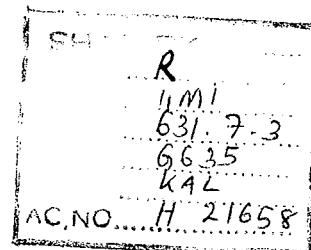
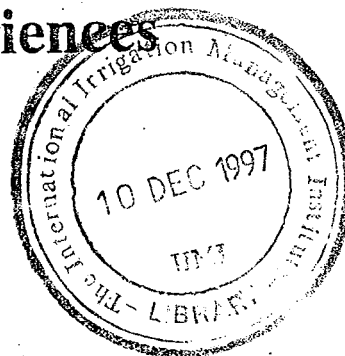


631.7.2 Irrigation management & financial transfer from private
to public
summary, water distribution & irrigation

Workshop on Irrigation Management Transfer in India



Outcomes of Irrigation Management Transfer and Financial Performance of Water Users' Associations in India : Some Experiences



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OUTCOMES OF IRRIGATION MANAGEMENT TRANSFER AND FINANCIAL PERFORMANCE OF WATER USERS' ASSOCIATIONS IN INDIA : SOME EXPERIENCES¹

1.0 INTRODUCTION

Large resources have been committed to irrigation development worldwide, given its importance for agricultural production. Unfortunately, experience world over has been disappointing regarding the actual performance of these systems. Governments are also finding it extremely difficult to commit adequate resources to the maintenance and upkeep of these systems. Increasing attention is, therefore, being devoted to alternate approaches to manage these systems in order to not only improve performance but also to prolong the life of these assets. One alternative approach that is receiving considerable attention worldwide is transfer of irrigation management, implying thereby transfer of some management functions in irrigation management to associations and other institutions.

Experience in India is no different from that worldwide. Policy makers have considered various interventions to improve water use efficiency and water distribution, including farmer participation in irrigation management. The national water policy of 1987 has also laid considerable emphasis on participative irrigation management. In recent years, various state governments have initiated policy reform to facilitate farmers' involvement in irrigation management and have also undertaken experiments to understand the implications of the transfer process and to facilitate management transfer in future.

A joint study undertaken by Indian Institute of Management, Ahmedabad and International Irrigation Management Institute, Colombo was designed to examine the nature and extent of management transfers taking place in the country and to examine how management transfers are working. The major focus was on understanding transfer processes and developing insights which would be useful in making transfers more successful. As a part of this study, we also sought to understand the nature of outcomes and the potential benefits from management transfers.

In this paper, we discuss the nature of outcomes in most of the sites selected for Phase II of this study and examine the financial performance of three user managed lift irrigation schemes and six cases of gravity flow systems turned over to water user associations.

¹ Draft paper prepared for discussion in the Workshop on Irrigation Management Transfer in India, to be held at Indian Institute of Management, Ahmedabad, December 11-13, 1995.

2.0 OUTCOMES OF TRANSFER

The nature of outcomes for the major constituents of transfer, namely, farmers and the state will affect the productivity and profitability of irrigated agriculture, financial viability and sustainability of water users' associations. The objectives of the state in transferring responsibility and authority to farmer groups for managing a part of the irrigation system are to reduce its financial burden and improve irrigation efficiency, equity and productivity. These objectives have direct bearing on the costs and returns to both constituents as well as the community. An examination of outcomes, therefore, will help in understanding the extent to which transferring over management of irrigation systems to farmer organizations can be made sustainable.

Various benefits and costs for each of the constituents were identified from the data collected from the case studies. These components have been classified according to their nature. Tables A1, A2 and A3 of Appendix A provide a detailed listing of these components. Several of these components are not easily measurable. Data availability on these components was a major problem. We have, therefore, made a qualitative assessment of their presence or absence in the sites included in this study. Some of the components lend themselves to relatively easier measurement. But this was not attempted in this study, as the major focus was on understanding the processes of transfer.

The major tangible benefits observed at these sites for farmers are increased availability of water, improved reliability in water supply, flexibility in cropping pattern, changes in cropping intensity, and changes in cropping pattern. Water availability increased at all the sites in gravity flow systems except two sites in Tamilnadu, LBP and PAP. The increase in Mohini was only marginal. On the other hand, improved reliability in water supply was reported at all the sites. In all cases, farmers had freedom to decide cropping patterns. Except for Mohini and LBP, cropping intensity also was reported to have increased at all sites. Yields are reported to have improved in all the sites except Mohini and LBP. The increase was however small at some of the sites (Shevare, Kedar, Kadoli and Phulewadi). A slight reduction in yields has been reported at one of the sites viz. Mohini. Increase in prices realised for agricultural produce was reported at Ozar and Phulewadi, at the latter due to marketing arrangements provided by the society and at the former because of quality improvement.

Several intangible benefits have been reported as well by farmers in most of the WUAs. These are timely availability of water, saving in time and hassles to pay water charges, improved ability to deal with the agency, reduction in conflicts due to improved equity and in some cases benefits from other services provided by the WUA as well.

The major incremental cost to farmers was an increase in water charges that they had to pay

at some of the sites, namely, Datta, Shevare, Ozar, Pingot, Kedar, Parunde, and all the lift irrigation systems. In Tamilnadu, water charges are not payable in any case and in two sites in Gujarat, Mohini and Anklay, there was no increase in water charges reported. In all the sites intangible costs relating to time spent on meetings and approaching agencies for organising the association as well as managing water distribution activities were reported. Contributions and extra charges towards canal maintenance of the main system were also reported in all the Maharashtra sites and Mohini in Gujarat. Repair and maintenance of field channels in all sites was the responsibility of the farmers. In some cases, because of inadequate level of maintenance by farmers, WUAs had taken over this activity and charged the farmers additional amounts towards this expenditure. Farmers have had to contribute to the construction cost of the main system in either cash or kind in all the lift systems and also in Kedar as well as in Thambraparani (incurred many years ago at the time of formation of the society).

The irrigation departments had to incur additional investments in practically all the cases to improve the physical system condition before handing over to farmers for water distribution. The only exceptions were the lift systems. In the case of Bhima lift irrigation scheme, the District Panchayat incurred the entire capital cost of the scheme itself. Other costs incurred by the society were additional water provided in all cases studied in Maharashtra and Gujarat (except for Pingot). Additional water was not provided in the Tamilnadu sites also. Societies received management subsidy and repair and maintenance grants from the agency in all the gravity flow systems of Maharashtra and in two of the Tamilnadu sites. Neither management subsidy nor R&M grants were provided to any of the lift systems studied. The other important intangible cost to agency was due to training WUA representatives and farmers, as well as agency staff for organising and coordinating the activities of the WUAs. There was some intangible cost due to time spent by officials on organisational activity and for meetings with WUA representatives and farmers.

The significant benefits to the agency were increase in recovery of water charges reported in all cases where water charges are payable by farmers, improvement in irrigation efficiency at practically all the sites except for Mohini, Pingot and the lift irrigation systems. The agency also had to spend much less time in collection of water charges, water distribution activity and resolving conflicts. Another benefit to agencies was the increase in equity in water distribution which incidentally happens to be one of their major objectives in transfer of management activities to WUAs. There is no evidence that the expenditure by the irrigation authorities on repair and maintenance has declined after turnover which is another objective of the state in irrigation management transfer.

There are some implications of both benefits and cost for agency officials. These are a sense of achievement in accomplishing management transfer to WUAs on the one hand and loss of

power and status as well as income on the other. This last observation is however relevant only in the case of gravity flow systems in Maharashtra and Gujarat.

There have been implications of transfer for the larger community as well. The important tangible benefits are increase in groundwater availability, increase in employment opportunities largely due to cropping pattern changes, and availability of new business opportunities both on account of increase in economic activity as well as contracts for system modernisation given to farmers by the agency. Some of the intangible benefits are the reduction in conflict and increase in goodwill in the community.

3.0 FINANCIAL ANALYSIS

Sustainability of transfer critically depends not only on the organisational capability and learning capacity of the Water Users' Association (WUA), but also on its financial viability. Financial viability of WUAs in turn depends upon the incremental benefits generated in the command area, and how well the association manages its income and expenditure. The profit and loss accounts of the Water Users' Association of Mohini, Datta, Shevare, Ozar among gravity systems and Bhima, Kadoli and Phulewadi among lift irrigation schemes, have been analysed. Some of these WUAs have used the accrual system for reporting their income and expenditure (Mohini, Datta and Shevare) whereas others have used the accrued basis for reporting income and expenditure (Bhima, Ozar, Kadoli and Phulewadi).

Ratios such as share of water charges collected from members in the total income of the society, share of water charges paid to irrigation department, salary and wages, and repair and maintenance in total expenditure have been computed to facilitate comparison and also to assess the financial viability of these WUAs. Repair and maintenance costs, transaction costs, management costs and total costs have also been calculated on a per hectare basis of gross irrigated area as well as net command area.

The transaction costs include expenditure on all items except depreciation, interest on loans, electricity charges in the case of lifts, repair and maintenance, and water charges paid to irrigation department. Management costs are the transaction costs plus the cost of repair and maintenance. Total costs represent the sum of management costs, depreciation, interest of loans, electricity charges and water charges paid to irrigation department (all items of expenditure are included). These costs have been calculated not only to facilitate comparison but also to examine how well the WUAs manage their activities, and the extent to which the costs incurred by the WUAs differ from the subsidies and grants that they receive as well as the need for these subsidies and grants in future.

Water charges, water charges recovery rates, cropping patterns, cropping intensities and water

use efficiency have also been studied wherever possible. They enable us to understand the problem of financial viability.

A brief description of each of the selected WUAs and their performance follows.

3.1 Mohini Water Distribution Cooperative Society, Mohini, District Surat:

Mohini Water Distribution Cooperative Society was established in 1978-79 in the Kakrapar irrigation system. The command area of the society extends over 6 villages in Chorasi taluka of Surat district and covers a net irrigated area of 337 hectares. The command falls on the Bhestan minor and is served by 3L, 4L, 5L and 1R sub-minors and two direct outlets. The Bhestan minor itself takes off from Chalthan branch which in turn takes off from Bardoli branch at a distance of 2.5 kms from the take off points of Bardoli branch. Bardoli branch is a branch of the Surat branch canal which receives supply from the Kakrapar left bank canal. Mohini village is located approximately 15 kms from Surat and the Mohini Water Distribution Cooperative Society command is situated approximately 40 kms from the Kakrapar left bank canal (KLBC). The KLBC runs almost throughout the year whereas the Surat branch canal is closed from time to time according to pre determined schedules.

Kakrapar irrigation system was completed in phases from 1958 to 1977. There was a considerable lag between the potential created and utilization of this potential. By the year 1976, irrigation could be provided to only one third of the command area. This has increased marginally during later years, but the performance continued to be poor due to variety of reasons, including poor distribution system, lack of field channels and inadequate drainage. This was the situation despite excess availability of water in the Kakrapar irrigation system. Perennial crops like sugarcane and bananas began to be cultivated in a large part of the command area. The actual cropping pattern differs substantially from the cropping pattern envisaged in the project design.

Concerned about the poor performance of the system, the irrigation authorities conceived the plan to form water users cooperatives which would receive water on a bulk basis and then distribute it to members beyond the measuring points. Under this scheme, the maintenance of sub-minors would be the responsibility of the government whereas maintenance of the field channels below the outlets would be the responsibility of the concerned farmers.

The Mohini Water Distribution Cooperative Society was formed in response to this scheme promoted by the irrigation authorities. Initially 142 members in the command of sub-minors 3L, 4L and 5L contributed a share capital of Rs.7500 to form this society. Subsequently, sub-minor 1R was added to the command of the society, which resulted in a further increase in the number of members. The members in the command of the proposed society were by and

large financially well off due to the high returns they obtained from the cultivation of sugarcane. They were able to mobilize the necessary financial resources to form the society and also to appoint full time paid staff. The Irrigation Department first remodelled the sub-minors to carry the designated flows and also installed measuring devices at the take off points. As a further incentive, the State Government offered the society a grant of Rs.26,000 per year for two years to meet the administrative expenses and the state also agreed to bear the losses in the first three years. The state also built a brand new building for the society office at its own cost. The state government constructed this building at a cost of over Rs.1 lakh and rented it to the society at a nominal rent of Re.1/- per month. The irrigation authorities also agreed to supply water on volumetric basis at 25 paise per 10,000 litres plus an additional tax at 20% which brought the total cost to 30 paise per 10,000 litres. The society was allowed to charge its members on crop area basis at the rates applicable to all farmers in the command. The irrigation authorities also agreed to provide technical guidance to the society.

The society turned out to be financially successful in the very beginning. From the very first year, the society began to make profits and began paying dividends from the second year. Within five years it had built up a reserve fund of Rs.11,250 and had approximately Rs.1.50 lakhs in various funds earmarked for different purposes. In the second year of its operation, it also purchased a tractor for use by members in farming operations. This activity also proved to be a financial success. The society could repay the loan for this purchase and show surplus from the tractor operations. The water rate structure itself ensured that there was a wide gap between the charges for water paid by the society to the Irrigation Department and the amount that it could charge from the members. Further, the cropping pattern in the command area of the society enabled not only collection of higher water charges but also enabled farmers to pay the water charges easily. The cropping pattern even presently is dominated by sugarcane (89% of command area). Earlier studies by Datye and Patil have clearly demonstrated that such cropping patterns are not sustainable throughout the command and if the cropping pattern followed by the society had been similar to the one envisaged in the project design, then it would have been difficult for the society to meet its costs with the applicable water rates.

The society continued to function very well upto 1988-89. 1988-89 however marks a departure from the earlier success story. This was the first year in which collection of water charges was not 100%. The percentage default was 1% in that year, but this has subsequently increased to 66% in 1994-95. (see Appendix B1, Table B1.3). 1992-93 was the first year in which the society did not pay the entire water charges due to the Irrigation Department. Only 80% of the amount due was paid. This fell drastically in the next year. The society has not paid any dues to the irrigation department for water since 1993-94 (see Appendix B1, Table B1.2). This has been the situation despite the reported reduction in the amount charged

to the society in 1994-95 for the water supplied to it. The cumulative amount outstanding to be paid to the Irrigation Department is Rs.4,01,883. The cumulative amount due to be collected from members is Rs.2,02,138. The decline in recovery rates was substantial during the year 1994-95.

The profit and loss account of the society is reported for the years 1990-91 upto 1994-95 in Appendix B1, Table B1.1. The total income of the society excluding income from tractor charges has been reasonably stable during this period, though it has increased slightly from 1990-91 to 1993-94 and declined in 1994-95. Water charges constitute a significant part of this total income (approximately 90%). Income from water charges levied on non-members ranges between 2-9% of total income. The cost of water payable to Irrigation Department is the largest component of expenditure, ranging between 61-68%. The other major component is salaries and related staff expenditure which averages 22% of total expenditure (excluding tractor operations). Expenditure on repair and maintenance has been reasonably constant at 6.5% of total expenditure.

If the tractor operations are not considered, the society would have incurred marginal losses during the years 1990-91, 1991-92 and 1993-94. The profit without tractor operations was substantial in 1992-93 and was 12% of total income excluding tractor income. This is mainly due to the lower water charges paid to the irrigation authorities in that year. Operations in 1994-95 also resulted in marginal profit without tractor operations. Due to very high loss from tractor operations in 1994-95 (Rs.28,139 on an income of Rs.31,897 from tractor operations), the society incurred an overall loss of Rs.24,144 during 1994-95. This is the first year in which the society has reported an overall loss. In order to restrict the loss during this year, the Irrigation Department has reportedly reduced the water charges payable by the society in 1994-95. Tractor operations were however profitable earlier, though there was a substantial decline in 1992-93 itself from the earlier figures.

The net irrigated area in the command of the society is reported to be 337 hectares. The gross irrigated area during these years has been by and large stable. The total cost of irrigation per gross hectare irrigated has varied from a minimum of Rs.298 to a maximum of Rs.359. The management and transaction costs per gross hectare irrigated during the same period have fluctuated between Rs.109 to 133 and Rs.88 to 109 respectively. These costs appear to be reasonable. The repair and maintenance cost per gross hectare irrigated has been approximately Rs.20. These costs when examined on net irrigated area basis exhibited a similar pattern. The management costs have fluctuated between 32% to 40% of the total cost and the repair and maintenance costs are 6% of the total cost. The transaction costs have varied between 26% and 33% of total cost. The repair and maintenance cost has been stable at approximately 7% of the total cost which averaged Rs.56 per ha.

It is interesting to note that the ratio of water charges collected to the water charges required to be collected for breakeven has varied between 97% and 115% during these years. The difference is not high and if the society can improve its water distribution and revenue collection activities it should be possible for it to overcome the losses incurred, and also to pay the outstanding amount to the Irrigation Department. As of June 30, 1995, the society owed Rs.4,01,883 to the Irrigation Department and had to recover Rs.2,02,138 from its members. The different reserve funds available to it have been more or less constant at Rs.2,40,000. These reserves are adequate to cover the reported losses. The viability of the society is however threatened because of the dramatic decline in recovery of water charges from members, the difference between the amount payable to Irrigation Department and the amount due to it, as well as the decline in profitability of tractor operations. If this continues, the only outcome will be the demise of the society.

3.2 Shri Datta Cooperative Water Distribution Society Limited, Chanda, Ahmednagar District.

Chanda village Ahmednagar district is a drought prone area and before the construction of the Mula dam, farmers practised rainfed agriculture. Due to the high moisture retention capacity of the soil, the farmers were able to take rabi crop in those years in which the rainfall was good. The Government of Maharashtra decided to construct a dam on Mula river, a tributary of Godavri, at Baragaon Nandur in Rahuri taluka of Ahmednagar district. This dam was completed in 1969 and two canals off taking from the dam on the left and right were expected to provide irrigation to 10,100 ha and 70,700 ha respectively. Minor No. 7 is one of the canals taking off from the right bank canal at a distance of 42.6 km from the canal head. The irrigable command of this minor according to the project design was 361 ha. Thirty per cent of Chanda cultivable area falls within the command of this minor which has a length of 2.2 km and 13 outlets. The canal is 1 km away from the village.

Irrigation from Mula right bank canal began in 1971-72. The project design envisaged 4% area under perennial crops mostly sugarcane 20% two seasonal crops and 30% under kharif, 42% under rabi and 3% under hot weather crops. The cropping intensity which in earlier years was 122% has increased but the actual area irrigated however was much less than that planned. This was partly due to the fact that sugarcane was cultivated in a much larger area than envisaged. Also the canal losses (all canals were unlined) were higher than those estimated.

In 1980 rotational water distribution system was introduced in the Mula irrigation system, following a successful pilot project introduced in 1978 in the Girnar command. Even as this experiment was underway, the policy makers were considering other interventions to improve water use efficiency and water distribution, particularly in the tertiary levels and tail ends of

the system. The national water policy of 1987 also laid considerable emphasis on farmers participation in the management of irrigation systems.

In this context, the Centre for Applied System Analysis in Development (CASAD) and the Government of Maharashtra decided to initiate a pilot experiment in the Mula irrigation system. Minor No. 7 of the MRBC was chosen for forming a cooperative water distribution society. Organisers of CASAD came to stay at Chanda to explain to the farmers the benefits of forming a cooperative and to motivate them to form such a society. In this effort they received help from the CADA authority and government administrators. They began collecting share capital at the rate of Rs.25/- per 37 gunthas of land. One hundred and fourteen members paid the required share capital and an application was made to the Registrar of Cooperative societies for registering the Datta Cooperative Water Distribution Society in February 1987. The society received its registration certificate two years later in February 1989. In June 1989, the society signed an agreement with the irrigation department for receiving water on volumetric basis and began functioning from 1st July, 1989. The WUA was expected to maintain and repair the minor and also was responsible for water distribution. The quantity of water to be provided to the society was fixed seasonwise to irrigate 94 ha in kharif; 120 ha in rabi and 62 ha in hot weather season. The volume of water was fixed at 63.9 million cubic feet. The irrigation department promised to carry out the necessary repairs to minor no. 7 and the society began functioning even before these were carried out.

The income and expenditure statement of the WUA is provided in Appendix B2, Table B2.1 for all the years since the inception of the society upto 93-94. During this period, the membership of the society has increased from 114 to 203. The net command area has also been expanded from 119 ha to 261 ha and the gross irrigated area has increased by 30% from 257 ha in 1989-90 to 338 ha in 1993-94. The gross irrigated area was however maximum at 412 ha in 1992-93.

Since the WUA's establishment, major changes have taken place in the cropping pattern in the command of the WUA. The area under sugarcane has increased from 15% to more than 40% of the command area. The area under wheat which used to be a major crop earlier has come down from 30% to 25%, though it is still the most important rabi crop cultivated. The area under oilseeds has also reduced substantially from about 35% of the command area to less than 7% of the command area in 1993-94.

The society obtains water from the Irrigation Department on volumetric basis and supplies water to its members on crop area basis. According to the MOU, the society is supposed to receive 13.65 mcft of water in kharif, 28.01 mcft in rabi and 22.28 mcft during hot weather, a total of 63.90 mcft to irrigate 276 ha. The society is allowed to carry forward unused

quantity of water from the previous season in the same irrigation year.

The Maharashtra government revised the water rates on both volumetric and crop area basis since 1989-90. By 1994-95 the rates have doubled (Tables B2.4 and B2.5). On these rates a local cess of 20% is also levied. The society gets a 5% discount for timely payment of water charges to the irrigation department. The society has also revised periodically the rates charged for water (Table B2.5). In addition, the society charges members Rs.25 per ha per year towards maintenance charges of field channels. For sugarcane the amount charged is Rs.25 per ha for each season i.e. Rs.75 per ha per year. The society also charges extra for additional water rotation provided to crops over and above the stipulated number. These rates are Rs.250/- per ha for sugarcane and Rs.100/- per ha for extra rotation. The society is eligible to receive Rs.10,000 per year as an R&M grant and also a management subsidy. In 1993-94 the management subsidy was withdrawn and instead the society was given a 20% discount on water charges.

The society's income from water charges has increased marginally over the years. The income in 1991-92 from water charges is however substantially lower because of a change in the accounting year during this period (July 1 to March 31). The total income has fluctuated considerably during these years due to the differing amount of management grant and R&M subsidy received. The society could earn substantial profit during the first 4 years. The profit in the 5th year came down drastically largely due to withdrawal of management subsidy. It is also important to note that the profit during 1989-90, 1990-91 and 1991-92 was higher than the total subsidies received. In 1991-92 the society would have incurred losses in the absence of management subsidy and R&M grants. The expenditure of the society has also been increasing steadily (except for the decline in 91-92 due to the change in accounting period). Water charges as a percentage of expenditure have declined from a high of 64% to the present level of 38%, implying thereby that other expenses have increased substantially. Salary and wages as a percentage of total expenditure has been more or less stable at 25% of total expenditure, except for 1993-94, when it was 20 per cent of total. The largest increase has been on repair and maintenance expenditure.

In rupee terms, the R&M expenditure has increased substantially in 93-94 (by 3 1/2 times compared to the R&M expenditure during the previous three years). In percentage terms the R&M expenditure has gone up from an average of approximately 10% during the period 1990-91 to 1992-93 to 28% in 1993-94. Interestingly, the R&M expenditure in 1993-94 was almost 4 times the R&M grant received, indicating willingness of the society to invest in the upkeep of their system. In the previous three years, expenditure on R&M was just about equal to the R&M grant.

The transaction cost of the society is much higher than the management subsidy that the

society has received (except for 91-92). The management cost is also higher than the management subsidy and the R&M grants received by the society (except for 91-92) implying thereby that farmers are willing to spend more after they are provided an assured supply of water as well as freedom to decide cropping pattern. On a gross irrigated area basis, the transaction cost per ha has fluctuated considerably, between Rs.80 and Rs.207. Corresponding figures for management cost and total cost per ha are Rs.91-251 and Rs.256-454. These costs on net irrigated area basis are Rs.108-Rs.237, Rs.124-318 and Rs.268-511 per ha. There is considerable variation from year to year. The share of these costs in total costs has also fluctuated considerably.

Water charges paid by the society to the irrigation department have increased considerably in the year 1993-94 compared to the relatively stable amount paid in the previous years. The ratio of water charges paid to ID to water charges billed to farmers has also shown considerable fluctuation and is presently approximately 45%. While society has been prompt in making payment to the ID and has invariably availed the 5% discount for timely payment its experience in recovering water charges from farmers has not been quite satisfactory. The maximum recovery rate was 50% during 92-93 and has averaged 40% in the past. The total dues outstanding from members are Rs 1,18,586 as of March 31, 1994. This amount is just about equal to the total reserves available with the society.

The society can be financially viable even without subsidies and grants from the government. This viability is critically dependent on the ability of the society to recover the water charges from members in a timely manner. Far more attention will have to be paid to this aspect in the future. As the society is no longer eligible for management subsidy, the total income is expected to reduce, but at the same time the expenditure is increasing.

3.3 The Laxmi Narsimha Canal Water Distribution Cooperative Society, Shevare, District Solapur

To utilize the high flows of Bhima - a rivulet of Krishna river - during monsoon, a dam was built in 1980 near village Ujjani located in Madha taluka of Solapur district. On its left bank canal there is a small village, Shevare, served by minor no. 10. Eventhough the village is located at the head reach of the main canal, reliability of water supply as well as equity in water distribution was poor. Farmers of this village realised the need for a cooperative society for water distribution after Siddheshwar Water Distribution Society started functioning successfully nearby. They, with the help of the irrigation department, organized the Laxmi Narsimha Canal Water Distribution Cooperative Society, Shevare in 1991, which started water distribution activities in 1992-93.

Since WUA's establishment, significant changes in the cropping pattern have taken place in

its irrigable command area of 168.96 ha. Notable change has been in the area under sugarcane which has increased from 15 ha before WUA to 65 hectares at present. Sugarcane has replaced mainly cereals such as jowar and bajra and oilseeds such as sunflower and groundnut (Table B3.2).

A total of 93 members contributed Rs 50 each towards share capital at the time of registration of the society. It now has 100 members and the membership has been stable. The society obtains water from the irrigation department on volumetric basis and supplies water to its members on crop area basis. According to the agreement between the irrigation department and the society, the society gets 0.77, 0.86 and 0.62 mcm of water during kharif, rabi and summer, respectively. The society is allowed to draw unused quota of water from the previous season in the same irrigation year.

The Maharashtra government has been revising the water rates of both volumetric and crop area basis since 1989-90 and by 1994-95 the rates have been doubled. On these rates a local cess of 20 per cent is levied by the government. The society gets 5 per cent discount from the irrigation department for prompt payment of water charges. The society charges its members the government water rates on crop area basis. In 1994-95 the society also levied Rs 25 per ha to meet the increasing repair and maintenance expenses. The society gets a R&M grant of Rs 20 per ha. The society is also entitled to get Rs 100, Rs 100 and Rs 75 per ha management grant for the first three years. The society collects 50 (25) per cent of the water charges for the area irrigated by the wells during rabi (summer) in the command area.

An analysis of incomes and expenditures for the financial years 1992-93 and 1993-94 shows that the society has earned substantial profits in both the years (Table B3.1). The increase in profit during 1993-94 over the previous year is mainly due to increase in the management subsidy received by the society. The society received only 75 per cent of the entitled subsidy from the government during 1992-93 while it received the full amount during 1993-94. Therefore, the share of management subsidy in the total income shows a 3.7 per cent increase during 1993-94. The management subsidy is about 27 per cent of the water charges paid to the irrigation department indicating that when 20 per cent discount is introduced instead of initial years management subsidy the society, in similar situations, would have received less money from the government. However, it is interesting to note that in both the years society would have made profit in the absence of management subsidy, repair and maintenance grant and discounts, from the government.

Societies income as well as expenditure have increased during the last three years. Income increase has come mainly from increase in the water charges levied on farmers and increase in the subsidy availed by the society. Cost increase has come mainly from increase in the government water charges. Repair and maintenance cost has also gone up from Rs 4000 in

1992-93 to approximately Rs 8100 in 1993-94. The shares of water charges collected from the farmers in the total incomes have been 77 and 80 per cent during 1992-93 and 1993-94, respectively. The share of water charges paid to irrigation department in the total cost is between 67-70 per cent. The share of salaries is around 20 per cent and the share of repair and maintenance has increased from 5 per cent to 9 per cent. The repair and maintenance expenditure incurred by the society is more than the grant received for this purpose indicating that society is willing to pay additional amount for maintaining the physical system.

There is no change in the gross area irrigated in these two years and gross area is small compared to the net area. Management, transaction and total costs are reasonable. On gross area basis these costs range between Rs 106-142, Rs 87-104 and Rs 352-430, respectively. The management cost has been around 30 per cent of the total cost and transaction cost accounts for about 25 per cent. During these two years the repair and maintenance costs have been Rs 24 and Rs 48/ha. Repair and maintenance grant provided by the government is around 40 per cent of the cost incurred in 1993-94. Total cost, on net area basis has increased over the years from Rs 442/ha in 1992-93 to Rs 548/ha in 1993-94. The ratio of water charges collected to costs needed to be recovered in order to break even has gone down slightly from 1.09 in 1992-93 to 1.07 in 1993-94. The ratio of water charges paid to irrigation department to water charges due from the farmers has gone down indicating increasing margin available for the society. The net returns of individual crops reveal that present water rates are less than 3% of the gross returns of major crops during 1994-95.

The society is financially viable and its viability depends primarily on the difference in the water rates between volumetric and area basis, seasonwise rates and cropping pattern, water use efficiency and recovery of water charges by the society.

The society has been collecting all its dues from farmers and paid its dues to the department in time and availed discounts. The ratio of water charges paid to water charges collected from farmers indicate that there is adequate margin built in for the society. However, a close examination of the water rates reveals that sugarcane is not charged in the usual proportion of 1:1.5:3 ratio for Kharif, Rabi and Summer crops (Table B3.2). The summer rates have been in favour of sugarcane. With the increase in the area under sugarcane this pattern of pricing can affect the profitability of the society.

As far as the water use efficiency is concerned the irrigated area under society's command has not increased though in the Bhima command the irrigated area increase during the period 1991-92 through 1993-94, has been to the extent of 70 per cent (Table B3.4 and Table B3.5). With the area under sugarcane increasing it is unlikely to happen in the futures.

After considerable over use of water during 1992-93, there seem to be some efforts to

improve the water use efficiency (Table B3.3). The WUA management claims that their efforts have helped its members to improve their irrigation practices and at present are giving 25 per cent less water to crops compared to the amounts applied earlier. Water usage in different seasons has changed and the society is using the surplus quota of water provided for rabi season to irrigate crops in summer. The society may have to make further efforts to improve the water use efficiency and change the water rate structure, especially that of sugarcane to reflect the more accurately the extent of water use and its cost.

3.4 Three Cooperative Societies at Ozar, District Nasik

Ozar village in Nasik district is situated at the tail end of the right bank canal of the Waghad irrigation project on the upper reaches of Godhavari river. As the water flow in the canal in the tail reaches was inadequate, the actual area irrigated was barely 30 ha compared to the irrigation potential of 1151 ha. In order to overcome this problem and to get an assured supply of water, the beneficiaries in the command of sub-minor 3 of distributory No.1, Minor No.17, 18, 18A and 19 decided to form a water users' cooperative society with help from the Samaj Parivartan Kendra, Nasik, a non governmental organisation. Because of the geographical dispersal and irrigation structure, they decided to form three separate cooperative societies in June 1990. Banganga Paniwatap Vyavastha Sahkari Sanstha located on sub-minor No.3 of distributory No.1, Jay Yogeshwar Paniwatap Vyavastha Sahkari Sanstha on Minor No.18A and 19, and Mahatma Jyotirao Phule Paniwatap Vyavastha Sahkari Sanstha on Minor No.17 and 18 were registered on March 8, 1991. They entered into an agreement with the Irrigation Department in November 1991 and began water distribution activities from March 1992.

The irrigable command area to be covered by these societies was 216 ha, 340 ha and 595 ha respectively. The societies were to have a common office and Secretary but would have independent Chairmen and Executive Bodies. An amount of Rs.25 per farmer was collected towards share capital and Rs.5 towards entrance fee. Each farmer also paid Rs.25 to meet the initial administrative expenses. A separate water quota was determined for each of the societies during the Kharif and Rabi seasons. During hot weather, they would receive water according to availability. Each society was permitted to store any unused quantity from their quota in Nallahs and Bhandaras. They were also permitted to transfer their unused Kharif quota to the Rabi and hot weather seasons. As an initial incentive, the Irrigation Department agreed to give 20% more water than their quota.

Before handing over the canal system to the societies, the Irrigation Department agreed to undertake the necessary repair and construction to enable the required volume of water to flow in the canals. This work began in May 1991 and was completed before the system was formally handed over to the societies.

Significant changes have occurred in the cropping pattern. Many crops which were not even considered earlier are now being cultivated regularly, such as sunflower, pulses, vegetables, grapes and even strawberries. Crops are taken in all three seasons unlike the only Kharif cropping in the past. There has been a clear shift from cereals and traditional crops to high value cash crops (see Table B4.2). This has been partly facilitated by a 40% increase in the number of wells in the command area and has brought about a significant change in the economic condition of the area. Farmers use latest intensive agricultural practices and have started sending some of their high value produce to distant markets in different parts of the country. Grapes are even being exported from this area to various countries. Yields of various crops have increased and those for sugarcane and wheat have almost doubled.

The number of wells as well as water level in the wells has increased substantially. All societies charge for use of well water at rates determined by the extent of well recharge on the basis of studies conducted by them. The water charges for different crops have also been determined on the basis of water requirement of different crops, plus a management fee. These rates charged by the societies are different from the rates charged by government on crop area basis. The rates applicable at present are given in Appendix B4, Table B4.3.

The income and expenditure statements (reported on accrued basis), cropping pattern and other data of the three societies are provided in Appendix B4, Table B4.1. The performance of each of these societies is described below. The financial data for Banganga was available for only two years, 1993-94 and 1994-95 whereas for Jay Yogeshwar and Mahatma Phule, data for three years, 1992-93 to 1994-95 are presented.

3.4.1 Banganga

This society incurred a loss of Rs.41,667 during 1993-94 and made a marginal profit of Rs.330 during 1994-95. The income of the society during 1994-95 has increased by about Rs.25,000 mainly due to increases in the water charges, repair and maintenance grants and management subsidy. Despite the increase in water charges paid to Irrigation Department, the total expenditure has reduced in 1994-95 compared to 1993-94 largely due to the significant drop in the repair and maintenance expenses. Other components of expenditure have been more or less stable. The society also incurred losses in 1991-92 and 1992-93 of Rs.3861 and Rs.7201 respectively (not reported in the table). The large loss in 1993-94 is mainly due to the fact that the society received neither repair and maintenance grants nor management subsidy from government, but had to incur a substantial expenditure on repair and maintenance of the distribution system. Even if the society had received the subsidy and grant, it would have incurred a loss. During the last two years alone, the society has spent Rs.41,861 on repair and maintenance, i.e. Rs.97/ha/year which is much higher than the subsidy they received. This is indicative of the willingness of the farmers to spend on the

upkeep of their system.

Water charges and subsidies together account for almost 90% of the revenue and water charges paid to Irrigation Department as well as the repair and maintenance cost together account for approximately 60% of the total cost. The salaries and wages as a percentage of total cost have increased from 19% in 1993-94 to 28% in 1994-95. The amount of increase is approximately Rs.2500.

The gross area irrigated has increased. On a net command area basis, the transaction, management and total costs have all declined. Transaction costs per hectare reduced from Rs.144 to Rs.124, management costs from Rs.301 to Rs.160 and total costs from Rs.393 to Rs.317. In terms of percentage of total costs, transaction costs increased marginally from 37% to 39%, management costs declined from 71% to 51%. The repair and maintenance costs declined from Rs.158/ha to Rs.36/ha during the same period. In percentage terms, the reduction was from 40% to 11%.

3.4.2 Jay Yogeshwar

This society made profits in 1992-93 and 1994-95 but incurred substantial loss in 1993-94. The loss of Rs.55,140 in 1993-94 was due to non receipt of the repair and maintenance grant and management subsidy. In the absence of these subsidies, the society would have incurred losses in the other years as well. In addition, the repair and maintenance cost in 1993-94 was more than double the expenditure on this account in the other years. The income from water charges has increased during these years, but the total income in 1993-94 was lower because the society did not receive any management subsidy and repair and maintenance grant as stated earlier. Water charges represent more than 90% of the total income (excluding grants and subsidies). Water charges and subsidies together account for 85-90% of total income. The major cost components are water charges, salaries and wages, and repair and maintenance. Water charges paid to the Irrigation Department as percentage of total expenditure have increased from 31% to 53%. The water charges have also increased in absolute terms from Rs.28,688 in 1992-93 to Rs.68,071 in 1994-95. Part of this increase is due to the increase in water rates as per the policy of the Government of Maharashtra. Salaries and wages have averaged approximately 21% of total cost. Repair and maintenance costs have averaged 20% of total expenditure during these three years. This amounts to Rs.40.52/ha/year. This expenditure is also more than the total repair and maintenance grants received from the Irrigation Department. The transaction costs during the three years are also much higher than the total management subsidy received by the society during the same period.

The gross area irrigated has increased during these three years (figures not available for 1994-

95), and the transaction costs have declined. On net command area basis, the transaction costs have declined from Rs.81/ha to Rs.68/ha. The management costs have fluctuated between a minimum of Rs.100/ha and a maximum of Rs.142/ha. The total costs have increased from Rs.155/ha to Rs.214/ha. In terms of percentage of total costs, transaction costs have declined from 52% to 32%, management costs have declined from 69% to 47% and repair and maintenance costs have varied considerably from a minimum of 15% in 1994-95 to a maximum of 28% in 1993-94. The latter is due entirely to the very high repair and maintenance costs incurred in 1993-94.

3.4.3 Mahatma Phule

The income from water charges of this society more than doubled during the three year period, but the total income during 1992-93 and 1994-95 increased by approximately Rs.7,300. The total income in 1993-94 dropped considerably because the society did not receive any management subsidy or repair and maintenance grants. The water charges paid by the society to the Irrigation Department increased substantially during these years. The share of water charges and subsidy in total income ranged between 86% and 92% whereas the share of water charges paid to total expenditure fluctuated between a minimum of 21% and a maximum of 40%. The society made profits during 1992-93 and 1994-95 though the profit of Rs.9,053 in 1994-95 was much lower than the profit of Rs.24,618 in 1992-93. The loss in 1993-94 was high because the society did not receive any subsidy and grant. Interestingly, in the absence of subsidy and grant in 1992-93 as well as 1994-95, the society would have incurred a loss in these years also. The high loss in 1993-94 is also partly due to the fact that the expenditure on repair and maintenance was much higher in that year. The total expenditure on repair and maintenance during these three years has been Rs.37,604 which is Rs.37/ha/year. This expenditure also averages 21% of total expenditure during this period. Salaries and wages averaged 31% of total expenditure and water charges accounted for an average of 29% of total expenditure during the same period.

The gross area irrigated has increased. The transaction, management and total costs per gross ha irrigated have all declined. On the basis of net command area, the transaction costs per hectare have fluctuated between Rs.71 and Rs.104, the management costs between Rs.87 and Rs.181 and the total cost between Rs.118 and 229. Both the management and total costs were high during 1993-94 because of the very high expenditure on repair and maintenance. Both transaction and management costs as a percentage of total cost were lower in 1994-95 as compared to 1992-93.

3.4.4 Financial Viability of the three societies:

All three societies have been regular in paying the water charges to the irrigation department

and have availed 5% rebate for timely payment. The recovery of water charges from members, though good, has however not been as impressive. All the three societies have levied penalty charges on members for late payment of dues. While data on the exact recovery rates is not available, some of the dues are more than 2 years old. The societies are also concerned about the high level of seepage losses and the fact that they have to pay for water which they are not able to use for irrigation. Despite the high seepage loss, the gross area irrigated has increased and consumption of water per unit of area irrigated has declined.

The societies are presently financially viable only because of the management subsidy and the repair and maintenance grants that they receive from the irrigation department. When the management subsidy is withdrawn and substituted by a 20% reduction in water charges, the societies will find it difficult to breakeven, unless they increase water use efficiency and thereby either increase area irrigated or reduce water drawn, or increase water charges or collect more money from farmers towards repair and maintenance, in view of the high level of maintenance expenditure involved. Recovery of water charges will also have to improve.

3.6 Bhima Irrigation Cooperative Society, Bhima, Dist. Panchmahal

Bhima village is situated in a notified backward area in Godhra Taluka of Panchmahal district of Gujarat state, 20 kms away from Godhra town, the district headquarter. This area was previously a jungle inhabited only by some tribals. Thirty years ago, under the land development programme, a major part of the jungle was cleared and converted into arable land. The condition of the farmers was however bad as they practiced only rainfed agriculture. Rainfall in the area is restricted to the south-west monsoon from mid June to end September. Ninety seven per cent of the total precipitation averaging 750 mm per year occurs during this period. The village had no irrigation facilities and there were only four wells. There was great difficulty for drinking water also as there was only one sweet water well in the village.

In 1972, the Government of Gujarat began work on constructing the Panam dam, which was completed in 1977. The main canal of this dam was designed to be a contour canal and the area of the right side of the canal would get irrigation water. A leading farmer of Bhima village, Shri Manibhai L Patel, thought of lifting water from this main canal and supplying it to the fields through pipelines. He, along with some other members from his community, proposed to form a cooperative society in 1982. The following year they obtained permission from the minor irrigation department for lifting water from the main canal. The District Panchayat under the Drought Prone Area Programme agreed to finance this project. The services of Sadguru Seva Trust, an NGO located at Dahod, was given the contract to survey the area and design the lift irrigation project. The estimated cost of the project was Rs.7,57,155. Construction work began in the year 1986 and was completed by the end of the

year. The actual expenditure incurred was Rs.7,90,696. The electric connection charges of Rs.9220 were paid for by the minor irrigation department.

The Bhima Irrigation Cooperative Society was registered on 31st July, 1986. In October 1987 the minor irrigation department handed over the completed lift irrigation scheme in proper working condition to the Chairman of the society, Shri Manibhai Patel. At the time of registration, the society had only 16 members, but the membership increased to 63 by 1989. The net command area in this scheme was expected to be 157 hectares. Over the years, there has been some increase in the gross area irrigated which depends on the availability of water, power and the operating schedule of the Panam main canal, which has had to be closed down on several occasions for repair and maintenance, though it is meant to be a perennial canal.

Irrigation has brought about a significant change in cropping pattern and cropping intensity. With irrigation, it has been possible to crop during Rabi and 15% of the area is also cropped during hot weather season. The main Rabi crops are tuvar, oilseeds and cereals, and groundnut in summer. In addition, there have been changes in input usage such as fertilizers and adoption of intensive agronomic practices. Members' incomes have increased and the overall condition of the village has improved.

The income of the society has steadily increased over the years and revenue from water charges is practically 100 per cent of the total income. Members are charged for water on an hourly basis and these hourly charges vary depending upon the chamber from which the members is supplied water. The chamberwise charges are different because of the different flow rates from the 14 chambers from which water is supplied to members fields. In addition to the water charges paid to the society, members pay 50% of the irrigation charges levied by the state government on crop area basis to the Irrigation Department. Pricing for water was modified in 1992-93 on the basis of experience and the observed flow rates from the chambers. It was changed again in 1993-94 when the government increased the electricity charges for the agriculture sector. The charges were increased from Rs.192 per HP to Rs.600 HP. The society could not absorb this increase in electricity charges and therefore had to increase the water rates by 60%. The cost of water to farmers at the prevailing rates accounts for 4% of income from Kharif cereals and pulses, 23% of income from Rabi cereals and 13% of income from oilseeds.

The recovery of water charges is very high because the society does not provide water to members who have not paid their water charges for the previous year. Richer farmers invariably pay their water charges on time. Most defaults in payment are by the small and marginal farmers.

The share of water charges in total cost is small and has averaged 8.5%. Similarly,

expenditure on salaries and wages has averaged a little over 6% of total cost. Expenditure on repair and maintenance has varied considerably from year to year and the total expenditure incurred during the last eight years is Rs.52,161, which represents an average of 4.8% of total cost. Depreciation has been the major component of expenditure which has declined from a high of 82% in the first year to 54% at present. Electricity charges which averaged 9% in the first six years, have doubled to 23% of total cost during the last two years. The increase in electricity charges has been substantial during the last two years on account of the increase in cost per HP levied by the state government as mentioned earlier. Total cost of providing irrigation per hectare has increased steadily from approximately Rs.741 per ha to Rs.1000 per ha at present. The management cost has increased from a minimum of Rs.28 per ha in 1988-89 to a maximum of Rs.173 per ha in 1994-95. Transaction cost have fluctuated from a minimum of Rs.9 per ha in 1990-91 to Rs.116 per ha during 1994-95.

The society has not been following the practice of providing for depreciation in its financial accounts. Without providing for depreciation, it could make profits in five of the eight years for which the society has functioned. The losses incurred during the period 1989-90 to 1991-92 without providing for depreciation were quite nominal and were largely due to very low revenue from water charges in 1989-90, the unusually high repair and maintenance costs in 1990-91 and the high water charges as well as repair and maintenance expenses in 1991-92. Profits on the other hand before providing for depreciation during the last three years (1992-93 to 1994-95) were substantial, having increased from Rs.34,798 to Rs.66,823 during this period. It is important to note that the society could not make profit during any of the eight years after providing for depreciation. This is because the hourly rates for water have been fixed ignoring depreciation.

Members of the society have been by and large satisfied with the management of the society and have perceived the distribution of water to be equitable. The society is not interested in increasing membership even though it has some applications for new members. The society is however not financially viable because of its faulty pricing for water. The members seem unconcerned about this aspect and are quite pleased that during the last eight years they have made substantial cumulative profit without providing for depreciation.

3.6 Shri Sambhaji Warana Coeprative Lift Irrigation Scheme Ltd., Kadoli, District Kolhapur

Shri Sambhaji Warana Cooperative Lift Irrigation Scheme Ltd., Kadoli was established in 1987 and began full fledged operations from the year 1988-89. The society was promoted with the support of Warana Sugar Factory which was interested not only in increasing area under sugarcane cultivation, but also in ameliorating the sad plight of poor farmers who had either no access to irrigation or were paying one fourth of the sugarcane produce as water

charges to well owners from whom they bought water. In addition they also had to pay water tax to the Irrigation Department authorities according to the prevailing rates.

The total investment in this lift irrigation scheme was Rs.14 lakhs and it was financed by loans from Bank of India and Warana Bank at commercial rates by hypothecating members' land and by share capital contributed by members. Initially there were 120 members each of whom contributed Rs.580 as share capital. The net irrigated area of this lift irrigation scheme is 97 ha. Over the years there has been very little area expansion in net irrigated area, but there has been some increase in gross irrigated area, and the number of members has also remained stable. The area under sugarcane cultivation has however increased and is presently cultivated in more than 90% of the command area.

Income of the society has steadily increased and revenue from water charges as a percentage of total income is approximately 90%. Revenue from water charges itself has increased, but a substantial part of the increase is due to a steep increase in prices of sugarcane during 1993-94 and 1994-95. Pricing for water was regularly modified to reflect the sugarcane price and the loan repayment and interest burden. The society presently charges Rs.1235/ha for Kharif crops and Rs.1976/ha for Rabi crops. Charges for sugarcane are on quantity basis, at 14.82 MT/ha, exactly half the quantity charged in the initial years.

Recovery of water charges is 100% because of the linkage that the society has with Warana Sugar Factory and due to the fact that more than 90% area is under sugarcane cultivation. Due to this linkage, interest payment on loan and instalment repayment to the banks was also regular. The association has completely repaid the loans taken in six years (after moratorium period) and the water charges in terms of sugarcane quantity per ha are expected to decline further. Management support from the sugar factory has also been a great help to the society in managing its financial matters.

Share of water charges in total cost is less than 5% (the irrigation department charges are Rs.468.75 per ha for sugarcane, Rs.25 per ha for Kharif crops and Rs.37.50 per ha for Rabi crops), and the two largest cost components after interest payment and depreciation are salaries & wages and repair & maintenance. These two components together presently account for approximately one third of the total cost. The repair and maintenance cost during the last three years (average of Rs.381/ha/year) has been substantially higher than previous years. Even though electricity charges have gradually increased, they are presently less than 10% of the total cost. Total cost of providing irrigation per ha has declined during the last three years from Rs.3,413 per ha to Rs.2839 per ha. The management cost per ha has also declined from Rs.2659 per ha to Rs.1803 per ha. Transaction cost has however doubled during this period from Rs.593 per ha to Rs.1123 per ha.

The society made a marginal profit of Rs.4735 after providing for depreciation in the year 1993-94. In 1994-95 it made a substantial profit of Rs.1,65,200 after providing for depreciation. In all other earlier years, it had incurred losses, but the society is now on its way to wiping out the accumulated losses. The accumulated loss at the end of 1994-95 was Rs.4,63,532. The society is financially viable even though it has not received any subsidy during these years and has also had to meet a substantial interest burden on the loans taken. The interest paid alone during the last six years was Rs.9,53,651/- which amounts to Rs.1,639 per ha per year.

Members of this lift irrigation society have paid comparatively higher charges for obtaining irrigation facilities which have been economically viable only because of their cultivating sugarcane and the linkage with the sugar factory. Water charges for wheat account for 8% of the gross returns and 13% for sugarcane. The members are quite satisfied with the management of the society and the equitable manner in which the water has been distributed. The water charges for sugarcane which have declined from 12 tons per acre to 6 tons per acre presently are expected to decline further because of the prevailing price of sugarcane and the loan having been repaid. The society is presently interested in increasing the number of members and intends to levy differential water charges for new members as compared to the existing members, because these new members have not contributed to building the assets of the society.

3.7 Mahatma Jyotirao Phule Cooperative Society, Phulewadi, District Kolhapur

The Mahatma Jyotirao Phule Cooperative Society, Phulewadi was established in 1958 as a multi purpose cooperative society. Every land owner within 10 kms of Kolhapur Municipal area who applied for membership was granted membership. Each member paid Rs.1000 per acre as a membership and deposit fee. At that time most farmers in the area practiced rain fed agriculture except for the rich farmers who owned wells or had private lift irrigation systems. Small land owners tried to implement lift irrigation schemes on contract basis as a single farmer could not bear the initial expenses nor could he easily comply with the irrigation department procedures for permission to lift water. He therefore bought water from other contractors or rich farmers paying a high price for that water. Twenty five per cent of his produce was to be given as water charges and even then water was not always available to him on demand. He had to submit to the dictates of the seller.

The Mahatma Jyotirao Phule Cooperative Society was concerned about this plight of farmers and was determined to get water by a lift irrigation scheme from the nearby Rajaram weir. An earlier scheme prepared by Shri Bondre had been turned down by the irrigation department as technically not feasible. The society was therefore determined to implement this scheme on its own. By this scheme water was to be carried to farmers' fields with the

help of a 5500 ft. pipeline. Work on this scheme was initiated in August 1960 and was completed in 1963. It was formally inaugurated on January 26, 1964 and farmers started receiving water from January 27, 1964. The estimated cost of the scheme was Rs.14-16 lakhs. To finance this investment, a sum of Rs.741 per ha was collected from all members of the society who wanted to be members of this lift irrigation scheme. A total of Rs.4,02,344 was collected from 934 members. The command area of this scheme was expected to be 558.7 ha. A loan was also taken from Kolhapur District Cooperative Bank to implement Phase I of this scheme. After two years of successful working, the Society decided to implement the second phase. This time, Government of Maharashtra offered its help and sanctioned a loan of Rs.7,25,000 for the work. For this phase, the society also availed the benefit of subsidy of Rs.1,75,000 on this loan.

The scheme has worked satisfactorily for all these years and the society was successful in repaying the loans taken. Over the years there has been considerable reduction in the gross area irrigated as well as the number of members of the lift irrigation scheme. This has been due to the increasing urbanization of Kolhapur city and conversion of agricultural lands into residential areas.

Financial data for the three years, 1991-92 to 1993-94, is presented in the Appendix. During these three years, the society incurred a loss in two years and could make a reasonable profit only in 1993-94 after providing for depreciation. The profit in the last year was mainly due to an increase in water charges collected and the loss in 1992-93 was due to less availability of water and consequent reduction in supply of water and revenues from water supply. In 1991-92, though the society incurred a loss after providing for depreciation, it did not incur any cash loss.

Water rates are determined by the society after considering all expenses which include expenditure on repair and maintenance, electricity charges, wages and salaries and miscellaneous expenditure. As the expenditure varies every year, the water rates also vary each year. A steep increase in water charges collected in 1993-94 resulted in profit in that year. The present water charges are Rs.3705 per ha for sugarcane, Rs.1729 per ha and Rs.741 per ha for Rabi and Kharif crops respectively. Recovery rates are fairly high even though the society has no linkage with any sugar factory (There is no sugar factory nearby). Presently, more than 90% of the command area is under sugarcane cultivation and members produce jaggery in their cottage production units from the sugarcane they cultivate. The society has been helping them to market this jaggery for better price realisation. Water charges for wheat account for 20% of the gross returns and 8.5% for sugarcane.

Share of water charges in revenue is approximately 90%. The society has also increased its water revenue by levying 50% charge on well owners in the command who use well water

for irrigation. The water charges paid by the farmers in the society are comparatively lower than those paid by the farmers in Kadoli lift irrigation society.

The society pays water charges to the irrigation department at Rs.468.75 per ha for sugarcane, Rs.37.50 per ha for rabi and Rs.25 per ha for kharif. The share of water charges in total expenses is however small (less than 10%) as this is a lift irrigation scheme. The two largest cost components are electricity charges and repair and maintenance (approximately 23% each). They are followed by salaries and wages (20%). The total cost of providing irrigation per ha of command area has varied considerably during the three years from a minimum of Rs.2110 in 1992-93 to a maximum of Rs.2622 in 1993-94. It must however be noted that the comparatively lower value in 1992-93 was on account of substantially lower expenditure on repair and maintenance in 1992-93 compared to 1993-94. The repair and maintenance cost per ha has varied from Rs.438 to 856. The management cost per ha during this period exhibited a similar behaviour due to the same reason and has varied from a minimum of Rs.1094 in 1992-93 to a maximum of Rs.1914 in 1993-94. The transaction cost ranged from Rs.656 to Rs.1058 per ha.

Members perceive the performance of the society to be satisfactory and consider the distribution of water to be equitable. The society in fact is strict in maintaining discipline and levies penalty charges on any members who violates the water distribution rules. The society makes up for the loss it has incurred on irrigation activity through its other enterprises. It also provides other services to water users such as sale of fertilizers and marketing of jaggery. The society, even without receiving any management subsidy, could be a financially viable enterprise provided its scope of operations does not shrink further. Unfortunately, it appears that more and more agricultural land is likely to be converted into residential area, which can spell the ultimate decline of this lift irrigation association.

3.8 Comparative Analysis

We compare the performance of WUAs' functioning in gravity flow systems and user managed lift irrigation schemes in the following sections.

3.8.1 WUAs' Functioning in Gravity Flow Systems:

The sites chosen in gravity flow systems were Mohini, Datta, Shevare, Banganga, Jay Yogeshwar and Mahatma Phule. Mohini has been functioning for more than 15 years and is in the maturity stage of its organisational life cycle and perhaps entering into the declining phase. Financial data for Mohini was analysed for five years from 1990-91 to 1994-95. Datta WUA has functioned for seven years and its operations are in the process of being stabilised. Financial data for this society was analysed for five years from 1989-90 to 1993-

94. The other WUAs are in their formative years and only limited experience is available. Table 3.1 provides a comparison of their performance.

Table 3.1: Performance of WUAs in Turned Over Surface Irrigation Projects						
	Mohini	Datta	Shevare	Banganga	Jay-Yoge	M. Phule
No. of Years Data Analyzed	5 (90-91 to 94-95)	5 (89-90 to 93-94)	2 (92-93 to 93-94)	2 (93-94 to 94-95)	3 (92-93 to 94-95)	3 (92-93 to 94-95)
Profit (No. of years)	2 (92-93, 94-95)	5	2	1 (94-95)	2 (92-93, 94-95)	2 (92-93, 94-95)
Ratio of WC Paid to ID WC Due	0.60 - 0.75	0.37-0.65	0.66-0.72	0.50-0.68	0.43-0.75	.49-.56
Share of WC in total Income (Range - %)	66-82	43-82	77-80	72-92	46-93	33-92
Share of WC paid in total cost (Range - %)	61-68	37-64	67-70	23-49	31-53	21-40
Total Cost/ha (Range in Rs)	786-929	268-511	442-548	317-393	155-227	118-229
Management Cost/ha (Range in Rs)	286-344	124-318	133-181	160-301	100-142	87-181
Transaction Cost/ha (Range in Rs)	231-283	108-237	109-133	124-144	68-81	71-104
R&M Cost/ha (Range in Rs)	51-61	15-145	24-48	36-158	26-64	15-77

Datta and Shevare have made profits in all the years for which data has been analysed. The three Ozar societies incurred losses in one of the three years and Mohini in three out of five

years for which the data were analysed. All the WUAs except Mohini have received management subsidy as well as repair and maintenance grants during the period studied.

Repair and maintenance cost per hectare was highest in Datta and Banganga. The year to year variation was also very high. This cost was lower in Shevare, Jay Yogeshwar and Mahatma Phule, and it was the mid-range and stable in Mohini. Interestingly the repair and maintenance cost per hectare was higher than the repair and maintenance grants that the societies were receiving.

The transaction cost per hectare in Mohini was distinctively higher than in other societies. The transaction costs were much lower in the three Ozar societies which could be due to the fact that the net command area of these societies is larger than the net irrigated area. The transaction cost per hectare at Shevare is similar to the transaction cost incurred in Banganga which is a little higher than that in the other two Ozar societies. In Datta, Shevare and Banganga, the transaction cost was higher than the management subsidy that they received. Only in Jay Yogeshwar and Mahatma Phule, management subsidy exceeded the transaction cost.

The management cost per ha was highest in Mohini and lowest in Jay Yogeshwar and Mahatma Phule. Although the variation in management cost was higher in Datta and Banganga, the average is quite similar and some what higher than that in Shevare, Jay Yogeshwar and Mahatma Phule.

The total cost per ha was highest in Mohini and lowest in Mahatma Phule and Jay Yogeshwar. Interestingly in every one of these societies, this cost is less than 5% of the net incomes from the high value crops cultivated in the commands of these societies. These costs are also expectedly substantially lower (less than half) than the total cost per ha in lift irrigation systems. The total cost per ha in Mohini is much higher due to the high amount spent on salaries and wages.

The ratio of water charges paid to the irrigation department to the water charges due to the societies did not exceed 0.75 in any WUA. It did however fluctuate considerably between a minimum of 0.37 and a maximum of 0.75. The margin between water charges due and water charges paid was highest in Datta and lowest in Mohini and Shevare. The share of water charges due to the society in total income of the society exhibits considerable variation for Datta, Jay Yogeshwar and Mahatma Phule largely due to differences in availability of subsidy and grants in different years. The share of water charges paid in total cost was highest in Mohini and Shevare and lowest for the three Ozar societies.

TABLE A2: Costs and Benefits of Transfer to Agency

	DATTA	SHEVARE	OZAR	MOHINI	ANKLAV	PINGOT	LBP	PAP	T.PARANI	KEDAR	PARUNDE	BHIMA	KADOLI	P.WADI
COSTS:														
Tangible Costs:														
i. System Related														
-Physical Improvement	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y	Y	Y	N	N
ii. Organizational Cost														
-Hiring Addtl Staff	N	N	N	N	Y	Y	Y	Y	N	Y	N	Y	NA	NA
-Exps Twrds Mtrng & O Proc	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	NA	NA	NA
-Training	Y	Y	Y	N	Y	Y	Y	Y	N	Y	N	N	N	N
iii. Management Support														
- Management Subsidy	Y	Y	Y	Y	N	N	Y	Y	N	NA	Y	N	N	N
- R&M Grant														
- Water Charge Discounts	Y	Y	Y	Y	Y	N	N	N	N	NA	Y	Y	N	N
- Addtl Wtr Prvd	Y	Y	Y	Y	Y	N	N	N	N	NA	NA	NA	NA	NA
Intangible Costs:														
-Time Spnt by Officials	Y	Y	Y	Y	Y	N	Y	Y	N	Y	Y	NA	NA	NA
BENEFITS:														
Tangible Benefits:														
i.Imprv Recov Wtr Chrg	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y
ii.Imprv lrg Efficiency	Y	Y	Y	-	Y	-	Y	Y	Y	Y	Y	-	-	-
iii.Redct Transm loss	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	NA	NA	NA
iv.Redct R & M Chrg	Y	Y	Y	N	Y	N	N	Y	Y	Y	NA	N	NA	NA
v Reduction in Estab. Exp	Y	N	N	N	Y	N	N	N	N	N	NA	N	N	N
vi.Avl External Support	Y	Y	N	Y	Y	Y	N	N	N	Y	NA	NA	NA	NA
Intangible Benefits:														
i.Ablt Off/Stff Wrk Lrg Area	N	Y	Y	N	N	N	N	N	N	N	NA	NA	NA	NA
ii.Redct in Time Spnt Coll WC	Y	Y	Y	Y	Y	-	N	N	N	Y	NA	Y	Y	Y

iii. Redct in Time Spnt W Dist	Y	Y	Y	Y	Y	Y	-	N	N	N	Y	NA	NA	NA	NA
iv. Redct in Time Spnt Resol Con	Y	Y	Y	Y	Y	Y	-	N	Y	N	Y	NA	NA	NA	NA
v. More Equitable Distribution	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
OFFICIALS															
-Loss of Income	Y	Y	Y	Y	Y	Y	-	N	N	N	NA	NA	NA	NA	NA
-Loss of Power & Status	Y	N	Y	N	Y	N	-	N	N	N	NA	NA	NA	NA	NA
-Sense of Achievement	Y	Y	Y	N	Y	Y	Y	Y	Y	n	Y	Y	N	N	N

TABLE A3: Costs and Benefits of Transfer to Community

	DATTA	SHEVARE	OZAR	MOHINI	ANKLAV	PINGOT	LBP	PAP	T.PARANI	KEDAR	PARUNDE	BHIMA	KADOLI	P.WADI
COSTS:														
i.Environmental	N	N	N	Y	N	N	N	N	N	-	N	-	-	-
BENEFITS:														
Tangible Benefits:														
i.Employment	Y	Y	Y	SI	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
ii.Bussin Opport	Y	Y	Y	N	N	-	N	Y	Y	Y	Y	Y	Y	Y
iii.Increased Supp Grnd Wtr	Y	Y	Y	Y	Y	.	N	Y	Y	-	Y	-	Y	Y
Intangible Benefits:														
i.Infrastructure Dev	Y	Y	Y	Y	Y	-	N	N	N	Y	Y	-	-	Y
ii.Environment	Y	Y	-	N	Y	-	N	N	N	-	-	-	-	-
iii.Increased Prestige	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
iv.Access to New Resource	Y	N	-	N	N	-	N	N	N	Y	N	-	-	Y
v.Less Conflict in Soc	Y	Y	Y	-	Y	-	N	N	Y	Y	Y	-	-	Y
SI Slight increase														

APPENDIX B1

Mohini Water Distribution Cooperative Society

TABLE B1.1 Income and Expenditure

INCOME (Rs)	1990-91	91-92	92-93	93-94	94-95
Water Charges	252166	271443	272176	266563	262487
Extra Water Charges	12101	5820	14020	26953	11284
Punishment	6980	10034	10020	7989	10149
Interest	4150	4861	4436	10119	5242
Dividend	12	128	138	187	215
SUB TOTAL	275409	292286	300790	311811	289377
Tractor Charges	86417	120865	95272	90715	31897
TOTAL	361826	413151	396062	402526	321274
EXPENDITURE (Rs)					
Water Charges	179711	203809	163197	197030	172847
Canal Maintenance	17070	18515	20062	20519	18644
Salary	51168	50628	50628	50628	50628
Patkari Staff Bonus	1667	1733	1935	2000	1840
Patkari dress Expenses	1500	0	0	1500	0
Staff Bonus	5116	5062	5062	5062	5062
Staff Providend Fund	6078	6169	6747	6852	6452
Travelling	119	0	600	0	0
Mail-Telegram	50	128	63	67	84
Stationary	2644	4483	3788	4407	5501
Guest	2515	2160	1772	2775	2536
Electric Charges	965	749	899	2120	2170
Audit Fee	279	250	162	200	313
Office Garden	600	0	0	0	0
General Meetings	2492	0	0	6613	0
Vehicle Insurance	780	310	290	0	0
Vehicle Maintenance	3893	5783	8503	12031	10646
Vehicle Tax Exp	1880	0	0	0	0
Bank Commission	0	5	9	13	2
Office Water Supply	0	0	0	0	7401
Other expenses	671	484	1123	1197	1256
SUB TOTAL	279198	300268	264840	313014	285382
Tractor Expenditure	63802	89539	93892	82768	60036
TOTAL	343000	389807	358732	395782	345418
PROFIT / LOSS					
Without Tractor	-3789	-7982	35950	-1203	3995
With Tractor	18826	23344	37330	6744	-24144

APPENDIX B2

Shri Datta Cooperative Water Distribution Society Ltd., Chanda

TABLE B2.1: Income and Expenditure

INCOME	89-90	90-91	91-92	92-93	93-94
Water Charges	85601	105463	40433	110652	112477
R&M Grants	10000	5000	10000	15000	10000
Management Subsidy	9000	34886	40012	34377	0
Bank Interest	146	752	707	4353	4024
Surcharge	0	1103	3108	3724	4320
Hiring out Implements	0	580	345	595	855
Miscellaneous	0	331	135	1934	5200
Penalty	0	120	0	0	0
TOTAL	104747	148235	94740	170635	136876
EXPENDITURE					
Water Charges	42422	40482	26254	41151	50329
Repair & Maintenance	2910	8685	9250	10200	37950
salaries & Wages	16600	24000	16000	28000	26800
Staff Bonus	0	2880	0	2000	0
Travels	140	1936	2559	4980	5655
Meetings	0	0	1000	924	885
Office Rent	1050	2100	2000	3250	3000
Stationary	2431	2095	836	2091	2036
Postage	0	78	135	24	156
Banking	60	151	200	147	96
Advertising	300	250	0	800	0
Printing	0	3500	3676	9900	385
Miscellaneous	0	4207	2440	8229	6137
TOTAL	65913	90364	64350	111696	133429
PROFIT/LOSS	38834	57871	30390	58939	3447
PROFIT/LOSS without					
Grant and Subsidy	19834	17985	-19622	9562	-6553
SHARE (%) IN INCOME					
Subsidy	8.59	23.53	42.23	20.15	0.00
Water Charges	81.72	71.15	42.68	64.85	82.17
SHARE (%) IN EXPENDITURE					
Water Charges	64.36	44.80	40.80	36.84	37.72
Salary	25.18	26.56	24.86	25.07	20.09
Repair & maintenance	4.41	9.61	14.37	9.13	28.44
Share of Subsidy in WC					
Due to ID	21.22	86.18	152.40	83.54	0.00
COSTS (Rs)					

Management	23491	49882	38096	70545	83100
Transaction	20581	41197	28846	60345	45150
Total	65913	90364	64350	111696	133429
AREA IRRIGATED (Ha)					
Gross	257	199	233	412	338
Net	190	240	240	255	261
COST PER HECTARE (G)					
Management	91.40	250.66	163.50	171.23	245.86
Transaction	80.08	207.02	123.80	146.47	133.58
Total	256.47	454.09	276.18	271.11	394.76
COST PER HECTARE (N)					
Management	123.64	207.84	158.73	276.65	318.39
% in Total Cost	35.64	55.20	59.20	63.16	62.28
Transaction	108.32	171.65	120.19	236.65	172.99
% in Total Cost	31.22	45.59	44.83	54.03	33.84
R & M Cost	15.32	36.19	38.54	40.00	145.40
% in Total Cost	4.41	9.61	14.37	9.13	28.44
Total	346.91	376.52	268.13	438.02	511.22
WC NEEDED TO COVER COST	55767	82478	50055	86090	109030
RATIO OF WC DUE TO DESIRED	1.53	1.28	0.81	1.29	1.03
RATIO WC PAID TO WC DUE	0.50	0.38	0.65	0.37	0.45
GENERAL					
Membership	114	157	199	-	203
Share Capital (Rs)	16845	19145	20360	22470	23320
Reserve Funds (Rs)	2473	1720	24611	40193	61243
Education Funds (Rs)	0	0	52	100	150
Religious Funds (Rs)	0	0	9885	17020	25990
Building Funds (Rs)	0	0	13224	23609	36219
Sp. Building Funds (Rs)	0	0	8961	15432	23564

From Tractor	22615	31326	1380	7947	-28139
SHARE (%) IN INCOME					
WC Without Tractor	91.56	92.87	90.49	85.49	90.71
WC With Tractor	69.69	65.70	68.72	66.22	81.70
SHARE (%) IN EXPENDITURE WITHOUT TRACTOR					
Water Charges	64.37	67.88	61.62	62.95	60.57
Salaries & Wages	23.47	21.18	24.31	21.10	22.42
Repair & Maintenance	6.11	6.17	7.58	6.56	6.53
SHARE (%) IN EXPENDITURE WITH TRACTOR					
Water Charges	52.39	52.28	45.49	49.78	50.04
Salaries & Wages	19.10	16.31	17.94	16.69	18.52
Repair & Maintenance	4.98	4.75	5.59	5.18	5.40
COST (Rs)					
Management Cost	99487	96459	101643	115984	112535
Transaction Cost	82417	77944	81581	95465	93891
Total Cost	279198	300268	264840	313014	285382
AREA IRRIGATED (Ha)					
Gross	827.7	883.5	888.18	872.74	928.42
Net	337	337	337	337	337
COST PER HECTARE (G)					
Management	120.20	109.18	114.44	132.90	121.21
Transaction	99.57	88.22	91.85	109.39	101.13
Total	337.32	339.86	298.18	358.66	307.38
COST PER HECTARE (N)					
Management	295.21	286.23	301.61	344.17	333.93
% in Total Cost	35.63	32.12	38.38	37.05	39.43
Transaction	244.56	231.29	242.08	283.28	278.61
% in Total Cost	29.52	25.96	30.80	30.50	32.90
R&M cost	50.65	54.94	59.53	60.89	55.32
% in Total Cost	6.11	6.17	7.58	6.56	6.53
Total	828.48	891.00	785.88	928.82	846.83
WC NEEDED TO COVER COST	255955	279425	236226	267766	258492
RATIO OF WC DUE TO WC					
REQUIRED FOR BREAK-EVEN	0.99	0.97	1.15	1.00	1.02
RATIO OF WC PAID TO					
WC DUE FROM FARMERS	0.71	0.75	0.60	0.74	0.66
GENERAL					
Membership	247	251	256	264	267
Share Capital (Rs)	13350	13550	13700	14150	14550
Reserve Funds (Rs)	23946	23977	23984	23994	25686
Other Funds (Rs)	163833	153292	159607	150335	158440
Depreciation Fund (Rs)	57345	60675	59157	59957	59957

TABLE B1.4: Cropping Pattern

Years	Crops	S.Cane	Paddy	Grass	Wheat	Veg.	Banana	Others	Total
85-86	Area (Ha)	827	39.6	9.38	0.94	13.98	10.46	49.56	950.92
	%	86.97	4.16	0.99	0.10	1.47	1.10	5.21	100
86-87	Area (Ha)	863.76	36	13.13	1.12	3.01	10.46	49.78	977.26
	%	88.39	3.68	1.34	0.11	0.31	1.07	5.09	100
87-88	Area (Ha)	877.08	18.59	15.01	0.12	2.13	0	35.71	948.64
	%	92.46	1.96	1.58	0.01	0.22	0	3.76	100
88-89	Area (Ha)	832.49	18.59	15.01	0.12	2.13	0	35.71	904.05
	%	92.08	2.06	1.66	0.01	0.24	0	3.95	100
89-90	Area (Ha)	805.99	19.64	11.29	0.12	1.94	0	46.95	885.93
	%	90.98	2.22	1.27	0.01	0.22	0	5.30	100
90-91	Area (Ha)	747.69	23.3	5.65	0.12	6.49	0	44.45	827.7
	%	90.33	2.82	0.68	0.01	0.78	0	5.37	100
91-92	Area (Ha)	765.39	33.04	4.79	0.73	13.31	0	66.25	883.51
	%	86.63	3.74	0.54	0.08	1.51	0	7.50	100
92-93	Area (Ha)	784.44	27.87	6.97	0.24	8.53	0	60.14	888.19
	%	88.32	3.14	0.78	0.03	0.96	0	6.77	100
93-94	Area (Ha)	763.13	31.49	4.36	0.86	20.79	0	52.1	872.73
	%	87.44	3.61	0.50	0.10	2.38	0	5.97	100
94-95	Area (Ha)	822.15	36.43	3.85	1.2	21.53	0	43.27	928.43
	%	88.55	3.92	0.41	0.13	2.32	0	4.66	100

TABLE B2.3: Area Irrigated and Water Used

(Area in ha; Volume in Mct)									
Year	Seasonwise Area and Volume				Hot Weather		Total		Mct/Ha
	Kharif		Rabi						
	Area	Volume	Area	Volume	Area	Volume	Area	Volume	
1982-83	94.14	13.65	119.25	28.01	62.05	22.28	275.28	63.90	0.23
1983-84	83.00	8.89	104.82	23.67	83.00	28.02	200.82	60.58	0.30
1984-85	81.30	9.52	97.10	23.83	87.80	29.30	266.20	62.60	0.24
1985-86	72.40	9.48	77.80	9.48	3.07	1.54	153.20	20.50	0.13
1986-87	117.00	13.17	104.90	12.78	3.60	3.25	255.50	31.60	0.12
1987-88	128.00	11.31	125.03	13.80	2.80	0.89	263.43	18.76	0.07
1988-89	125.60	7.23	112.50	24.00	99.20	22.11	337.30	53.34	0.16
1989-90	52.00	5.31	138.00	24.48	85.00	14.68	256.62	48.43	0.19
1990-91	50.00	7.05	55.80	12.98	92.85	25.92	198.65	45.88	0.23
1991-92	69.55	13.96	107.40	28.89	56.30	14.45	233.25	57.30	0.25
1992-93	99.20	7.35	225.95	28.21	86.95	18.14	412.10	57.30	0.14
1993-94	99.95	15.12							

TABLE B2.4: Water Rates (Rs/1000 m3) in Maharashtra (Volumetric)

	90-91	91-92	92-93	93-94	94-95
KHARIF	12	14	16	18	20
RABI	18	21	24	27	30
SUMMER	36	42	48	54	60

TABLE B2.5: Water Rates (Rs/Ha) in Maharashtra (Crop wise)

Season	Crop	89-90	90-91	91-92	92-93	93-94
Kharif	Paddy	65	70	80	90	100
	G.Nut	120	140	160	180	200
Rabi	Wheat	100	125	150	175	200
	Cotton	180	240	240	270	300
	G.Nut	180	210	240	270	300
Summer	S.Cane	1000	1250	1500	1750	1750
	Banana	800	1000	1250	1500	1750

APPENDIX B3

The Laxmi Narasimha Canal Water Distribution Cooperative Society,

Shevare

TABLE B3.1: Income and Expenditure

INCOME (Rs)	92-93	93-94
Water charges	72125	94776
Discounts	2614	3091
Management Subsidy	9852	16893
Repair & Maintenance Grant	2534	3389
Miscellaneous	6000	417
TOTAL	93125	118566
EXPENDITURE (Rs)		
Water charges	52275	62088
Salaries & Wages	15850	18190
Repair & Maintenance	4000	8120
Meetings	450	757
Travels & Trainings	700	475
Stationary	1122	2024
Postage	56	30
Miscellaneous	240	945
TOTAL	74693	92629
PROFIT/LOSS	18432	25937
PROFIT/LOSS without Subsidy and Grant	6046	5655
SHARE (%) IN REVENUE:		
Management Subsidy	10.58	14.25
Water charges	77.45	79.94
SHARE (%) IN EXPENDITURE		
Water charges	69.99	67.03
Salaries & Wages	21.22	19.64
Repair & Maintenance	5.36	8.77
SUBSIDY AS % OF WC PAID	18.85	27.21
COSTS (Rs)		
Management	22418	30541
Transaction	18418	22421
Total	74693	92629
AREA IRRIGATED (HA)		
Gross	212.39	215.4
Net	168.96	168.96
COST PER HECTARE (G)		
Management	105.55	141.79
Transaction	86.72	104.09

Total	351.68	430.03
COST PER HECTARE (N)		
Management	132.68	180.76
% in Total Cost	30.01	32.97
Transaction	109.01	132.70
% in Total Cost	24.66	24.21
R&M	23.67	48.06
% in Total Cost	5.36	8.77
Total	442.08	548.23
WC NEEDED TO COVER COST	64841	75736
RATIO OF WC DUE TO DESIRED	1.11	1.25
RATIO OF WC PAID TO WC DUE	0.72	0.66
GENERAL		
Membership	100	100
Share Capital (Rs)	5000	5000

TABLE B3.3: Actual Season Wise Water Distribution and Water Charges

YEAR	SEASON	AREA IN HA	WATER UTILISATION			ASSESSMENT ON VOLUMELECTRIC BASIS			ASSESSMENT ON AREA BASIS			WCPD/COL	DAYCUS/HA
			DAY CUSEC	MCM@	MCM#	WC	LF	TOTAL	WC	LF	TOTAL		
1992-93	KHARIF	55.40	161.70	0.40	0.16	2588.16	517.63	3105.79	6920.00	1384.00	8304.00	0.37	2.92
	RABI	98.00	561.96	1.37	0.56	13487.04	2697.41	16184.45	20202.00	4040.40	24242.40	0.67	5.73
	SUMMER	73.19	572.67	1.40	0.57	27488.16	5497.53	32985.69	32984.00	6594.80	39578.80	0.83	7.82
	TOTAL\$	226.59	1296.33	3.17	1.29	43563.36	8712.57	52275.93	60106.00	12019.20	72125.20	0.72	5.72
1993-94	KHARIF	53.20	119.21	0.29	0.12	2145.78	429.16	2574.94	6881.00	1377.20	8258.20	0.31	2.24
	RABI	88.80	365.69	0.89	0.37	9873.63	1974.73	11848.36	28972.10	5794.40	34766.50	0.34	4.12
	SUMMER	72.65	300.60	0.74	0.74	39720.24	7944.65	47664.89	43126.00	8625.11	51751.11	0.92	4.14
	TOTAL	214.65	785.50	1.92	1.23	51739.65	10348.54	62088.19	78979.10	15796.71	94775.81	0.66	3.66
1994-95	KHARIF	55.42	142.17	0.35	0.35	6957.40	1391.40	8348.80	16947.00	3389.40	20336.40	0.41	2.57
	RABI*	88.80	178.84	0.44	0.44	13200.00	2640.00	15840.00	39726.00	7945.20	47671.20	0.33	2.01
	SUMMER												

@ MM 3 calculated based on Day cusec.

MM 3 reported.

\$ Averages for the last two columns.

* Water charges indicated are estimates.

WCPD/COL is the ratio of water charges paid to ID to water charges collected from members.

TABLE B4.2: Cropping Pattern

(Area in Ha; Share in %)							
Society	CROPS	91-92		92-93		93-94	
		Area	Share	Area	Share	Area	Share
BBANGANGA	VEG.	3	6.24	2.93	3.33	8.32	6.82
	S.CANE	0.4	0.83	5.96	6.78	3.67	3.01
	WHEAT	40.8	84.82	40.12	45.62	44.06	36.09
	GRAM	1.4	2.91	14.75	16.77	1.24	1.02
	ONION	1.8	3.74	1.48	1.68	12.12	9.93
	GRAPES	0.4	0.83	17.85	20.30	46.67	38.23
	JOWAR	0.1	0.21	2.42	2.75	1.79	1.47
	OTHERS	0.2	0.42	2.43	2.76	4.2	3.44
	TOTAL	48.1	100	87.94	100	122.07	100
M.PHULE	VEG.	1.2	1.90	1.92	3.06	4.56	4.01
	S.CANE	1.76	2.78	2.77	4.41	2.49	2.19
	WHEAT	41.57	65.74	32.01	50.98	57.28	50.43
	GRAM	3.57	5.65	16.95	26.99	10.01	8.81
	ONION	1.9	3.00	0.61	0.97	12.82	11.29
	GRAPES	0.4	0.63	2.62	4.17	13.04	11.48
	JOWAR	5.37	8.49	3.75	5.97	7.55	6.65
	OTHERS	7.46	11.80	2.16	3.44	5.83	5.13
	TOTAL	63.23	100	62.79	100	113.58	100
JAY.YOGE	VEG.	8.34	4.79	10.6	5.96	24.66	8.34
	S.CANE	1.9	1.09	2.87	1.61	8.72	2.95
	WHEAT	116.29	66.86	83.53	46.96	115.4	39.02
	GRAM	19.57	11.25	38.49	21.64	31.74	10.73
	ONION	16.7	9.60	10.14	5.70	50.93	17.22
	GRAPES	5.41	3.11	15.61	8.78	37.62	12.72
	JOWAR	5.73	3.29	12.53	7.04	17.83	6.03
	OTHERS	0	0.00	4.09	2.30	8.88	3.00
	TOTAL	173.94	100	177.86	100	295.78	100

TABLE B4.4: Area Irrigated and Water Used in the Three Societies During Rabi Season

YEAR	AREA HA	AREA WELL IRR.	WATER USED DAY CUSEC	NO. OF ROTATION	DAYCU/HA	DAYCU/HA INCL WELL
90-91	61.92		218.67	3.00	3.53	3.53
91-92	290.37		929.05	4.00	3.20	3.20
92-93	326.70		974.83	3.00	2.98	2.98
93-94	225.69	306.20	854.07	4.00	3.78	1.61
94-95	262.09	319.14	947.76	4.00	3.62	1.63

TABLE B1.2: Payment of Water Charges to Irrigation Department

Year	Water Charges Billed	Water Charges Due	Amount Recovered	Balance Amount Due	Cumulative Amount Due	Paid %
1978-79	17074	17074	17074	0	0	100
1979-80	78760	78760	78760	0	0	100
1980-81	129613	129613	129613	0	0	100
1981-82	103785	103785	103785	0	0	100
1982-83	131688	131688	131688	0	0	100
1983-84	135235	135235	135235	0	0	100
1984-85	196045	196045	196045	0	0	100
1985-86	228106	228106	228106	0	0	100
1986-87	240506	240506	240506	0	0	100
1987-88	214821	214821	214821	0	0	100
1988-89	182999	182999	182999	0	0	100
1989-90	230455	230455	230455	0	0	100
1990-91	179712	179712	179712	0	0	100
1991-92	203810	203810	203810	0	0	100
1992-93	163197	163197	131191	32006	32006	80
1993-94	197030	229036	0	197030	229036	0
1994-95	172847	401883	0	172847	401883	0

TABLE B1.3: Collection of Water Charges by WUA

Year	Water Charges Billed	Water Charges Due	Amount Recovered	Balance Amount Due	Cumulative Amount Due	Recovery %
1978-79	51120	51120	51120	0	0	100
1979-80	119704	119704	119704	0	0	100
1980-81	154236	154236	154236	0	0	100
1981-82	222429	222429	222429	0	0	100
1982-83	218063	218063	218063	0	0	100
1983-84	189014	189014	189014	0	0	100
1984-85	269402	269402	269402	0	0	100
1985-86	302272	302272	302272	0	0	100
1986-87	299955	299955	299955	0	0	100
1987-88	305129	305129	305129	0	0	100
1988-89	275085	275085	272616	2469	2469	99
1989-90	244470	246939	238100	6370	8839	96
1990-91	252166	261005	250617	1549	10388	96
1991-92	271443	281831	266367	5076	15464	95
1992-93	272176	287640	264380	7796	23260	92
1993-94	266563	289823	246685	19878	43138	85
1994-95	262487	305625	103487	159000	202138	34

TABLE B1.5: Water Usage per Gross Irrigated Hectare

YEAR	VOLUME OF WATER DELIVERED (M.Lt.)	GROSS IRRIGATED AREA (Ha)	WATER USE M.Lt./Ha
85-86	7000.85	951.82	7.36
86-87	7603.49	977.25	7.78
87-88	NA	948.63	-
88-89	6099.95	904.04	6.75
89-90	7681.81	885.93	8.67
90-91	5990.37	827.70	7.24
91-92	6793.63	883.50	7.69
92-93	5174.20	888.18	5.83
93-94	6567.68	872.74	7.53

TABLE B1.6: Water Rates for Different Crops

Season	Crops	Rate (Rs/ha)
KHARIF	Paddy	110
	Veg. & Grasses	60
	Others	100
RABI	Wheat	110
	Veg. &	
	Grasses	100
	Others	150
SUMMER	Veg. & Grasses	140
	Others	200
	S.Cane	830

TABLE B2.2: Collection of Water Charges by WUA

YEAR	WATER CHARGES BILLED	WATER CHARGES DUE	AMOUNT RECOVERED	BALANCE AMOUNT DUE	CUMULATIVE AMOUNT DUE	RECOVERY RATE %
+89-90	85601	85601	29926	55675	55675	34.96
+90-91	105463	161138	69255	36208	91883	42.98
*91-92	40433	132316	54610	-	77706	41.27
92-93	110652	188358	94779	15873	93579	50.32
93-94	112477	206056	87470	25007	118586	42.45
+ Accounting year July 1 to July 30.						
* Accounting year changed to end March 31.						
Results relate to 9 months period July 1 to March 31.						

TABLE B2.6: Cropping Pattern

Year	Crops	Seasonwise Irrigated Area (ha)			Gross Irrigated Area (ha)	Share (%) in GIA
		Kharif	Rabi	Summer		
89-90	Sugarcane	4	11.7	24.8	40.5	14.93
	Bajra	2.8	0	0	2.8	1.03
	G.Nut	27.6	0	47	74.6	27.51
	Tur	0	0	0	0	0.00
	Jowar	0.2	18.35	0	18.55	6.84
	Wheat	0	88.82	0	88.82	32.75
	Gram	0	6.7	0	6.7	2.47
	S.Flower	13.3	3.4	3	19.7	7.26
	Maize	0	0	4.4	4.4	1.62
	Others	4.95	4.4	5.8	15.15	5.59
	Total	52.85	133.37	85	271.22	100
90-91	Sugarcane	13.2	15.95	24.6	53.75	24.58
	Bajara	11.71	0	0	11.71	5.36
	G.Nut	19.2	0	47	66.2	30.28
	Tur	0	0	0	0	0.00
	Jowar	0	0.4	0	0.4	0.18
	Wheat	0	24.4	0	24.4	11.16
	Gram	0	4.4	0	4.4	2.01
	S.Flower	13.8	13.8	3	30.6	13.99
	Maize	0	0	4.6	4.6	2.10
	Others	2.6	9.8	10.2	22.6	10.34
	Total	60.51	68.75	89.4	218.66	100
91-92	Sugarcane	53.3	25.3	51.6	130.2	50.36
	Bajara	17.05	0	0	17.05	6.59
	G.Nut	18.5	0	3.4	21.9	8.47
	Tur	0	0	0	0	0.00
	Jowar	0	2.5	0	2.5	0.97
	Wheat	0	68.4	0	68.4	26.46
	Gram	0	4.7	0	4.7	1.82
	S.Flower	0	2.4	0	2.4	0.93
	Maize	0	0	1.3	1.3	0.50
	Others	5.7	4.4	0	10.1	3.91
	Total	94.55	107.7	56.3	258.55	100
92-93	Sugarcane	38.75	58.3	62.3	159.35	38.69
	Bajara	55.85	0	0	55.85	13.56
	G.Nut	1	0	1.8	2.8	0.68
	Tur	1.4	0	0	1.4	0.34
	Jowar	0	14.5	0	14.5	3.52

	Gram	0	139.3	0	139.3	33.82
	S.Flower	0	4.2	1.2	5.4	1.31
	Maize	0	0	12.35	12.35	3.00
	Others	2.2	9.45	9.3	20.95	5.09
	Total	99.2	225.75	86.95	411.9	100
93-94	S.cane	28.1	9.1	104.3	141.5	41.15
	G.Nut	2.9	0	17.2	20.1	5.85
	S.Flower	0.4	0	0	0.4	0.12
	Bajara	58.95	0	0	58.95	17.14
	Tur	5	0	0	5	1.45
	Wheat	0	82	0	82	23.85
	Gram	0	8.2	0	8.2	2.38
	Jowar	0	0.4	0	0.4	0.12
	Fruits	0	0	2.3	2.3	0.67
	Soybean	0	0	3.6	3.6	1.05
	Maize	0.9	0	3.55	4.45	1.29
	Others	3.7	6.3	6.95	16.95	4.93
	Total	99.95	106	137.9	343.85	100
94-95	Sugarcane	73.5	30.1			
	Bajara	97.8	0			
	G.Nut	7.2	0			
	Tur	14.9	0			
	Jowar	5	5			
	Gram	0	10.9			
	Wheat	0	40.5			
	S.Flower	0	0			
	Maize	0	0			
	Others	15.5	0.3			
	Total	213.9	86.8			

SUGARCANE-ADSALI	10.00	62.00				350.00	583.00	
ONION	0.10					500.00		
FODDER	0.75					100.00		
MAIZE	2.00	2.90				100.00	150.00	
PERCOLATION SUGARCANE	2.20					350.00		
BAJARA	2.80					100.00		
TUR	2.00					150.00		
SUNFLOWER	0.45	0.80				100.00	150.00	
JOWAR		10.30					150.00	
WHEAT		5.95					200.00	
GRAM		1.45					200.00	
Total	55.47	83.40						

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APPENDIX B4

Three Cooperative Societies at Ozar, District Nashik

TABLE B4.1: Income and Expenditure

INCOME	Banganga		Jay-Yogeshwari			Mahatma Phule		
	93-94	94-95	92-93	93-94	94-95	92-93	93-94	94-95
Water Charges	39689	49727	67396	73860	90835	21548	29165	45027
R&M Grants	0	6480	11900	0	17850	6800	0	9000
Management Subsidy	0	10800	59500	0	29750	34000	0	17000
Penalty	2068	1021	1845	3432	3237	1380	1345	619
Int. Bank Deposits	1411	212	2925	1754	953	1001	1045	313
Miscellaneous	60	498	2087	790	550	0	251	80
TOTAL	43228	68738	145653	79836	143175	64729	31806	72039
EXPENDITURE								
Water Charges	19776	33793	28688	50381	68071	10615	16293	25110
Repair & Maintenance	34121	7740	15529	38181	18525	5263	26084	6257
Salary & Wages	16372	18815	24579	21939	29146	13229	19122	23382
Stationary	4945	1286	1563	6155	1577	1205	4888	1398
Travels	657	230	1748	847	290	1125	503	255
Meetings	1613	625	443	1600	811	386	1630	740
Office Rent	840	1392	1582	2100	1404	1251	1260	1404
Vehicle	804	726	3247	4436	2847	1392	2075	864
Audit	851	800	1200	1000	1904	720	983	1086
Miscellaneous	4308	3001	5883	5264	1257	4035	4235	1770
Depreciation	608	0	7937	3073	1460	890	833	710
TOTAL	84895	68408	92399	134976	127392	40111	77906	62986
PROFIT/LOSS	-41667	330	53254	-55140	15783	24618	-46100	9053
PROFIT/LOSS without								
Subsidy and Grant	-41667	-16950	-18146	-55140	-31817	-16182	-46100	-16947

SHARE (%) IN INCOME										
Water Charges	91.81	72.34	46.27	92.51	63.44	33.29	91.70	62.50		
Subsidy	0.00	15.71	40.85	0.00	20.78	52.53	0.00	23.60		
SHARE (%) IN EXPENDITURE										
Water Charges	23.29	49.40	31.05	37.33	53.43	26.46	20.91	39.87		
Salary & Wages	19.28	27.50	26.60	16.25	22.88	32.98	24.54	37.14		
Repair & Maintenance	40.19	11.31	16.81	28.29	14.62	13.12	33.48	9.93		
COSTS (Rs)										
Management	65119	34615	63711	84595	59321	29496	61613	37876		
Transaction	30998	26875	48182	46414	40696	24233	35529	31619		
Total	84895	68408	92399	134976	127392	40111	77906	62988		
AREA IRRIGATED (Ha)										
Gross	142	NA	174	349	NA	66	139	NA		
Net (CCA)	216	211	595	595	595	340	340	340		
COST PER HECTARE (G)										
Management	459	-	366	242	-	447	443	-		
Transaction	218	-	277	133	-	367	256	-		
Repair & Maintenance	240	-	89	109	-	80	188	-		
Total	598	-	531	387	-	608	560	-		
COST PER HECTARE (N)										
Management	301	164	107	142	100	87	181	111		
% in Total Cost	76.71	50.60	68.95	62.67	46.57	73.54	79.09	60.13		
Transaction	144	127	81	78	68	71	104	93		
% in Total Cost	36.51	39.29	52.15	34.39	31.95	60.41	45.60	50.20		
Repair & Maintenance	158	37	26	64	31	15	77	18		
% in Total Cost	40.19	11.31	16.81	28.29	14.62	13.12	33.48	9.93		
Total	383	324	155	227	214	118	229	185		
WC NEEDED TO COVER COST	81356	60197	73642	129000	104802	30930	75265	52974		

RATIO OF WC DUE TO										
DESIRED	0.49	0.83	0.92	0.57	0.87	0.70	0.39			0.85
RATIO OF WC										
PAID TO COLLECTED	0.50	0.68	0.43	0.68	0.75	0.49	0.56			0.56

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TABLE B4.3: Water Rates of Irrigation Department and WUA's During 1992-93

Season	Crops	Irrigation Department Rates Rs/ha			Society's Water Rates Rs/ha		TOTAL WATER RATE
		WATER CHARGES	LOCAL FUND	TOTAL WATER RATE	WATER CHARGES	LOCAL FUND	
KHARIF	JOWAR, BAJARA, SOWING						
	RICE & LEGUMES	80.00	16.00	96.00	110.00		110.00
	GROUNDNUT	160.00	32.00	192.00	200.00		200.00
	ONION/POL KANDA	410.00	82.00	492.00	500.00		500.00
	(KHARIF + RABI)						
	VEGETABLES	180.00	32.00	212.00	200.00		200.00
	GARDEN (FRUIT)	1250.00	250.00	1500.00	* 375.00		* 375.00
	LUCERN	1250.00	250.00	1500.00	* 375.00		* 375.00
	TOMATO (HYBRID)						
	LEGUMES						
RABI	SUNFLOWER, CHICK PEA,						
	JOWAR & MAIZE.	120.00	24.00	144.00	200.00		
	WHEAT (OF WATER TAKE BEFORE 15 TH OCTOBER)						
	WHEAT (OF WATER TAKE AFTER 15 TH OCT FOR						
	PRE SOWING)	120.00	24.00	144.00			
	GARDEN (GUAVA & GRAPE)	150.00	30.00	180.00	160.00		160.00
	LUCERN, SUGARCANE	150.00	30.00	180.00	200.00		200.00
	ONION (RABI)	1250.00	250.00	1500.00	* 250.00		* 250.00
	VEGETABLES, FLOWER	1250.00	250.00	1500.00	* 250.00		* 250.00
	POMOGRAATE, BER &	410.00	82.00	492.00	550.00		550.00
	CUSTARD APPLE.	245.00	49.00	294.00	300.00		300.00
		1250.00	250.00	1500.00	* 175.00		* 175.00

[illegible]

APPENDIX B5
Bhima Irrigation Cooperative Society, Bhima
TABLE B5.1 : Income & Expenditure

INCOME	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95
Water Charges	39075	46859	24072	35500	40668	85927	110000	129988
Int. Income	625	35	506	865	0	0	0	0
TOTAL	39700	46894	24578	36365	40668	85927	110000	129988
EXPENDITURE								
Water Charges	3496	3876	12417	8506	21829	18860	10861	0
Electricity Charge	11520	11520	11520	11520	11520	11520	36000	36000
Salary & Wages	4610	4200	2220	1200	5930	17437	15291	16200
Repair & Maintenance	6373	0	3512	16633	6528	2544	7471	9100
Miscellaneous	398	130	157	167	377	768	2090	1865
SUB TOTAL	26397	19726	29826	38026	46184	51129	71713	63165
Depreciation	90000	90000	90000	90000	90000	90000	90000	90000
Total	116397	109726	119826	128026	136184	141129	161713	153165
PROFIT/LOSS								
Without Depreciation	13303	27168	-5248	-1661	-5516	34798	38287	66823
With Depreciation	-76697	-62832	-95248	-91661	-95516	-55202	-51713	-23177
SHARE (%) IN INCOME								
Water Charges	98.43	99.93	97.94	97.62	100.00	100.00	100.00	100.00
SHARE (%) IN EXPENDITURE								
Water Charges	3.00	3.53	10.36	6.64	16.03	13.36	6.72	0.00
Salary	3.96	3.83	1.85	0.94	4.35	12.36	9.46	10.58
R & M	5.48	0.00	2.93	12.99	4.79	1.80	4.62	5.94
Electricity	9.90	10.50	9.61	9.00	8.46	8.16	22.26	23.50
Depreciation	77.32	82.02	75.11	70.30	66.09	63.77	55.65	58.76
COSTS (Rs)								
Management	11381	4330	5889	18000	12835	20749	24852	27165
Transaction	5008	4330	2377	1367	6307	18205	17381	18065
Total	116397	109726	119826	128026	136184	141129	161713	153165
Area Irrigated (Ha)								
Net	157	157	157	157	157	157	157	157
COSTS PER HECTARE (N)								
Management	72	28	38	115	82	132	158	173
% In Total Cost	9.78	3.95	4.91	14.06	9.42	14.70	15.37	17.74
Transaction	32	28	15	9	40	116	111	115
% In Total Cost	4.30	3.95	1.98	1.07	4.63	12.90	10.75	11.79
R&M	41	0	22	106	42	16	48	58
% In Total Cost	5.48	0.00	2.93	12.99	4.79	1.80	4.62	5.94
Depreciation	573	573	573	573	573	573	573	573
% in Total Cost	77.32	82.02	75.11	70.30	66.09	63.77	55.65	58.76
Total	741	699	763	815	867	899	1030	976

APPENDIX B7

Mahatma Jyotirao Phule Cooperative Society,
Phulewadi

TABLE B7.1: Income and Expenditure

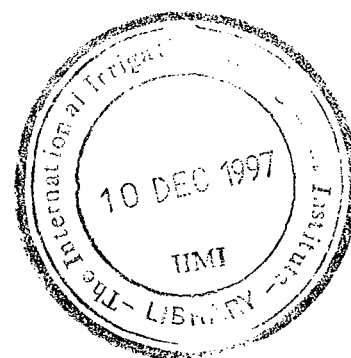
INCOME	91-92	92-93	93-94
Water Charge	392038	220680	691463
Inter Water Charge	12415	2080	11450
Share Dividend	28154	12410	19920
Member Share Fee	218	15	25
Share Transfer Fee	514	350	180
Int Bank Saving	11240	0	2145
Penalty	4500	500	850
Int. Deposits	9982	3155	6744
TOTAL	459061	239190	732777
EXPENDITURE			
Water Charges	31413	17682	55405
Salary	99600	74700	115402
Electricity	115500	86625	145000
R&M Machinery	48450	36337	68450
R&M of Water Channel	24502	18378	47482
R&M of PipeLine	29490	22117	34140
Transport	1544	1340	2814
Telephone Charge	1740	1454	1820
Stationary	2128	1814	5410
Postage	598	405	540
Meeting Expenses	1500	1125	2580
GB Meeting	2890	2167	3645
Corp Tax	2104	1578	3814
Wages	1405	1405	13405
Audit	9450	7400	10500
Insurance	18140	17540	23188
Miscellaneous	1740	4140	2415
SUB-TOTAL	392194	296207	536010
Depreciation	98316	73737	99145
TOTAL	490510	369944	635155
PROFIT/LOSS			
Without Depreciation	66867	-57017	196767
With Depreciation	-31449	-130754	97622
SHARE (%) IN INCOME			
Water Charges	85.40	92.26	94.36
SHARE (%) IN EXPENDITURE			
With Depreciation			

Water Charges	6.40	4.78	8.72*
Salary	20.59	20.57	20.28
R & M	20.88	20.77	23.63
Electricity	23.55	23.42	22.83
Depreciation	20.04	19.93	15.61
Without Depreciation			
Water Charges	8.01	5.97	10.34
Salary	25.75	25.69	24.03
R & M	26.12	25.94	28.00
Electricity	29.45	29.24	27.05
COSTS (Rs)			
Management	245281	191900	335605
Transaction	142839	115068	185533
Total	490510	369944	635155
AREA IRRIGATED	(HA)		
Net	175.36	175.36	175.36
COST PER HECTARE (Rs)			
Management	1399	1094	1914
% in Total Cost	50.01	51.87	52.84
Transaction	815	656	1058
% in Total Cost	29.12	31.10	29.21
R&M	584	438	856
% in Total Cost	20.88	20.77	23.63
Depreciation	561	420	565
% in Total Cost	20.04	19.93	15.61
Total	2797	2110	3622

Tables for the paper

**Outcomes of Irrigation Management Transfer and
Financial Performance of Water Users' Associations
in India : Some Experiences**

**Dr. A.H. Kalro
Dr. Gopal Naik**



(The tables attached with the above paper circulated to you are not in a correct sequence. Please refer to the enclosed tables).

APPENDIX B1

Mohini Water Distribution Cooperative Society

TABLE B1.1 Income and Expenditure

INCOME (Rs)	1990-91	91-92	92-93	93-94	94-95
Water Charges	252166	271443	272176	266563	262487
Extra Water Charges	12101	5820	14020	26953	11284
Punishment	6980	10034	10020	7989	10149
Interest	4150	4861	4436	10119	5242
Dividend	12	128	138	187	215
SUB TOTAL	275409	292286	300790	311811	289377
Tractor Charges	86417	120865	95272	90715	31897
TOTAL	361826	413151	396062	402526	321274
EXPENDITURE (Rs)					
Water Charges	179711	203809	163197	197030	172847
Canal Maintenance	17070	18515	20062	20519	18644
Salary	51168	50628	50628	50628	50628
Patkari Staff Bonus	1667	1733	1935	2000	1840
Patkari dress Expenses	1500	0	0	1500	0
Staff Bonus	5116	5062	5062	5062	5062
Staff Providend Fund	6078	6169	6747	6852	6452
Travelling	119	0	600	0	0
Mail-Telegram	50	128	63	67	84
Stationary	2644	4483	3788	4407	5501
Guest	2515	2160	1772	2775	2536
Electric Charges	965	749	899	2120	2170
Audit Fee	279	250	162	200	313
Office Garden	600	0	0	0	0
General Meetings	2492	0	0	6613	0
Vehicle Insurance	780	310	290	0	0
Vehicle Maintenance	3893	5783	8503	12031	10646
Vehicle Tax Exp	1880	0	0	0	0
Bank Commission	0	5	9	13	2
Office Water Supply	0	0	0	0	7401
Other expenses	671	484	1123	1197	1256
SUB TOTAL	279193	300268	264840	313014	285382
Tractor Expenditure	63802	89539	93892	82768	60036
TOTAL	343000	389807	358732	395782	345418
PROFIT / LOSS					
Without Tractor	-3789	-7982	35950	-1203	3995
With Tractor	18826	23344	37330	6744	-24144

From Tractor	22615	31326	1380	7947	-28139
SHARE (%) IN INCOME					
WC Without Tractor	91.56	92.87	90.49	85.49	90.71
WC With Tractor	69.69	65.70	68.72	66.22	81.70
SHARE (%) IN EXPENDITURE WITHOUT TRACTOR					
Water Charges	64.37	67.88	61.62	62.95	60.57
Salaries & Wages	23.47	21.18	24.31	21.10	22.42
Repair & Maintenance	6.11	6.17	7.58	6.56	6.53
SHARE (%) IN EXPENDITURE WITH TRACTOR					
Water Charges	52.39	52.28	45.49	49.78	50.04
Salaries & Wages	19.10	16.31	17.94	16.69	18.52
Repair & Maintenance	4.98	4.75	5.59	5.18	5.40
COST (Rs)					
Management Cost	99487	96459	101643	115984	112535
Transaction Cost	82417	77944	81581	95465	93891
Total Cost	279198	300268	264840	313014	285382
AREA IRRIGATED (Ha)					
Gross	827.7	883.5	888.18	872.74	928.42
Net	337	337	337	337	337
COST PER HECTARE (G)					
Management	120.20	109.18	114.44	132.90	121.21
Transaction	99.57	88.22	91.85	109.39	101.13
Total	337.32	339.86	298.18	358.66	307.38
COST PER HECTARE (N)					
Management	295.21	286.23	301.61	344.17	333.93
% in Total Cost	35.63	32.12	38.38	37.05	39.43
Transaction	244.56	231.29	242.08	283.28	278.61
% in Total Cost	29.52	25.96	30.80	30.50	32.90
R&M cost	50.65	54.94	59.53	60.89	55.32
% in Total Cost	6.11	6.17	7.58	6.56	6.53
Total	828.48	891.00	785.88	928.82	846.83
WC NEEDED TO COVER COST	255955	279425	236226	267766	258492
RATIO OF WC DUE TO WC					
REQUIRED FOR BREAK-EVEN	0.99	0.97	1.15	1.00	1.02
RATIO OF WC PAID TO					
WC DUE FROM FARMERS	0.71	0.75	0.60	0.74	0.66
GENERAL					
Membership	247	251	256	264	267
Share Capital (Rs)	13350	13550	13700	14150	14550
Reserve Funds (Rs)	23946	23977	23984	23994	25686
Other Funds (Rs)	163833	153292	159607	150335	158440
Depreciation Fund (Rs)	57345	60675	59157	59957	59957

TABLE B1.2: Payment of Water Charges to Irrigation Department

Year	Water Charges Billed	Water Charges Due	Amount Recovered	Balance Amount Due	Cumulative Amount Due	Paid %
1978-79	17074	17074	17074	0	0	100
1979-80	78760	78760	78760	0	0	100
1980-81	129613	129613	129613	0	0	100
1981-82	103785	103785	103785	0	0	100
1982-83	131688	131688	131688	0	0	100
1983-84	135235	135235	135235	0	0	100
1984-85	196045	196045	196045	0	0	100
1985-86	228106	228106	228106	0	0	100
1986-87	240506	240506	240506	0	0	100
1987-88	214821	214821	214821	0	0	100
1988-89	182999	182999	182999	0	0	100
1989-90	230455	230455	230455	0	0	100
1990-91	179712	179712	179712	0	0	100
1991-92	203810	203810	203810	0	0	100
1992-93	163197	163197	131191	32006	32006	80
1993-94	197030	229036	0	197030	229036	0
1994-95	172847	401883	0	172847	401883	0

TABLE B1.3: Collection of Water Charges by WUA

Year	Water Charges Billed	Water Charges Due	Amount Recovered	Balance Amount Due	Cumulative Amount Due	Recovery %
1978-79	51120	51120	51120	0	0	100
1979-80	119704	119704	119704	0	0	100
1980-81	154236	154236	154236	0	0	100
1981-82	222429	222429	222429	0	0	100
1982-83	218063	218063	218063	0	0	100
1983-84	189014	189014	189014	0	0	100
1984-85	269402	269402	269402	0	0	100
1985-86	302272	302272	302272	0	0	100
1986-87	299955	299955	299955	0	0	100
1987-88	305129	305129	305129	0	0	100
1988-89	275085	275085	272616	2469	2469	99
1989-90	244470	246939	238100	6370	8839	96
1990-91	252166	261005	250617	1549	10388	96
1991-92	271443	281831	266367	5076	15464	95
1992-93	272176	287640	264380	7796	23260	92
1993-94	266563	289823	246685	19878	43138	85
1994-95	262487	305625	103487	159000	202138	34

TABLE B1.4: Cropping Pattern

Years	Crops	S.Cane	Paddy	Grass	Wheat	Veg.	Banana	Others	Total
85-86	Area (Ha)	827	39.6	9.38	0.94	13.98	10.46	49.56	950.92
	%	86.97	4.16	0.99	0.10	1.47	1.10	5.21	100
86-87	Area (Ha)	863.76	36	13.13	1.12	3.01	10.46	49.78	977.26
	%	88.39	3.68	1.34	0.11	0.31	1.07	5.09	100
87-88	Area (Ha)	877.08	18.59	15.01	0.12	2.13	0	35.71	948.64
	%	92.46	1.96	1.58	0.01	0.22	0	3.76	100
88-89	Area (Ha)	832.49	18.59	15.01	0.12	2.13	0	35.71	904.05
	%	92.08	2.06	1.66	0.01	0.24	0	3.95	100
89-90	Area (Ha)	805.99	19.64	11.29	0.12	1.94	0	46.95	885.93
	%	90.98	2.22	1.27	0.01	0.22	0	5.30	100
90-91	Area (Ha)	747.69	23.3	5.65	0.12	6.49	0	44.45	827.7
	%	90.33	2.82	0.68	0.01	0.78	0	5.37	100
91-92	Area (Ha)	765.39	33.04	4.79	0.73	13.31	0	66.25	883.51
	%	86.63	3.74	0.54	0.08	1.51	0	7.50	100
92-93	Area (Ha)	784.44	27.87	6.97	0.24	8.53	0	60.14	888.19
	%	88.32	3.14	0.78	0.03	0.96	0	6.77	100
93-94	Area (Ha)	763.13	31.49	4.36	0.86	20.79	0	52.1	872.73
	%	87.44	3.61	0.50	0.10	2.38	0	5.97	100
94-95	Area (Ha)	822.15	36.43	3.85	1.2	21.53	0	43.27	928.43
	%	88.55	3.92	0.41	0.13	2.32	0	4.66	100

TABLE B1.5: Water Usage per Gross Irrigated Hectare

YEAR	VOLUME OF WATER DELIVERED (M.Lt.)	GROSS IRRIGATED AREA (Ha)	WATER USE M.Lt./Ha
85-86	7000.85	951.82	7.36
86-87	7603.49	977.25	7.78
87-88	NA	948.63	-
88-89	6099.95	904.04	6.75
89-90	7681.81	885.93	8.67
90-91	5990.37	827.70	7.24
91-92	6793.63	883.50	7.69
92-93	5174.20	888.18	5.83
93-94	6567.68	872.74	7.53

TABLE B1.6: Water Rates for Different Crops

Season	Crops	Rate (Rs/ha)
KHARIF	Paddy	110
	Veg. & Grasses	60
	Others	100
RABI	Wheat	110
	Veg. &	
	Grasses	100
	Others	150
SUMMER	Veg. & Grasses	140
	Others	200
	S.Cane	830

APPENDIX B2

Shri Datta Cooperative Water Distribution Society Ltd., Chanda

TABLE B2.1: Income and Expenditure

INCOME	89-90	90-91	91-92	92-93	93-94
Water Charges	85601	105463	40433	110652	112477
R&M Grants	10000	5000	10000	15000	10000
Management Subsidy	9000	34886	40012	34377	0
Bank Interest	146	752	707	4353	4024
Surcharge	0	1103	3108	3724	4320
Hiring out Implements	0	580	345	595	855
Miscellaneous	0	331	135	1934	5200
Penalty	0	120	0	0	0
TOTAL	104747	148235	94740	170635	136876
EXPENDITURE					
Water Charges	42422	40482	26254	41151	50329
Repair & Maintenance	2910	8685	9250	10200	37950
salaries & Wages	16600	24000	16000	28000	26800
Staff Bonus	0	2880	0	2000	0
Travels	140	1936	2559	4980	5655
Meetings	0	0	1000	924	885
Office Rent	1050	2100	2000	3250	3000
Stationary	2431	2095	836	2091	2036
Postage	0	78	135	24	156
Banking	60	151	200	147	96
Advertising	300	250	0	800	0
Printing	0	3500	3676	9900	385
Miscellaneous	0	4207	2440	8229	6137
TOTAL	65913	90364	64350	111696	133429
PROFIT/LOSS	38834	57871	30390	58939	3447
PROFIT/LOSS without					
Grant and Subsidy	19834	17985	-19622	9562	-6553
SHARE (%) IN INCOME					
Subsidy	6.59	23.53	42.23	20.15	0.00
Water Charges	81.72	71.15	42.68	64.85	82.17
SHARE (%) IN EXPENDITURE					
Water Charges	64.36	44.80	40.80	36.84	37.72
Salary	25.18	26.56	24.86	25.07	20.09
Repair & maintenance	4.41	9.61	14.37	9.13	28.44
Share of Subsidy in WC					
Due to ID	21.22	86.18	152.40	83.54	0.00
COSTS (Rs)					

Management	23491	49882	38096	70545	83100
Transaction	20581	41197	28846	60345	45150
Total	65913	90364	64350	111696	133429
AREA IRRIGATED (Ha)					
Gross	257	199	233	412	338
Net	190	240	240	255	261
COST PER HECTARE (G)					
Management	91.40	250.66	163.50	171.23	245.86
Transaction	80.08	207.02	123.80	146.47	133.58
Total	256.47	454.09	276.18	271.11	394.76
COST PER HECTARE (N)					
Management	123.64	207.84	158.73	276.65	318.39
% in Total Cost	35.64	55.20	59.20	63.16	62.28
Transaction	108.32	171.65	120.19	236.65	172.99
% in Total Cost	31.22	45.59	44.83	54.03	33.84
R & M Cost	15.32	36.19	38.54	40.00	145.40
% in Total Cost	4.41	9.61	14.37	9.13	28.44
Total	346.91	376.52	268.13	438.02	511.22
WC NEEDED TO COVER COST	55767	82478	50055	86090	109030
RATIO OF WC DUE TO DESIRED	1.53	1.28	0.81	1.29	1.03
RATIO WC PAID TO WC DUE	0.50	0.38	0.65	0.37	0.45
GENERAL					
Membership	114	157	199		203
Share Capital (Rs)	16845	19145	20360	22470	23320
Reserve Funds (Rs)	2473	1720	24611	40193	61243
Education Funds (Rs)	0	0	52	100	150
Religious Funds (Rs)	0	0	9885	17020	25990
Building Funds (Rs)	0	0	13224	23609	36219
Sp. Building Funds (Rs)	0	0	8961	15432	23564

TABLE B2.2: Collection of Water Charges by WUA

YEAR	WATER CHARGES BILLED	WATER CHARGES DUE	AMOUNT RECOVERED	BALANCE AMOUNT DUE	CUMULATIVE AMOUNT DUE	RECOVERY RATE %
+89-90	85601	85601	29926	55675	55675	34.96
+90-91	105463	161138	69255	36208	91883	42.98
*91-92	40433	132316	54610	-	77706	41.27
92-93	110652	188358	94779	15873	93579	50.32
93-94	112477	206056	87470	25007	118586	42.45
+ Accounting year July 1 to July 30.						
* Accounting year changed to end March 31.						
Results relate to 9 months period July 1 to March 31.						

TABLE B2.3: Area Irrigated and Water Used

(Area in ha; Volume in Mct)									
Year	Seasonwise Area and Volume				Hot Weather		Total		Mct/Ha
	Kharif		Rabi						
	Area	Volume	Area	Volume	Area	Volume	Area	Volume	
1982-83	94.14	13.65	119.25	28.01	62.05	22.28	275.28	63.90	0.23
1983-84	83.00	8.89	104.82	23.57	83.00	28.02	200.82	60.58	0.30
1984-85	81.30	9.52	97.10	23.83	87.80	29.30	266.20	62.60	0.24
1985-86	72.40	9.48	77.80	9.48	3.07	1.54	153.20	20.50	0.13
1986-87	117.00	13.17	104.90	12.78	3.60	3.25	255.50	31.60	0.12
1987-88	128.00	11.31	125.03	13.80	2.80	0.89	263.43	18.76	0.07
1988-89	125.60	7.23	112.50	24.00	99.20	22.11	337.30	53.34	0.16
1989-90	52.00	5.31	138.00	24.48	85.00	14.68	256.62	48.43	0.19
1990-91	50.00	7.05	55.80	12.98	92.85	25.92	198.65	45.88	0.23
1991-92	69.55	13.96	107.40	28.89	56.30	14.45	233.25	57.30	0.25
1992-93	99.20	7.35	225.95	28.21	66.95	18.14	412.10	57.30	0.14
1993-94	99.95	15.12							

TABLE B2.4: Water Rates (Rs/1000 m3) in Maharashtra (Volumetric)

	90-91	91-92	92-93	93-94	94-95
KHARIF	12	14	16	18	20
RABI	18	21	24	27	30
SUMMER	36	42	48	54	60

TABLE B2.5: Water Rates (Rs/Ha) in Maharashtra (Crop wise)

Season	Crop	89-90	90-91	91-92	92-93	93-94
Kharif	Paddy	65	70	80	90	100
	G.Nut	120	140	160	180	200
Rabi	Wheat	100	125	150	175	200
	Cotton	180	240	240	270	300
	G.Nut	180	210	240	270	300
Summer	S.Cane	1000	1250	1500	1750	1750
	Banana	800	1000	1250	1500	1750

TABLE B2.6: Cropping Pattern

Year	Crops	Seasonwise Irrigated Area (ha)			Gross Irrigated Area (ha)	Share (%) In GIA
		Kharif	Rabi	Summer		
89-90	Sugarcane	4	11.7	24.8	40.5	14.93
	Bajra	2.8	0	0	2.8	1.03
	G.Nut	27.6	0	47	74.6	27.51
	Tur	0	0	0	0	0.00
	Jowar	0.2	18.35	0	18.55	6.84
	Wheat	0	88.82	0	88.82	32.75
	Gram	0	6.7	0	6.7	2.47
	S.Flower	13.3	3.4	3	19.7	7.26
	Maize	0	0	4.4	4.4	1.62
	Others	4.95	4.4	5.8	15.15	5.59
	Total	52.85	133.37	85	271.22	100
90-91	Sugarcane	13.2	15.95	24.6	53.75	24.58
	Bajara	11.71	0	0	11.71	5.36
	G.Nut	19.2	0	47	66.2	30.28
	Tur	0	0	0	0	0.00
	Jowar	0	0.4	0	0.4	0.18
	Wheat	0	24.4	0	24.4	11.16
	Gram	0	4.4	0	4.4	2.01
	S.Flower	13.8	13.8	3	30.6	13.99
	Maize	0	0	4.6	4.6	2.10
	Others	2.6	9.8	10.2	22.6	10.34
	Total	60.51	68.75	89.4	218.66	100
91-92	Sugarcane	53.3	25.3	51.6	130.2	50.36
	Bajara	17.05	0	0	17.05	6.59
	G.Nut	18.5	0	3.4	21.9	8.47
	Tur	0	0	0	0	0.00
	Jowar	0	2.5	0	2.5	0.97
	Wheat	0	68.4	0	68.4	26.46
	Gram	0	4.7	0	4.7	1.82
	S.Flower	0	2.4	0	2.4	0.93
	Maize	0	0	1.3	1.3	0.50
	Others	5.7	4.4	0	10.1	3.91
	Total	94.55	107.7	56.3	258.55	100
92-93	Sugarcane	38.75	58.3	62.3	159.35	38.69
	Bajara	55.85	0	0	55.85	13.56
	G.Nut	1	0	1.8	2.8	0.68
	Tur	1.4	0	0	1.4	0.34
	Jowar	0	14.5	0	14.5	3.52

	Gram	0	139.3	0	139.3	33.82
	S.Flower	0	4.2	1.2	5.4	1.31
	Maize	0	0	12.35	12.35	3.00
	Others	2.2	9.45	9.3	20.95	5.09
	Total	99.2	225.75	86.95	411.9	100
93-94	S.cane	28.1	9.1	104.3	141.5	41.15
	G.Nut	2.9	0	17.2	20.1	5.85
	S.Flower	0.4	0	0	0.4	0.12
	Bajara	58.95	0	0	58.95	17.14
	Tur	5	0	0	5	1.45
	Wheat	0	82	0	82	23.85
	Gram	0	8.2	0	8.2	2.38
	Jowar	0	0.4	0	0.4	0.12
	Fruits	0	0	2.3	2.3	0.67
	Soybean	0	0	3.6	3.6	1.05
	Maize	0.9	0	3.55	4.45	1.29
	Others	3.7	6.3	6.95	16.95	4.93
	Total	99.95	106	137.9	343.85	100
94-95	Sugarcane	73.5	30.1			
	Bajara	97.8	0			
	G.Nut	7.2	0			
	Tur	14.9	0			
	Jowar	5	5			
	Gram	0	10.9			
	Wheat	0	40.5			
	S.Flower	0	0			
	Maize	0	0			
	Others	15.5	0.3			
	Total	213.9	86.8			

Total	351.68	430.03
COST PER HECTARE (N)		
Management	132.68	180.76
% in Total Cost	30.01	32.97
Transaction	109.01	132.70
% in Total Cost	24.66	24.21
R&M	23.67	48.06
% in Total Cost	5.36	8.77
Total	442.08	548.23
WC NEEDED TO COVER COST	64841	75736
RATIO OF WC DUE TO DESIRED	1.11	1.25
RATIO OF WC PAID TO WC DUE	0.72	0.66
GENERAL		
Membership	100	100
Share Capital (Rs)	5000	5000

TABLE B3.2: Area and Water Rates of Different Crops

YEAR	CROPS	AREA-IN-HECTARE			SHARE IN AREA (%)	RATE RS/HA		
		KHARIF	RABI	SUMMER		KHARIF	RABI	SUMMER
1992-93	BAJRA	13.00			6.12	80.00		
	MAIZE	11.00	1.10	18.80	14.45	80.00	120.00	240.00
	SUNFLOWER	1.00	1.30	10.80	6.07	80.00	120.00	240.00
	SUGARCANE	16.40	21.15	18.85	26.55	300.00	500.00	700.00
	JOWAR		57.50		27.07		120.00	
	WHEAT		13.50		6.36		150.00	
	GRAM		3.45		1.62		120.00	
	GROUNDNUT			24.94	11.74			500.00
	Total	41.40	98.00	72.99	100.00			
		4.20			1.95	90.00		
1993-94	BAJRA							
	MAIZE	7.30	1.90	10.60	9.20	90.00	135.00	270.00
	SUGARCANE-SURU	8.05		25.65	15.66	350.00		817.00
	SUGARCANE-ADSALI	8.95	37.25	7.75	25.06	350.00	583.00	700.00
	TUR	0.40			0.19	135.00		
	SUGARCANE (PER)	0.80		1.00	0.84	175.00		204.25
	GROUNDNUT (PER)	24.30			11.29	0.00		
	JOWAR		39.55		18.37		135.00	
	WHEAT		7.40		3.44		175.00	
	GRAM		1.90		0.88		135.00	
	SUNFLOWER		0.80	8.00	4.09		135.00	270.00
	GROUNDNUT			18.75	8.71			550.00
	MUNG			0.70	0.33			270.00
	Total	54.00	88.80	72.45	100.00			
1994-95	SUGARCANE							
	SUGARCANE-SURU	35.17				350.00		

SUGARCANE-ADSALI	10.00	62.00				350.00	583.00
ONION	0.10					500.00	
FODDER	0.75					100.00	
MAIZE	2.00	2.90				100.00	150.00
PERCOLATION SUGARCANE	2.20					350.00	
BAJARA	2.80					100.00	
TUR	2.00					150.00	
SUNFLOWER	0.45	0.80				100.00	150.00
JOWAR		10.30					150.00
WHEAT		5.95					200.00
GRAM		1.45					200.00
Total	55.47	83.40					

TABLE B3.3: Actual Season wise Water Distribution and Water Charges

YEAR	SEASON	AREA IN HA	WATER UTILISATION			ASSESSMENT ON VOLUMETRIC BASIS			ASSESSMENT ON AREA BASIS			WCPD/COL	DAYCUS/HA
			DAY CUSEC	MCM@	MCM#	WC	L.F	TOTAL	WC	L.F	TOTAL		
1992-93	KHARIF	55.40	161.70	0.40	0.16	2588.16	517.63	3105.79	6920.00	1384.00	8304.00	0.37	2.92
	RABI	98.00	561.96	1.37	0.56	13487.04	2697.41	16184.45	20202.00	4040.40	24242.40	0.67	5.73
	SUMMER	73.19	572.67	1.40	0.57	27488.16	5497.53	32985.69	32984.00	6594.80	39578.80	0.83	7.82
	TOTAL\$	226.59	1296.33	3.17	1.29	43563.36	8712.57	52275.93	60106.00	12019.20	72125.20	0.72	5.72
1993-94	KHARIF	53.20	119.21	0.29	0.12	2145.78	429.16	2574.94	6881.00	1377.20	8258.20	0.31	2.24
	RABI	88.80	365.69	0.89	0.37	9873.63	1974.73	11848.36	28972.10	5794.40	34766.50	0.34	4.12
	SUMMER	72.65	300.80	0.74	0.74	39720.24	7944.65	47664.89	43126.00	8625.11	51751.11	0.92	4.14
	TOTAL	214.65	785.50	1.92	1.23	51799.65	10348.54	62088.19	78979.10	15796.71	94775.61	0.66	3.66
1994-95	KHARIF	55.42	142.17	0.35	0.35	6957.40	1391.40	8348.80	16947.00	3389.40	20336.40	0.41	2.57
	RABI*	88.80	178.84	0.44	0.44	13200.00	2640.00	15840.00	39726.00	7945.20	47671.20	0.33	2.01
	SUMMER												

@ MM 3 calculated based on Day cusec.

MM 3 reported.

\$ Averages for the last two columns.

* Water charges indicated are estimates.

WCPD/COL is the ratio of water charges paid to ID to water charges collected from members.

TABLE B3.4: The Pattern of Water Use Before and After Formation of Society

Year	Season	Area in ha	Quantity day cusec	AI/DC
Before Formation				
1988-89	Kharif	69.55	40.86	1.70
	Rabi	101.45	220.71	0.45
	Summer	86.85	249.30	0.34
1989-90	Kharif	53.20	48.95	1.10
	Rabi	113.15	192.01	0.58
	Summer	85.70	216.55	0.40
1990-91	Kharif	58.30	96.29	0.61
	Rabi	104.40	160.41	0.65
	Summer	95.20	229.74	0.45
After Formation				
1992-93	Kharif	55.40	161.70	0.35
	Rabi	98.00	561.96	0.17
	Summer	73.19	572.67	0.12
1993-94	Kharif	52.40	119.21	0.44
	Rabi	88.80	365.69	0.25
	Summer	73.95	300.60	0.24
1994-95	Kharif	69.00	142.17	0.49
	Rabi	88.80	178.84	0.50
	Summer	-	-	-

TABLE B3.5: Water Availability and Area Irrigated in Bhima Command							
Year	Kharif ha	Rabi ha	Summer ha	Perennial ha	Annual ha	Total ha	Live Storage in October mm cu
1988-89	8430	13342	13592	102	9627	33662	1356
1989-90	8622	17178	11043	56	11525	47424	1418
1990-91	7833	14776	13066	88	11477	47240	*
1991-92	8901	19040	12135	522	11030	51628	1476
1992-93	3593	37032	16064	327	11575	62292	1504
1993-94	3593	37409	18580	796	16511	84774	1565
* Not Available, but the storage level was highest this year.							

APPENDIX B4

Three Cooperative Societies at Ozar, District Nashik

TABLE B4.1: Income and Expenditure

INCOME	Banganga		Jay-Yogeshwari			Mahatma Phule		
	93-94	94-95	92-93	93-94	94-95	92-93	93-94	94-95
Water Charges	39689	49727	67396	73860	90835	21548	29165	45027
R&M Grants	0	6480	11900	0	17850	6800	0	9000
Management Subsidy	0	10800	59500	0	29750	34000	0	17000
Penalty	2068	1021	1845	3432	3237	1380	1345	619
Int. Bank Deposits	1411	212	2925	1754	953	1001	1045	313
Miscellaneous	60	498	2087	790	550	0	251	80
TOTAL	43228	68738	145653	79836	143175	64729	31806	72039
EXPENDITURE								
Water Charges	19776	33793	28688	50381	68071	10615	16293	25110
Repair & Maintenance	34121	7740	15529	38181	18625	5263	26084	6257
Salary & Wages	16372	18815	24579	21939	29146	13229	19122	23392
Stationary	4945	1286	1563	6155	1577	1205	4888	1398
Travels	657	230	1748	847	290	1125	503	255
Meetings	1613	625	443	1600	811	386	1630	740
Office Rent	840	1392	1582	2100	1404	1251	1260	1404
Vehicle	804	726	3247	4436	2847	1392	2075	864
Audit	851	800	1200	1000	1904	720	983	1086
Miscellaneous	4308	3001	5883	5264	1257	4035	4235	1770
Depreciation	608	0	7937	3073	1460	890	833	710
TOTAL	84895	68408	92399	134976	127392	40111	77906	62986
PROFIT/LOSS	-41667	330	53254	-55140	15783	24618	-46100	9053
PROFIT/LOSS without								
Subsidy and Grant	-41667	-16950	-18146	-55140	-31817	-16182	-46100	-16947

SHARE (%) IN INCOME									
Water Charges	91.81	72.34	46.27	92.51	63.44	33.29	91.70	62.50	
Subsidy	0.00	15.71	40.85	0.00	20.78	52.53	0.00	23.60	
SHARE (%) IN EXPENDITURE									
Water Charges	23.29	49.40	31.05	37.33	53.43	26.46	20.91	39.87	
Salary & Wages	19.28	27.50	26.60	16.25	22.88	32.98	24.54	37.14	
Repair & Maintenance	40.19	11.31	16.81	28.29	14.62	13.12	33.48	9.93	
COSTS (Rs)									
Management	65119	34615	63711	84595	59321	29496	61613	37876	
Transaction	30998	26875	48182	46414	40696	24233	35529	31619	
Total	84895	68408	92399	134976	127392	40111	77906	62986	
AREA IRRIGATED (Ha)									
Gross	142	NA	174	349	NA	66	139	NA	
Net (CCA)	216	211	595	595	595	340	340	340	
COST PER HECTARE (G)									
Management	459	-	366	242	-	447	443	-	
Transaction	218	-	277	133	-	367	256	-	
Repair & Maintenance	240	-	89	109	-	80	188	-	
Total	598	-	531	387	-	608	560	-	
COST PER HECTARE (N)									
Management	301	164	107	142	100	87	181	111	
% in Total Cost	76.71	50.60	68.95	62.67	46.57	73.54	79.09	60.13	
Transaction	144	127	81	78	68	71	104	93	
% in Total Cost	36.51	39.29	52.15	34.39	31.95	60.41	45.60	50.20	
Repair & Maintenance	158	37	26	64	31	15	77	18	
% in Total Cost	40.19	11.31	16.81	28.29	14.62	13.12	33.48	9.93	
Total	393	324	155	227	214	118	229	185	
WC NEEDED TO COVER COST	81356	60197	73642	129000	104802	30930	75265	52974	

TABLE B4.2: Cropping Pattern

(Area in Ha; Share in %)							
Society	CROPS	91-92		92-93		93-94	
		Area	Share	Area	Share	Area	Share
BBANGANGA	VEG.	3	6.24	2.93	3.33	8.32	6.82
	S.CANE	0.4	0.83	5.96	6.78	3.67	3.01
	WHEAT	40.8	84.82	40.12	45.62	44.06	36.09
	GRAM	1.4	2.91	14.75	16.77	1.24	1.02
	ONION	1.8	3.74	1.48	1.68	12.12	9.93
	GRAPES	0.4	0.83	17.85	20.30	46.67	38.23
	JOWAR	0.1	0.21	2.42	2.75	1.79	1.47
	OTHERS	0.2	0.42	2.43	2.76	4.2	3.44
	TOTAL	48.1	100	87.94	100	122.07	100
M.PHULE	VEG.	1.2	1.90	1.92	3.06	4.56	4.01
	S.CANE	1.76	2.78	2.77	4.41	2.49	2.19
	WHEAT	41.57	65.74	32.01	50.98	57.28	50.43
	GRAM	3.57	5.65	16.95	26.99	10.01	8.81
	ONION	1.9	3.00	0.61	0.97	12.82	11.29
	GRAPES	0.4	0.63	2.62	4.17	13.04	11.48
	JOWAR	5.37	8.49	3.75	5.97	7.55	6.65
	OTHERS	7.46	11.80	2.16	3.44	5.83	5.13
	TOTAL	63.23	100	62.79	100	113.58	100
JAY.YOGE	VEG.	8.34	4.79	10.6	5.96	24.66	8.34
	S.CANE	1.9	1.09	2.87	1.61	8.72	2.95
	WHEAT	116.29	66.86	83.53	46.96	115.4	39.02
	GRAM	19.57	11.25	38.49	21.64	31.74	10.73
	ONION	16.7	9.60	10.14	5.70	50.93	17.22
	GRAPES	5.41	3.11	15.61	8.78	37.62	12.72
	JOWAR	5.73	3.29	12.53	7.04	17.83	6.03
	OTHERS	0	0.00	4.09	2.30	8.88	3.00
	TOTAL	173.94	100	177.86	100	295.78	100

TABLE B4.3: Water Rates of Irrigation Department and WUA's During 1992-93

Season	Crops	Irrigation Department Rates Rs/ha			Society's Water Rates Rs/ha		TOTAL WATER RATE
		WATER CHARGES	LOCAL FUND	TOTAL WATER RATE	WATER CHARGES	LOCAL FUND	
KHARIF	JOWAR, BAJARA, SOWING						
	RICE & LEGUMES	80.00	16.00	96.00	110.00		110.00
	GROUNDNUT	160.00	32.00	192.00	200.00		200.00
	ONION/POL KANDA	410.00	82.00	492.00	500.00		500.00
	(KHARIF + RABI)						
	VEGETABLES	180.00	32.00	212.00	200.00		200.00
	GARDEN (FRUIT)	1250.00	250.00	1500.00	* 375.00		* 375.00
	LUCERN	1250.00	250.00	1500.00	* 375.00		* 375.00
	TOMATO (HYBRID)						
	LEGUMES						
RABI	SUNFLOWER, CHICK PEA,						
	JOWAR & MAIZE.	120.00	24.00	144.00	200.00		
	WHEAT (OF WATER TAKE BEFORE 15 TH OCTOBER)						
	WHEAT (OF WATER TAKE AFTER 15 TH OCT FOR						
	PRE SOWING)	120.00	24.00	144.00			
	GARDEN (GUAVA & GRAPE)	150.00	30.00	180.00	160.00		160.00
	LUCERN, SUGARCANE	150.00	30.00	180.00	200.00		200.00
	ONION (RABI)	1250.00	250.00	1500.00	* 250.00		* 250.00
	VEGETABLES, FLOWER	1250.00	250.00	1500.00	* 250.00		* 250.00
	POMOGRANTE, BER &	410.00	82.00	492.00	550.00		550.00
	CUSTARD APPLE.	245.00	49.00	294.00	300.00		300.00
		1250.00	250.00	1500.00	* 175.00		* 175.00

SUMMER							455.00		455.00
	VEGETABLES RABI/SUMMER		545.00	108.00		653.00	655.00		655.00
	VEGETABLE		1250.00	250.00		1500.00	350.00		350.00
	GARDEN		1250.00	250.00		1500.00	350.00		350.00
	LUCERN		500.00	100.00		600.00	600.00		600.00
	GROUNDNUT		640.00	128.00		768.00	770.00		770.00
	ONION (RABI + SUMMER)		240.00	48.00		288.00	300.00		300.00
	KHOND/FODDER CROP						200.00		200.00
	NILGIRI & MANGO								

TABLE B4.4: Area Irrigated and Water Used in the Three Societies During Rabi Season

YEAR	AREA HA	AREA WELL IRR.	WATER USED DAY CUSEC	NO. OF ROTATION	DAYCU/HA	DAYCU/HA INCL WELL
90-91	61.92		218.67	3.00	3.53	3.53
91-92	290.37		929.05	4.00	3.20	3.20
92-93	326.70		974.83	3.00	2.98	2.98
93-94	225.69	306.20	854.07	4.00	3.78	1.61
94-95	262.09	319.14	947.76	4.00	3.62	1.63

APPENDIX B5
Bhima Irrigation Cooperative Society, Bhima
TABLE B5.1 : Income & Expenditure

INCOME	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95
Water Charges	39075	46859	24072	35500	40668	85927	110000	129988
Int. Income	625	35	506	865	0	0	0	0
TOTAL	39700	46894	24578	36365	40668	85927	110000	129988
EXPENDITURE								
Water Charges	3496	3876	12417	8506	21829	18860	10861	0
Electricity Charge	11520	11520	11520	11520	11520	11520	36000	36000
Salary & Wages	4610	4200	2220	1200	5930	17437	15291	16200
Repair & Maintenance	6373	0	3512	16633	6528	2544	7471	9100
Miscellaneous	398	130	157	167	377	768	2090	1865
SUB TOTAL	26397	19726	29826	38026	46184	51129	71713	63165
Depreciaton	90000	90000	90000	90000	90000	90000	90000	90000
Total	116397	109726	119826	128026	136184	141129	161713	153165
PROFIT/LOSS								
Without Depreciation	13303	27168	-5248	-1661	-5516	34798	38287	66823
With Depreciation	-76697	-62832	-95248	-91661	-95516	-55202	-51713	-23177
SHARE (%) IN INCOME								
Water Charges	98.43	99.93	97.94	97.62	100.00	100.00	100.00	100.00
SHARE (%) IN EXPENDITURE								
Water Charges	3.00	3.53	10.36	6.64	16.03	13.36	6.72	0.00
Salary	3.96	3.83	1.85	0.94	4.35	12.36	9.46	10.58
R & M	5.48	0.00	2.93	12.99	4.79	1.80	4.62	5.94
Electricity	9.90	10.50	9.61	9.00	8.46	8.16	22.26	23.50
Depreciation	77.32	82.02	75.11	70.30	66.09	63.77	55.65	58.76
COSTS (Rs)								
Management	11381	4330	5889	18000	12835	20749	24852	27165
Transaction	5008	4330	2377	1367	6307	18205	17381	18065
Total	116397	109726	119826	128026	136184	141129	161713	153165
Area Irrigated (Ha)								
Net	157	157	157	157	157	157	157	157
COSTS PER HECTARE (N)								
Management	72	28	38	115	82	132	158	173
% in Total Cost	9.78	3.95	4.91	14.06	9.42	14.70	15.37	17.74
Transaction	32	28	15	9	40	116	111	115
% in Total Cost	4.30	3.95	1.98	1.07	4.63	12.90	10.75	11.79
R&M	41	0	22	106	42	16	48	58
% in Total Cost	5.48	0.00	2.93	12.99	4.79	1.80	4.62	5.94
Depreciation	573	573	573	573	573	573	573	573
% in Total Cost	77.32	82.02	75.11	70.30	66.09	63.77	55.65	58.76
Total	741	699	763	815	867	899	1030	976

APPENDIX B6
Shri Sambhaji Warana Cooperative Lift Irrigation Scheme Ltd, Kadoli
TABLE B6.1: Income and Expenditure

INCOME	88-89	89-90	90-91	91-92	92-93	93-94	94-95
Water Charge	43100	87528	212592	201853	183482	291638	394000
Int. Water Charge	0	0	0	261	209	112	200
Int Bank Savings	229	666	346	386	54	53	0
Int. Deposit	0	0	0	9444	11381	14453	35000
Int MSEB	83	201	210	210	200	0	0
Int WSFS	0	0	5187	4302	5037	8403	10000
Int & Others	0	0	1143	54	0	0	200
Penalty	701	2092	190	252	1280	1464	1000
Insurance	0	0	1625	0	4064	1971	0
Share Transfer	0	0	0	472	114	0	200
Sale of Pipes	0	0	0	0	0	0	0
TOTAL	44113	90487	221293	217234	205821	318094	440600
EXPENDITURE							
Water Charge	0	0	7838	8851	9579	13941	15000
Electricity Charge	9323	8543	6022	12750	12739	21251	25500
Repair of Mach.	1556	3107	3797	7978	27201	20632	25000
Repair of Pipeline	1206	1521	1340	3084	6114	6724	10000
Repair of channel	0	3280	3060	4005	4979	4133	6000
Int. on Bank Loan	0	311684	146692	179171	162060	129044	25000
Int. on WSFLoan	3849	26257	0	326	0	297	0
Salary & Wages	26976	22497	36374	31389	31795	35520	46000
WSF Supervision	4000	4000	4000	4000	4000	4000	4000
Pump HLR	0	0	0	0	0	6000	1000
Pipe LLR	0	0	0	0	113	38	50
Transport	0	1015	215	730	470	2160	2000
Office Rent	360	360	270	410	2000	3600	4000
Post	106	77	91	29	166	142	250
Audit	750	179	0	0	1613	1348	1800
Education	50	50	100	100	100	100	100
Meetings	1088	1402	1392	1098	1202	4140	11200
Travel & tour	6226	1377	3182	476	1365	875	25000
Publication	1934	2794	2839	1150	4364	2282	9000
Advocate	750	0	4200	0	500	0	500
Insurance	1725	2225	2292	2831	6994	2513	3000
Penalty	0	0	0	0	0	0	0
Miscellaneous	2070	1197	1756	3676	2883	2680	1000
SUB TOTAL	61969	391565	225460	262054	280237	261420	215400
Depreciation	0	49363	37565	50396	50825	51939	60000
Total	61969	440928	263025	312450	331062	313359	275400

PROFIT/LOSS							
W/out Depreciation	-17856	-301078	-4167	-44820	-74416	56674	225200
With Depreciation	-17856	-350441	-41732	-95216	-125241	4735	165200
SHARE (%) IN INCOME							
Water Charges	97.70	96.73	96.07	92.92	89.15	91.68	89.42
SHARE (%) IN EXPENDITURE							
Without Depreciation							
Water Charges	0.00	0.00	3.48	3.38	3.42	5.33	-6.96
Salary	43.53	5.75	16.13	11.98	11.35	13.59	21.36
R & M	4.46	2.02	3.64	5.75	13.66	12.05	19.03
Electricity	15.04	2.18	2.67	4.87	4.55	8.13	11.84
With Depreciation							
Water Charges	0.00	0.00	2.98	2.83	2.89	4.45	5.45
Salary	43.53	5.10	13.83	10.05	9.60	11.34	16.70
R & M	4.46	1.79	3.12	4.82	11.57	10.05	14.89
Electricity	15.04	1.94	2.29	4.08	3.85	6.78	9.26
Depreciation	0.00	11.20	14.28	16.13	15.35	16.57	21.79
COSTS (Rs)							
Management	52646	383022	211600	240453	257919	226228	174900
Transaction	46035	37173	56711	45889	57565	65398	108900
Total	61969	440928	263025	312450	331062	313359	275400
AREA IRRIGATED (Ha)							
Net	97	97	97	97	97	97	97
COST PER HECTARE (N)							
Management	543	3949	2181	2479	2659	2332	1803
% in Total Cost	84.96	86.87	80.45	76.96	77.91	72.19	63.51
Transaction	475	383	585	473	593	674	1123
% in Total Cost	74.29	8.43	21.56	14.69	17.39	20.87	39.54
R&M	28	82	85	155	395	325	423
% in Total Cost	4.46	1.79	3.12	4.82	11.57	10.05	14.89
Depreciation	0	509	387	520	524	535	619
% in Total Cost	0.00	11.20	14.28	16.13	15.35	16.57	21.79
Total	639	4546	2712	3221	3413	3231	2839

APPENDIX B7

Mahatma Jyotirao Phule Cooperative Society,
Phulewadi

TABLE B7.1: Income and Expenditure

INCOME	91-92	92-93	93-94
Water Charge	392038	220680	691463
Inter Water Charge	12415	2080	11450
Share Dividend	28154	12410	19920
Member Share Fee	218	15	25
Share Transfer Fee	514	350	180
Int Bank Saving	11240	0	2145
Penalty	4500	500	850
Int. Deposits	9982	3155	6744
TOTAL	459061	239190	732777
EXPENITURE			
Water Charges	31413	17682	55405
Salary	99600	74700	115402
Electricity	115500	86625	145000
R&M Machinery	48450	36337	68450
R&M of Water Channel	24502	18378	47482
R&M of PipeLine	29490	22117	34140
Transport	1544	1340	2814
Telephone Charge	1740	1454	1820
Stationary	2128	1814	5410
Postage	598	405	540
Meeting Expenses	1500	1125	2580
GB Meeting	2890	2167	3645
Corp Tax	2104	1578	3814
Wages	1405	1405	13405
Audit	9450	7400	10500
Insurance	18140	17540	23188
Miscellaneous	1740	4140	2415
SUB-TOTAL	392194	296207	536010
Depreciation	98316	73737	99145
TOTAL	490510	369944	635155
PROFIT/LOSS			
Without Depreciation	66867	-57017	196767
With Depreciation	-31449	-130754	97622
SHARE (%) IN INCOME			
Water Charges	85.40	92.26	94.36
SHARE (%) IN EXPENDITURE			
With Depreciation			

Water Charges	6.40	4.78	8.72
Salary	20.59	20.57	20.28
R & M	20.88	20.77	23.63
Electricity	23.55	23.42	22.83
Depreciation	20.04	19.93	15.61
Without Depreciation			
Water Charges	8.01	5.97	10.34
Salary	25.75	25.69	24.03
R & M	26.12	25.94	28.00
Electricity	29.45	29.24	27.05
COSTS (Rs)			
Management	245281	191900	335605
Transaction	142839	115068	185533
Total	490510	369944	635155
AREA IRRIGATED	(HA)		
Net	175.36	175.36	175.36
COST PER HECTARE (Rs)			
Management	1399	1094	1914
% in Total Cost	50.01	51.87	52.84
Transaction	815	656	1058
% in Total Cost	29.12	31.10	29.21
R&M	584	438	856
% in Total Cost	20.88	20.77	23.63
Depreciation	561	420	565
% in Total Cost	20.04	19.93	15.61
Total	2797	2110	3622