed system was that if they planned to grow crops other than the staple crops or sugarcane in their farms, they had to apply for prior permission. They found this very cumbersome.

4. EMERGENCE OF THE WUA: FORMATION OF A COOPERATIVE SOCIETY FOR WATER DISTRIBUTION IN CHANDA

To address all these problems, the cooperative venture for water distribution was proposed. There was a need to remove the black market and substitute it with something in which all stakeholders (all farmers) could participate and benefit. To this end, a cooperative was started in 1989. The objective of this cooperative, as stated in the MOU between the society and the government was, “to ensure farmer participation in water management so as to optimize the use of the available water and raise agricultural productivity in the command (Lele).

The proposal of the society came from the government's end. It was at the instance of the government and an active NGO,¹ that the WUA took shape. The government's Irrigation Research Development Center and CASAD (the NGO) were directly instrumental in the formation of the society. The process began in 1987, when CASAD and the government representatives held several discussions with the farmers about forming such a society.

Initially there was some opposition to this idea. All the farmers were not very keen on this, especially the big farmers as they were already getting water at relatively cheap rates. Nevertheless, the society, named, "Shri Datt Sahakari Pani Vatap Saunstha Maryadit" (SDSPVSM) was formed with 92 members after a long and protracted process of registration in 1989.

4.1 Deciding the Leader

The first board of directors/governors, was appointed or selected by the NGO, CASAD and the government. CASAD undertook the exercise by listing 5 - 6 potential candidates among the farmer members and considering each one from the point of view of making the venture a success. (Lele, 1994). The President was appointed by the catalyst agencies and he along with advice of the catalyst agency representatives, selected the other eight office bearers.

5. THE DESIGN OF THE NEW SYSTEM

The new system was designed to work as follows: the society bought water from the irrigation department of the government at volumetric rates. It was entitled to receive water on a volumetric basis annually, broken in three phases on the basis of the agricultural seasons as shown in Table 1. If the sanctioned water in the rabi season is not fully utilized, this claim could be carried forward to the next season and more water could be drawn then. The maximum amount of water allotted to the society for each season is shown in the Table 1 and the rates at which the government or the irrigation department would charge the society are shown in Table 2.

This water was then sold by the society to its members and non-members according to predetermined rates, which were crop area based and not volumetric. The water rates for staple crops were continued as the earlier government rates but the water rate for sugarcane was decided by the members of the society collectively. This was now pegged at a much lower rate than the earlier government rate of Rs. 400/acre at Rs. 100/acre. (See Table 3). The water rates for non-members were 30% higher across the board.

Table 1: Water Allocation Season-wise.

Sr. No.	Season	Duration	% allocation	Amount in '000 cum
1.	Kharif (monsoon)	1 st July –15 th October	24 %	433
2.	Rabi (winter)	16 th October- 28 th Feb.	60 %	1058
3.	Summer	1 st March –June end.	16 %	283
Total			100	1774

Source: Compiled from Lele, 1994.

As earlier, the members had to apply for water. But now, they had to apply to the society office and not the section office of the irrigation department, which is located approximately 6 km from the village, whereas the society office is located within the village and is therefore much more accessible to the farmers. Once all the applications for the coming season are collected, the office bearers of the society work out the total water requirement and its schedule. This quantity and schedule is then conveyed to the section office of the irrigation department.

¹ Center of Applied System Analysis in Development (CASAD) which is now Society for the Peoples' Participation in Ecosystem Management (SOPPECOM)

Table 2: Water Charges to Society (per 1000 cum)

Season	Rate in Rs. 1000 cum	Max. Allocation (‘000 cum)	Total Amount in Rs	Current Rate as on 31.3.06 (Rs.)	Total Amt as per New Rate (Rs.)
Kharif	10	433	4330	47.60	20610.8
Rabi	15	1058	15870	71.40	75541.2
Summer/HW	37.50	283	10612.50	144.80	40978.40
Total		1774	30812.50		137130.40

Source: Compiled from Lele, 1994, and field visits.

Once the schedule is conveyed to the ID, they approve it and this approved, proposed schedule of release of water by the ID into the Minor 7 canal is communicated to the society. The society then decides which field channel gates are to be opened when. This detailed schedule of opening the gates of the various field channels is put up in the society office so that members can come and check on which day their field is due to receive water. Accordingly, they have to keep their fields ready to receive the water.

Table 3: Water Rates Charged by Society to Members (Rate in Rs. per Acre)

Crop	Rate Before Society in Rs./Acre	Rate after Society Formation in Rs./acre.		
		Kharif (Monsoon)	Rabi (Winter)	Summer
Sugarcane	400	100		
Bajri		60		
Sunflower/Soyabean		60		
Wheat		60		
Green Gram harbara		60		

6. WORKING OF THE WUA/ IMPACT OF SOCIETY AND THE NEW SYSTEM

The new system started working as described above, the society started buying water from the government and selling it to its members. In terms of water rates, the society was able to charge water rates from its members at less than the government rates. So members now had to pay only Rs.100/acre for sugarcane as against Rs.400/acre earlier. For other crops water rates were much less at Rs.60/acre. The society was probably able to provide lower water rates to its members because of the initial subsidy given to it by the government as also because they could sell water to non-members at 30% higher rates.

The government also provided the society with maintenance funds for three years. These funds were used for repairing field channels.

The society was able to handle the inter season and inter member water distribution efficiently. For instance, during the rabi (winter) season the society did not use all the water allotted to it because of high water table. (They were using well water, which was getting replenished due to the seepage from the canal). Instead, they used the unused allocation in the summer season when there was general water scarcity.

Another change that the society brought about was the freedom that the farmers got to cultivate any crop they wanted. They did not have to ask for permission from the irrigation department. They had to just give their water requirement to the society.

On the whole the society worked well for the initial three years. In fact, it worked so well that surplus income was generated which was distributed to members. Thus members' income increased due to improved agricultural conditions, namely availability of cheap water, freedom to choose crops and decrease in paper work and transactions costs.

Although working on the basis of no profits, the cooperative was able to create surplus funds. Most of its members were satisfied about the water distribution. Moreover, the society was able to ensure some infrastructure development in terms of improvements of the village roads. The village roads used to get damaged mainly due to the trucks of the sugar factories coming to the farms to collect the sugarcane. The society was able to impress upon the sugar cooperatives that this was their responsibility and were able to get several of the village roads repaired. This was possible because the farmers were under one umbrella and with a competent leader. They were also able to secure some funding for further infrastructure development from an international agency because of their work.

The society also undertook regular cleaning of the canal, which did not happen very often during the period of government management.

The apprehensions of the farmers before the society was formed were allayed after the Managing committee (MC) took charge, because transactions were now more transparent, the MC was more vigilant and did not allow for misquoting of acreage on the demand form as against the actual acreage irrigated. (In a village, all members generally know about each others farm sizes. So there was minimal theft) Moreover, the MC maintained good discipline in supplying water to members by adhering to schedules.

The functioning and the general success of the water distribution society led to many visitors coming and studying this pioneering experiment. This experiment inspired an NGO of Nasik to advocate this model in their region.

6.1 Elections and Change of Leadership 1994

This period of success of the Chanda co-operative came to an end after 3-5 years around 1991-1994. Once the subsidy given by the government stopped, the water rates charged to the members had to be increased. The rates at which the society bought water from the government too were increased every year. This adversely affected the financial position of the society.

Around the same time, internal differences started cropping up in the society. Elections took place in 1994 and the initial body was voted out. There may have been disillusionment with the first governing body but there is also a view that this disillusionment was limited to a few who had their own vested interest in getting a new body elected and they influenced the remaining members into doing so.

Table 4: Water Rates Charged by Society to Members (Rate in Rs./Acre)

Crop	Rate Before Society, 1987 (Rs./acre)	RateAfter Society in 1989 (Rs./acre)	Rate After Election in 1994. (Rs./acre.)		
			Kharif	Rabi	Summer
Sugarcane	400	100	250	350	350
Bajri		60	150	—	—
Sunflower/Soyabean		60	150	—	—
Wheat		60	—	300	—
Green Gram harbara		60	—	250	—

Note: Crops other than sugarcane are seasonal crops.

6.2 Leadership and Working of the New Managing Committee

The result of all these pulls and pressures was that a new governing committee was elected. Initially the new body worked fairly well but later problems started surfacing. It was a popularly elected committee but it reportedly lacked the competence to administer the distribution of a common property resource like water. The committee members were not well equipped to understand concepts related to measurement of water based on

the flow of the water, width of the channels etc. It was reported that the office bearers of the society were unable to dispense their duties adequately. The distribution of water was not as efficient and equitable as before. Lack of discipline and vigilance was noticed in the functioning of the society.

Table 5: New Water Charges to Society (per 1000 cum).

Season	Old Rate in Rs. (Per '000 cum)	Max. Water Allocation in ('000 cum)	Total Amount In Rs. Payable by society	New Rate as on 31.3.06 in (Rs. / '000 cum)	Total Amt as per New Rate in Rs. Payable by society
Kharif	10	433	4330	47.60	20610.8
Rabi	15	1058	15870	71.40	75541.2
Summer/HW	37.50	283	10612.50	144.80	40978.40
Total		1774	30812.50		137130.40

Source: Compiled from Lele, 1994., field visits.

During this period, the society saw a lot of problems. The government subsidy stopped, the NGO withdrew from the day to day management. Finances and water allocation could not be managed as well as earlier. The farmers farther away from the canal would get little water and this led to internal differences. The water rates applicable to the members had to be increased because of increase in government rates and reduction in water availability. The promised grant by an international agency lapsed, reportedly, because the committee members were unable to comply with the formalities in time.

We gathered that these problems facing the society are mainly due lack of technically qualified people within the society or lack of an advisory capacity to the society. The society members are now realizing the importance of having a technically qualified leadership rather than only a popular one. The other major reason put forth by the people for the poor functioning of the water cooperative is that the water to every member cannot be metered. Water is measured only when the government releases it into the sub canal, in this case, Minor 7. However, the distributaries after that and the field channels do not have metering devices at their heads, because of which it is difficult to keep an account of how much water is let out and how much is to be paid for.

6.3 Recent Developments in the Chanda WUA

The Chanda WUA, which so far has been under the co-operative and the irrigation departments, has recently, in 2007, been delinked from the co-operative department. In accordance with this, the word, "Sahakari" has been dropped and the WUA is now called, "Shri Datt Pani Vatap Saunstha Maryadit" (SDPVSM). According to the secretary of the society, this is a more streamlined approach as now they have to adhere to the rules laid down by the irrigation department only.

Another recent development is that elections were held in 2007 and a new managing committee has taken charge, with a woman as the chairperson. It remains to be seen how this will impact the working of the society.

The society members are also trying to deal with the financial problems that have emerged. In our field discussions with members, we realized that although the society has increased the water charges to the members, they are not complaining. They maintain that even with higher charges to be paid to the society, they would rather use this system to procure water than the low priced government water because here their transactions costs (in terms of several visits to the section office, getting hold of the patvari to get their water etc.) are greatly reduced and they are getting the required water at the required time.

Members are also suggesting that the society should take up some commercial activity, which will augment the resources of the society. They have suggested that the society can undertake milk collection, which is currently being done by private middlemen in the village. Members would sell their milk to society and the society can earn some income from this. Another activity being suggested is the service of water testing and provision of labor. All these services are required by the members and hence can be to the mutual benefit of the society and the members.

7. WORKING OF WUA IN OTHER PLACES: EVIDENCE FROM OTHER PLACES IN INDIA

There has been a worldwide trend of increased farmer's participation in irrigation management. In India too, WUA are being promoted by the state governments like that of Haryana, Maharashtra, Karnataka and Andhra Pradesh.

Generally the evidence on the success of the farmers' participation in irrigation management is mixed. According to Gulati et al., many times, blame for failure is attributed to governmental interference but the real reason is also the lack of management and technical skills in the people (Gulati et al., 2005). At many places in India various strategies to induce participation by farmers are followed, like deploying governmental staff to assist these associations or deploying NGOs to help these farmers. Even in the current case study the association was promoted by the government and an NGO together. Moreover, the NGO was present of and on to help the society.

Among the various factors that could contribute to the success of such societies, size and composition of the association are important ones. Gulati et al argue that smaller groups can be successful because the transactions costs of negotiating within the group can be low, where as larger groups can give the advantage of financial viability and economies of scale in terms of hiring professional staff. Larger groups of farmers would lead to reduction in transactions costs of negotiations between the society and the irrigation agency but increase the transactions costs of negotiating within the group. (Gulati et al., 2005)

For India, Gulati et al., suggest that the smaller groups would be more successful. Gulati et al., discussing the desirable composition of the group, contend that a group exclusively of either poor farmers or rich farmers may not work too well. This is because the poor farmers lack time and money to mobilize themselves and the rich may not be have the need to act together. (Gulati et al., 2005). R. K. Patil, one of the key persons involved in formation of the Chanda co-operative, feels that the social cohesion of the group is important for it to succeed.² Hence, it seems that smaller groups, which are socially cohesive but differentiated in terms of income levels, are most likely to succeed. Moreover, the presence of an external agency to guide the society in concepts of water measurement and in conducting meetings seems necessary.

8. LESSONS FROM THE CHANDA WUA EXPERIMENT: THE CO-OPERATIVE VS THE GOVERNMENT SYSTEM

Examining the Chanda co-operative, one can see that it functioned well for the initial period when the NGO and government functionaries were actively involved, but later, the society was unable to function as well. If we examine the co-operative as an institution versus the government as an institution, to manage a common property resource like canal water for irrigation, the following points emerge:

1. The co-operative model in the area of canal water distribution (WUA) can be more efficient than the government system. This is because misquoting of acreage irrigated can be minimized in the system of the WUA. In a village, everyone knows everyone's farm size where as a single government officer the patwari may not know every farmer's farm size. Moreover, he has neither the incentive nor the means, to verify it.
2. In a WUA, all members are jointly responsible for paying water charges to the irrigation authority. Hence, in case of the co-operative model, peer pressure can be leveraged to ensure payment by most members, whereas in the case of one government functionary there is a tendency to cheat on payment of water charges by farmers by underreporting the farm area irrigated. Peer monitoring can be leveraged to decrease the cost of monitoring payment of water charges.
3. The same factor discussed above (peer pressure) is also likely to ensure an equitable distribution of water. If the co-operative does not ensure that the water reaches the farther off fields, farmers who own these fields can refuse to pay the water charges. Thus pressure can be brought about to maintain equity, where

²Opinion expressed at a conference on "Integrated River Basin Management" held at BAIF, Pune on 10th and 11th April, 2007 by Gomukh, Pune and Arghyam Bangalore.

as in the case of government system the single person (patvari) in charge has no major incentive to ensure a fair water allocation.

4. Moreover, a well run WUA can assure an efficient way to decentralize the water distribution. A government administered system may become too centralized and fail to take in the local conditions, problems and requirements while distributing water. When the government system was in place, a farmer wanting to cultivate a crop not mentioned in government price list/schedule, had to apply for special permission. This, according to most members, was a cumbersome thing. However, under the WUA, members are free to cultivate any crop. Hence, this kind of a decentralized approach can be advantageous.
5. A WUA can make another vital contribution which is absent under the government water distributing system. This is that people are inevitably brought together to resolve their problems and with this approach they learn to take responsibility for them. As seen in the Chanda experiment, although the WUA ran into problems of funds and conflicting interest, they have also begun to address these issues and will no doubt learn to resolve them in due course of time. Having realized the benefits of the WUA, they may co-operate in other areas such as marketing their produce, using newer techniques of farming, and ultimately also in protecting their common property resources. There are enough examples of the success of such ventures in their vicinity for them to get inspired. For instance, the Ralegaon Sidhhi village where Shri Anna Hazare has helped the people to help themselves and make it a developed village, similarly the Hiware Bazaar village where Shri Popat Rao Pawar has motivated the villagers to develop the village.

Hence, even if the WUA goes through a turbulent phase in the short term, over time one may expect very positive outcomes in terms of overall development. Any successful experiment has a strong demonstration effect, (the Chanda co-operative was visited and the Chanda model was emulated by the NGO of Nasik). Hence, one feels that the Chanda model or the WUA approach to water distribution has the potential to work well and deliver on the expected outcomes as well as have an impact on other larger issues of environmental protection, albeit over time. In the meanwhile some roadblocks could lengthen the process. If these can be removed, the process may be fastened.

1. A major one is to ensure active participation by all members. This is sometimes lacking because some farmers are too poor to be able to attend meetings. Rich members may not participate because they do not realize the benefit of doing so.
2. It is difficult to ensure fairness in water delivery and collecting the appropriate water charges because the canals are not lined and it is difficult to measure the water actually supplied to a particular field. This brings about scope for human error and dishonesty.
3. Some members have bore wells in their farms and draw water from these, a large part of which may have come from seepage losses of the canal. Although in the “Maharashtra Management of Irrigation Systems by Farmers Act” (MMISFA) 2005, farmers have to pay some charge to draw well water if well is located in the command of the dam, it is difficult to enforce this and collect these charges.
Hence, to realize the complete potential of the co-operative model to ensure an equitable and efficient water usage, some concomitant factors have to be in place. These are:
 1. Canals should be properly lined to reduce seepage losses and should be better maintained. Some system of metering the water at the field level would help.
 2. Deploying competent persons of the government or any other independent agency to advice the co-operative functionaries in dispensing the water and measuring its usage is necessary.
 3. As a fundamental and long-term solution, thought can be given to laying pipe lines to deliver water to farms to minimize evaporation and seepage losses and enable better measurement of water drawn.

9. SUMMARY AND CONCLUSIONS

Co-operatives in the area of canal water distribution for irrigation or WUAs are now a reality and no longer an experiment in the various states of India. The Maharashtra government has chosen this as the vehicle to distribute water for irrigation. So the question now is how to make these WUA realize their full potential to ensure efficient and equitable distribution of water

Having studied the pioneering attempt at Chanda in detail, one can say that the co-operative as applied in this area certainly has the potential to do what the government system could not. Since a co-operative is of the affected stakeholders, there is a greater incentive to use the canal water judiciously. In addition, in a village where everyone knows everyone, it is difficult for WUA members to cheat and under-quote the acreage irrigated by them using the canal water. Hence, the peer pressure of a co-operative can work to bring in efficiency, minimize thefts and ensure more equitable water distribution.

The detailed study of the Chanda WUA shows that the WUA could work well in the initial years due to two main reasons: one being that the governing body was selected by concerned state irrigation department personnel and an NGO. The other reason was the initial government help that it received in terms of the subsidy and the maintenance fund as well as technical guidance in the initial period. Since the initial office bearers were selected, they were mostly competent people who understood the nuances of not only farming but also of canal irrigation and water measurement. This competence in no small terms helped the society to function well. In fact, one can hypothesize that had a similar competent committee taken charge of the society after the elections, it could have continued the good work despite other drawbacks like the withdrawal of the subsidy.

Despite these drawbacks, it is seen that the Chanda co-operative members are attempting to improve the working of the WUA. They are suggesting commercial activities, which can be taken up to augment the resources of the co-operative. Moreover, despite the problems, they are showing a preference for this co-operative decentralized system as against a centralized government system of water distribution. According to them, this system is able to meet their requirements adequately and minimize their transactions costs.

Further, the co-operative members are showing a readiness to co-operate for a common goal, namely to get the system problem free and moving. This readiness can imply that in the long run, such a co-operative may take up problems of conserving common property resources once they realize that by doing so they will all benefit. This realization may not take too long a time as they have inspirational examples in their vicinity, namely the villages of Ralegaon Sidhhi and Hiware Bazaara.

Some problems could delay the process of realizing the above discussed benefits of applying a co-operative model in water distribution. One of these is that the water distributed to each individual farmer cannot be metered. This leads to problems of extracting the fair and proper price for the used water. Another problem which is encountered, though not necessarily only in the cooperative model, is that the sub-canal are not properly lined leading to major seepage and evaporation losses.

Hence one can say that the decentralized cooperative model can be useful in addressing the problem of efficient and equitable distribution of a common property resource like water, as against the centralized government system. Moreover, the adoption of the co-operative model may lead to other positive externalities, encompassing the general development of the village. Providing some enabling conditions, as detailed below, may help to speed up the process. Firstly, proper lining and maintenance of the sub-canal and the field canals can help to minimize the seepage and evaporation losses. Secondly, introducing some system of metering the water to measure how much water is drawn by each farmer may help. If not meters at every canal head, what is needed are competent persons who can calculate the approximate area that gets irrigated by studying the flow of the water and the width of the canals. Deploying competent persons of the government or an independent agency like an NGO, are needed, at least in the short run. Thirdly, as suggested by some of the society members themselves, a fundamental change as a long term solution to the problem of inefficient use of water, is that pipes could be used to take the canal waters to the fields so that measuring the water delivered is possible, is more accurate and evaporation and seepage losses are minimized.

In conclusion, the co-operative approach to distribution of canal water can not only be an efficient and equitable system of water distribution as against the earlier centralized government system, but it also has the potential to be applied to more such areas of public goods, especially natural resources which need to be conserved or used judiciously. Hence, a prudent implementation of the co-operative model in water distribution (the WUA), is necessary to ensure that the potential of the co-operative model to ensure an equitable, efficient and sustainable use of canal water for irrigation is realized.

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