

SECTION - II

CASE STUDIES

CHAPTER-III

BIHAR EXPERIMENT

3.1 Introduction

- 3.1.1 In Bihar the experiment with farmers participation in canal irrigation management has been of recent origin. Till October 1998 farmers' associations were formed in 37 channels and distributaries in the State. Farmers of 13 more distributaries had since agreed to take over management of their channels and applied for registration. Of the 37 Associations already formed, Paliganj Distributary on Sone Canal System is the oldest. Here management transfer has already taken place. It was, therefore, selected for the study.
- 3.1.2 Immediately after getting some experience on PIM in Paliganj, the state government introduced similar experiments in other distributaries as stated above. This too was in collaboration with WALMI. One such medium irrigation project namely Asarganj distributary of Badua canal in Bhagalpur district was also taken up for detailed study in consultation with state level authorities and WALMI's experts.
- 3.1.3 Bihar had a large number of tubewells most of which did not function for one reason or the other. Attempts made in the past to transfer them to Panchayati did not succeed. Hardly 50 percent of the tubewells were taken over by Panchayats. Meanwhile under the requirement of the World Bank Bihar Plateau Development Projects WUAs were under formation within the area covered by this Project. Another significant development, was the passing of a resolution by the state government on 14th May 1998 whereby it was decided to transfer state tubewells to WUAs to be formed under the State Cooperative Act 1996. The ownership of the tubewells would, however, continue to vest with the state government. Under the new scheme, WUAs would pay 10 percent of irrigation charges collected from farmers to the state government and retain the balance of 90 percent of operation and maintenance expenses. During the period of the study, the scheme was yet to be made operational and, therefore, data and information for review were not available.
- 3.1.4 However, as mentioned in Chapter II, Bihar has probably the longest experience of farmers participation in management of tubewell irrigation at Vaishali in Hajipur district. It was, therefore, selected as the third project for study in Bihar.

3.2 Paliganj Distributary Farmers' Committee

3.2.1 Historical Perspective

3.2.1.1 The Sone Canal System is the first and foremost irrigation scheme in the Sone basin. Actual irrigation started in the autumn of 1874. The canal system was supposed to provide rabi irrigation in an area of 4.5 lakh acres (1,40,000 Hec). However, soon after commissioning of the canal system, farmers in the command quickly switched over to paddy cultivation which has remained as a principal kharif crop even today. This was mainly because of water loss and undependable flow in the river during winter months. However, good flow during monsoon continued thereby providing adequate water in the canal even, as more and more areas were brought under irrigation. For example, the canal which was designed for only 4.5 lakh acres for rabi irrigation, irrigated an area of 6.19 lakh acres in the year 1921.

3.2.1.2 The remodelling of old canal system was also taken up and completed in 1965-66 wherein capacity of the main western canal was increased from 4,600 to 6,700 cusecs and of the main eastern canal from 2,600 to 2,960 cusecs. After completion of remodelling work in the old canal system and construction of barrage, certain agronomical changes took place in the command area in the wake of new agricultural technology introduced under Intensive Agricultural Area Programme. As a result, the remodelled capacity of canals soon proved to be insufficient to meet the enhanced irrigation requirements.

3.2.1.3 Sone command had been receiving irrigation for about last 115 years and since then land levelling and land shaping have been constantly going on. The command area has now developed into a good agricultural land having irrigation as well as drainage. But the canal system has many deficiencies such as absence of micro network beyond outlets, absence of control structures, gates etc., leading to considerable wastage of water with low field application efficiency, absence of proper legislation and management, etc. Accordingly, the Sone canal system was considered for modernisation since 1980.

3.2.1.4 With change in agriculture from traditional crops to HYV, demand for irrigation increased, which could not be met from the existing system. Farmers of upper reaches started putting barriers across the canal flowing through their reaches resulting in reduction in supply or no supply in the lower reaches. The man-made scarcity condition led to several problems at the lower levels of irrigation management. As a result, farmers started losing their faith in the system.

Detailed checks and controls on working of lower level functionaries became difficult. Even police force could not help in proper operation of the canal.

3.2.1.5 Revenue collection dropped and cost of maintenance increased due to price escalation. The 'Satta' system managed under the Bengal Irrigation Act 1876, under which permits were issued against farmers to irrigations of the request area, which was very much effective in earlier days, gradually became ineffective and erratic. The situation became unmanageable and the government finally gave away the century old system during 1974. It was decided that the assessment and water tax demand preparation would be done on the basis of the irrigation register to be maintained by water managers. But this could not be practised in the fields and as a result, farmers forgot their responsibility of judicious use of water and started unauthorised use of canal water. The operation and maintenance of canal system remained virtually uncared for, and the state government visualising the worsening condition, decided again to re-introduce the old 'Satta system' in 1988 which, however, was yet to be implemented.

3.2.2 Action Research by WALMI

3.2.2.1 With a view to studying the strength and weaknesses of existing irrigation system and formulating appropriate intervention to improve the performance, an Action Research Programme was launched by Water and Land Management Institute (WALMI), Patna, in 1988. The area for Action Research taken up by WALMI, was located in the eastern low level canal (ELCC) covering the command of the Paliganj Distributary which offtook from right bank of Patna canal (total length 125 kms) from 73.9 km i.e. 9th reach of Patna canal between Arwal and Mahabalipuram lock. The parent canal in this reach had a capacity of 905 cusecs. The head width and depth of flow were 60 ft. and 6.2 ft. respectively. It had a head slope of 1:7000. The total length of Paliganj distributary was 26.5 km and had two sub - distributaries namely Chandos and Bhavatpura which offtook from 11.5 km and 17.2 km respectively. The design discharge at the head of Paliganj distributary was 180 cusecs.

3.2.2.2 Minors were absent in the network since water courses offtook directly from the distributary or sub-distributaries. A group of water courses also offtook from a single location. Structures in the canal system were very old. They were inadequate in number, old fashioned and difficult to operate. The falls were not provided with gates for regulation. Provisions for putting wooden plank at the crest of falls were made to raise the supply level of channels at the time of low

flows. Almost all the structures were in a dilapidated condition and gates were missing. The research area covered a culturable command area (CCA) of 12, 197 hect having 76 villages mainly in Patna district.

3.2.3 Bench Mark Survey

3.2.3.1 A Bench Mark Survey for Action Research Programme in Paliganj distributary was conducted from June 1988 to December 1989. This was done with a view to establish a data base for assessment of impact of various interventions to be made in the system in future and to document the then prevailing status of various aspects of irrigated agriculture in the research area.

3.2.3.2 The major difficiencies in the system diagnosed by Action Research were :

- i) The most important problem in the opinion of farmers of the canal system was that water was not available in the lower reaches of the canal when required while excess water came and damaged standing crops during the time of low demand.
- ii) The canal system was very poorly maintained. Operation of the system was not properly attended. Villagers obstructed canal flows. They removed the obstructions on the request of next lower reach villagers and allowed water to flow down but only after fully or over-irrigating their own fields.
- iii) Though the villagers traditionally behaved as one social unit yet on the issue of canal water, no inter- village organisation existed in the area. Instead, inter-village rivalry was quite common for use of canal water.
- iv) No proper system of communication existed between farmers and water managers and among farmers themselves.
- v) Farmers had lost confidence in government machinery and were desperately looking for outside help.

3.2.3.3 The outcome of the Action Research helped evolve methodology for implementation of policies towards handing over the system to farmers organisation. The most important achievement under this programme was formation and gradual expansion of water users association which ultimately resulted in handing over the Paliganj distributary to farmers.

3.2.3.4 Paliganj distributary covered 76 villages. Of these only 20 villages initially formed part of Water User Association (WUA). This number increased to 35 after two years i.e. by 1991,

and further to 55 by August, 1993. The same number continued since then. Thus more than 70 percent of villages of the Paliganj distributary had joined the WUA.

3.2.3.5 The Bihar Government approved the transfer of Paliganj distributary to farmers in June 1996. But the distributary was formally handed over to the Paliganj Distributary Farmers Committee on 25.2.1997. Delay in handing over was due to the following reasons.

- i) WRD asked the farmers' organisation (FO) to get the arrear water charges of the demand cleared before takeover. (FO helped revenue wing in realisation of about 50% dues).
- ii) Announcement of election inhibited implementation of decision as per code of conduct of the election since this measure treated as a policy matter of the government.

3.2.4 Physical Aspect

3.2.4.1 As described earlier, Paliganj distributary a part of the Sone Canal System was very old. Almost all the structures were in a dilapidated condition, even gates were missing. The physical condition of the canal presented a depressing scenario. In the channel, heavy silt, unauthorised cuttings, frequent breaches in the banks, encroachments on channel embankments were common sights. This was basically because of callous attitude of the farmers, degradation of the community feelings, lack of collection, and meagre resources at the disposal of the Govt./local functionaries. The system needed modernisation, which would entail heavy cost. From this point of view the distributary handed over to farmers was a liability. Farmers of the area, however, had been reconciled to this, since they had been irrigating their land from this system for almost for a century. They had to depend entirely on canal irrigation, knowing fully well that the canals could neither be modernised nor repaired by the government due to shortage of funds and that there was every likelihood of further deterioration in the absence of any repairs etc.

3.2.5 Irrigation Aspect

3.2.5.1 The scheduled opening of Patna canal, from where Paliganj distributary got discharge, was 1st June/15th June. The reported design discharge of Paliganj distributary at offtake was 180 cusecs. As against the design, generally 120 cusecs of water was supplied to Paliganj distributary. Monsoon usually breaks in second or third week of June and in the command area on an average 954 mm of rainfall occurs during monsoon which was not adequate for kharif crops. The post monsoon rainfall which is 65mm on an average was also not adequate for rabi cultivation. Paddy grown in the command area was the principal kharif crop with irrigation from canal water as and when required to supplement the rainfall. Other kharif crops were

maize and pulses such as moong, arhar, etc. Vegetables and fodder crops were also grown. In rabi, wheat and pulses like masoor and gram as also fodder crops were grown. Farmers of the area generally did not grow any hot weather crop because of very high water requirement in the season. Intensity of cropping in the area was generally 200 percent.

3.2.5.2 With abolition of 'Satta' system as mentioned earlier, 'Tatil' (closure) system was followed which is an indirect rotational supply system to enforce rationing of the available supply of water. Under the system the Executive Engineers issued notices regarding opening and closing of various distributaries in turn. Patna canal was operated on 'tatil' system during kharif season but not during rabi season. During Kharif also this system was not followed immediately after the opening of the canal, which was usually 3rd week of June. The system started operating later, generally from mid July. This imposed restrictions on operation when paddy transplantation started and demand of water in the command increased. The schedule of 'tatil' system was prepared on the basis of past experience. As per operation plan of Paliganj distributary, during kharif, there was 15 days cycle, under which the supply was given for 10 days with 5 days closure. 10 days in cycle of 15 days fixed for water supply in Paliganj distributary, were further sub- divided among the 5 reaches of this distributary, so that maximum water supply could be ensured in each of the five reaches. Information on reach - wise number of days earmarked, volume of water used and area under Kharif under Paliganj distributary is given below.

Table : 3.2.1 Water Supply Schedule in Paliganj Distributary

	Reach	No. of days allotted	Water use in mm ³	Percentage of Water used	Percentage of Kharif
1.	Paliganj Reach I	2.5	12.10	46.17	18.92
2.	Chanduos sub distributary	2.0	4.04	15.41	19.92
3.	Paliganj Reach II	1.5	3.63	13.85	16.10
4.	Bhavatforwa Sub distributary	2.0	1.70	6.49	14.30
5.	Paliganj Reach III	2.0	4.74	18.08	30.76
	Total	10.0	26.20	100.00	100.00

Note : Data under cols. 3 to 5 relate to July 88 to October 1988

3.2.5.3 The water supply schedule was still in vogue. However, as reported by irrigation officials, it was not being enforced as before and water use in the upper reaches was a matter of convenience rather than need in the absence of strict control over the rotation of water supply to different reaches of the distributary. The above table shows that there was problem of inequity. Because of favourable locations, farmers in the upper reaches tried to obtain maximum possible irrigation water. Moreover, in a large area like Paliganj distributary, in every village there were strong and weak farmers and the strong one had a tendency of grab more water. In addition, there was also the problem of inadequacy. The following table on actual supply of water no different reaches tend to indicate that less water than requirements had been received. The data related to kharif 1992.

Table 3.2.2 : Operation Performance of Paliganj Distributary - kharif 1992

		Unit - MM ³		
	Reach	Requirement	Actual Supply	Short / Surplus
1,	Paliganj Reach I	10,262	11,379	+ 1,117
2,	Chandaus Sub - Sry	10,728	3,855	- 6,873
3,	Paliganj Reach II (Middle)	8,670	4,665	- 4,005
4,	Bharatpura	6,436	3,681	- 2,754
5,	Paliganj Reach III (Tail end)	13,892	5,195	- 8,696

3.2.6 Selection of Sample Households

3.2.6.1 In order to assess the functioning as well as impact of the WUA 40 water user beneficiaries were selected at random from 5 villages which too were also selected randomly from three different reaches of head, middle, and tail. While selecting the beneficiary farmers, care was taken to cover big, medium, small and marginal farmers from each of the selected villages.

About 27 percent of the members had land upto 1 hectare, and 1 to 2 hect. each. 36 percent reported land holding of 2-5 hectares, while only one 10 percent had land above 5 hect. About 32 percent were OBC and two-thirds belonged to other castes, while only 4 percent

were SC.

3.2.6.2 From the control area of Paliganj distributary not covered by the new experiment of farmers participation in irrigation management, 15 farmers were selected at random for a comparative study. The farmers selected were mostly small and marginal farmers.

3.2.7 Functioning of WUA

3.2.7.1 As per the Memorandum of Understanding (MOU), works related to operation, management and distribution of canal water, maintenance of canal system and collection of water rate in Paliganj distributary including its sub-distributaries from head to tail were handed over to Paliganj Distributary level Farmers Committee. Seventy percent of the water rate collected was to be retained by the farmers committee for management of the canal system, while the remaining 30 percent was to be remitted to the Irrigation Department for maintenance of head work and main canal area within hydraulic boundary of the distributary after modernisation as per feasibility report on Modernisation of Sone Canal System (WAPCOS 1988), after raising the water level in the canal and increasing the canal capacity of 360 cusecs.

3.2.7.2 As per irrigation records, at the time of the study, only 55 villages were being irrigated in which village level committees had been formed. One big villages had two committees presidents, the very resulting in 56 committees in 55 villages. All the 56 committees were made members of distributary level - committee.

Water Rates

3.2.7.3 Irrigation rates throughout the state were Rs. 70/- per acre for paddy and Rs. 60/- per acre for wheat and other rabi crops. Farmers at the tail-end, however, generally got less number of waterings in their fields due to inadequacy of water and as such they refused to pay water charges even at reduced rates, let alone full rates. In order to bring them under the net the association however, had taken the decision that they would be charged only Rs. 20/- per acre per watering. Similarly, farmers who got water through seepage, generally did not want to pay the charges. They had also been brought to the fold and paid full water rate. It was claimed by WUA that because of certain measures taken by the association, such as limiting the practice of raising canal head to get more water for the fields in the upper reaches, persuading and pressurising defaulters, involving women in revenue collection by creating a 'women cell' at the distributary level, bringing farmers who usually did not pay the charges, to the fold and payment of 5 percent commission to the members of VLCs collecting water charges, the water charge collection had increased by 30 percent after the takeover. But this claim was not corroborated by the collection figures which were Rs. 2.35/- lakh for 1996-97 and Rs. 2.00 Lakh for 1997-98, as against the annual demand of Rs. 9 Lakh. In the first quarter of 1998-99 they collected

Rs. 1 lakh only.

3.2.7.4 The Distributary Level Committee had been authorised by the Government to retain 70 percent of the revenue collected from the fixed area for the purpose of operation, maintenance, improvement and service charges connected with the operation. The Committee would pay the remaining 30 percent of the same to the Irrigation department as their share for the operation and maintenance of the main canal. Annual demand for water charges, collection thereof and amount deposited to ID by the Paliganj Distributary Committee during last 2 years are as follow :

Annual Demand (based on 4027 Hect.)	Collection		Deposited to ID	
	1996-97	1997-98	1996-97	1997-98
Rs. 9 Lakh	2,35,000	2,00,000	1,11,000	45,000

3.2.7.5 The amount deposited was not sufficient to cover 30 percent of the total demand to the ID, as stipulated in the MOU Rs. 50,000 spent in 1997-98 for construction of pucca structure on the breach site to be adjusted against Govt. share as decided in the meeting with Irrigation Commissioner.

Training

3.2.7.6 It was envisaged that under participatory management of irrigation project, the farmers would be imparted training in water management. But during the field study, it was found that only 6 (15%) of the selected respondents, were imparted training in water management, 4 at WALMI, Patna and 2 at VASFA during the years 1995 to 1997, the duration varying from 1 to 3 days. The topics covered were optimum use of water, importance of timely irrigation and urgency of canal water distribution to all farmers. All those trained were reportedly benefited. However one of them felt that the duration of training was too short.

Management Committee and WUA

3.2.7.7 The election of the office barers and members of the Village Committee were generally on consensus basis. There was no dominant group in the organisation. However, there had been some lack of power community feeling. Disputes among the farmers were settled through persuasion and no through coreion or penalisation.

3.2.7.8 All the respondents reported that they enjoyed adequate voice in decision making by the management committee. While 90 percent of them reported that decisions were taken through

consensus, only 10 percent expressed that the decision were taken through majority. All the respondent farmers denied having any group dominance in the management committee or conflict with regard to water distribution.

3.2.7.9 The selected farmers expressed that the overall performance of both the village level committees and distributary level committee was 'good'. All the farmer respondents suggested that the distributary level committee should be provided with adequate funds to carry out major repairs of the distributary so as to make it more effective and useful.

3.2.7.10 All the selected farmers felt happy with the new system of irrigation management as taken up by farmers. Of the total respondents, 35 percent considered the new system much better as compared to the earlier one. Among different reaches, 94 percent farmers of the head reach also held this view. As against this, only 6 percent of the tail-end respondents and 38 percent from the middle reach expressed this view. Of all respondents, 55 percent held that it was somewhat better and for 10 percent it was more or less the same. Eighty eight percent of the tail - end farmers expressed that it was somewhat better.

3.2.7.11 As regards irrigation management by farmers, almost all the respondents expressed satisfaction with the new system as it ensured adequacy and timeliness of irrigation, equitable distribution of water at reasonable charges, save time and money and eliminated or minimised corrupt practices. The new system also reduced tension among the users. About 55 percent of them, however, reported that irrigation channel was not properly maintained.

3.2.8 Impact of the Programme

(A) Before and After Approach

3.2.8.1 Though there was overall increase in the irrigated area in all the reaches as reported by the farmers association, the reachwise increase in irrigated area was not available. The study, however, revealed that though the irrigated area under kharif remained more or less same, (command area was predominantly paddy growing) rabi irrigated area increased from 688 hect. in 1994-95 to 1973 hect. in 1997-98.

Change in Irrigated Area

3.2.8.2 Crop-wise average irrigated area per respondent before formation of the Association and thereafter are brought out in the following table.

Table 3.2.3 : Average Increase in Irrigated Area per Respondent (0.00 hect.)

Village Location	Before (1995-96)				After (1997-98)			
	Crop		Wheat		Paddy		Wheat	
	Total area	Irrig. area	Total area	Irrig. area	Total area	Irrig. area	Total area	Irrig. area
1	2	3	4	5	6	7	8	9
Head	1.53	1.32	1.29	1.01	1.53	1.47	1.29	1.19
						(11.36)		(17.82)
Middle	1.69	1.57	0.80	0.78	1.71	1.62	0.80	0.78
						(3.18)		(0.0)
Tail	1.19	1.19	0.67	0.67	1.19	1.19	0.67	0.71
						(0.0)		(6.0)
Total	1.46	1.36	0.85	0.78	1.46	1.42	0.85	0.83
						(4.41)		(6.41)

Figures in parentheses are indices of growth over the period

As may be seen from the above table, while average total operational holding per respondent both under paddy and wheat, almost remained same at both points of time, 'before' and 'after', the average irrigated area per respondent registered an increase of about 4 and 6 percent respectively over the same period. However, the increase was more pronounced in the head reaches in respect of both the crops of paddy and wheat, being 11 and 18 percent respectively. Talking an overall picture of the sample households, for only five respondents total irrigated area increased from 17.10 hect. 'before' to 20.15 hect. 'after', about 18 percent increase, whereas for the rest irrigated area remained same at both points of time. Taking all respondents into account, average irrigated area per respondent increased from 2.12 hect. to 2.2 hect. i.e. an increase of 3.9%.

Quality of Irrigation

3.2.8.3 During the course of the study it was observed that quality of irrigation in terms of adequacy and timeliness for both paddy and wheat showed a marked improvement over the period after the takeover of the irrigation management by farmers. While adequacy of irrigation in respect of paddy was reported by 65 percent of the beneficiary respondents in 1997-98 as against 13 percent in the year prior to takeover, in case of where the percentages were 58 and 15 respectively. A similar trend was noticed in three different reaches, 'head' 'middle' and 'tail'.

Yield per Hectare

3.2.8.4 In an attempt to compare the average yield rate per hectare over the period, it was revealed that paddy yield registered an increase of about 13 percent, whereas wheat yield rate increased by 19 percent. While in the upper reaches, both the crops reported a maximum increase in yield rate, tail-enders registered more increase in respect of paddy as compared to the middle reach beneficiaries. This reflects more intensive irrigation in the tail-end as a result of participation management of irrigation. Data presented in the table below.

Table 3.2.4 : Average yield per hectare (Qtls.)

Village location	Before		After	
	Paddy	Wheat	Paddy	Wheat
Head	27.0	23.2	32.7 (21.1)	27.3 (17.7)
Middle	29.5	23.2	33.8 (14.6)	27.3 (19.8)
Tail	25.5	20.1	30.3 (18.8)	23.5 (16.9)
Total	27.6	22.2	31.4 (13.7)	26.5 (19.4)

Figures in parentheses are indices of growth

Awareness of the New Experiment

Value of Agricultural Produce

3.2.8.5 An endeavour was also made to ascertain the average value of produce per respondent during the periods 'before' and 'after'. The value of produce was estimated at constant prices based on current years prices. Analysis of the value at two points of time revealed that, by and large, the average value in case of the selected respondent increased to the extent of 15 percent for paddy and 26 percent for wheat. Respondents in head reach reported higher growth in

value of wheat (41%) and less for paddy (34%) over the same period. The same trend, by and large, was perceived for respondents in other two reaches. The increase in value of produce per respondent reflected the combined effect of increase in area under irrigation and increase in yield per hectare. Data are given in the table below.

**Table 3.2.5 : Average Value of Produce per Respondent
(at constant prices)**

Village Location	Before		After	
	Paddy	Wheat	Paddy	Wheat
Head	14,270	11,687	19,162 (34.28)	16,500 (41.18)
Middle	18,577	9,115	21,907 (17.92)	10,914 (19.74)
Tail	12,151	6,812	14,486 (19.22)	8,303 (21.89)
Total	15,145	8,708	17,390 (14.82)	10,987 (26.17)

Figures in parentheses are indices of growth

3.2.9 Impact of the Programme

(B) With and Without Approach

Change in Irrigated Area

3.2.9.1 Cropwise average irrigated area per respondent was comparatively much less (about two-thirds) than average irrigated area for selected beneficiaries. The irrigated area did not increase over the period. The data selected for the non-members are as follows :

Table 3.2.6 : Average Irrigated Area (per Respondent) (0.00 hect.)

Season / Crop	Before		After	
	No. reported	Average irrigated area per respondent (0.00 hect.)	No. reported	Average irrigated area per respondent (0.00 hect.)
Paddy	15	1.02	15	1.00
Wheat	15	0.52	15	0.52
Total	15	1.54	15	1.54

Quality of Irrigation

3.2.9.2 The selected non-members reported that irrigation was quite inadequate and untimely for paddy whereas for wheat it was adequate and timely. It was also reported that during kharif season there was scarcity of water in the canal system due to water loss resulting from cutting of bandhs and silt deposit, as reported by most of the respondents, while during rabi when requirement of water was comparatively less no dearth of irrigation was reported.

Yield Per Hectare

3.2.9.3 Yield per hectare of major crops grown by the respondent "before" and "after" are given below.

Table 3.2.7 : Average Yield per Hectare (qtls.)

Season / Crop	Before	After
Paddy	33.7	38.5 (14.24)
Wheat	21.9	23.9 (9.13)

Figures in brackets are indices of growth

The selected non - members by and large reported same, yield of paddy as the selected beneficiaries, both 'before' and 'after'. The selected beneficiaries not only reported higher yield rate of wheat at both points of time than the selected non-members but the net growth of their yield rate over the same period was more, 19 percent as against 9 percent reported by the selected non-members.

Average value of Produce

3.2.9.4 Average value of produce per selected non - members are indicated below :

Table 3.2.8 : Average Value of Produce per Respondent (Rs)
(at constant prices)

Crop	No. reported	Value of Produce in Rupees			
		Before		After	
Paddy	15	12,063	15	13,533	(12.18)
Wheat	15	5,700	15	6,233	(9.35)
Total	15	17,763	15	19,766	(11.27)

Figures in brackets are indices of growth.

Cropwise value of produce per respondent was much less than that of per selected beneficiary, ostensibly, due to less area under the crop for former group of respondents.

Awareness of the New Experiments

3.2.9.5 All the selected non - members were aware of management of irrigation by farmers in neighbouring areas. However, out of 15, only 2 (13%) wanted to form water users association as they considered that it would be easier to get water and internal disputes among farmers could be resolved easily, if they had control over management of irrigation system. The rest, however, considered that their own system was more or less the same and did not want change over to the new system. The selected non-members considered that unauthorised cutting of bands by interested farmers and lack of maintenance of the canal system by D.I. was responsible for water loss. They suggested that ID should take steps for proper maintenance of the canal including desilting of canal bed.

Water loss

3.2.9.6 Of the total respondents, about 68 percent reported water loss in the distributary or field channels during the last 3 years (1995-98). Among the three reaches of the distributary, 75 percent of the farmer respondents in the tail-end reported water loss. These figures in the middle and the head reaches were 69 and 50 percent respectively. The reasons for the water loss cited were siltation and damaged structure (78%) and unauthorised outlets (52%).

Proportionately more number of farmer respondent from tail-end reported these reasons for water loss. However, as many as 91 percent of the respondents in the middle reach reported siltation and damaged structure and 67 percent each in the remaining reaches cited these two reasons. The responses were multiple. Almost all the respondents of the control group reported water loss as a result of breach in the distributary and a few also opined that the loss was due to cutting of the banks. However, about 13 percent were not aware of the loss of water from the distributary. About 86 percent considered that water loss was more earlier and the remaining farmers reported more loss 'after'.

3.2.10 Strengths of the Association

- i) The I.D. had provided the Association with a jeep to move about in the command area of the distributary to supervise the canal banks and realise water charges. This had facilitated overall supervision and management of irrigation system.
- ii) The farmers involvement had increased and they persuaded the fellow farmers not to obstruct water flow or breach the canal banks, which, as per association officials, helped in preventing water loss to the extent of about 40 percent. As claimed by WALMI, officials it resulted in increase in area under irrigation. However this claim was not supported by any factual data.
- iii) Minor repair works were done quickly and personal disputes of the farmers sorted out easily.
- iv) A feeling of ownership of the distributary among farmers had developed; they started realising that the canal belonged to them and for their own benefit. Hence, they felt that its upkeep, operation and maintenance were farmers responsibilities. This reduced village rivalry over share of water. The village level committees supervised distribution of water in different villages.
- v) There appeared to be some improvement in distribution of water upstream. Farmers appreciated the problems of tail-enders and the deliveries, especially to lower reaches of the canal improved over time. But still the irrigation in the tail-end villages was not very satisfactory and farmers' total needs were not fulfilled.
- vi) Farmers capability in management of irrigation system, which was altogether new to them, gradually started improving.
- vii) The programme helped reduction of social tension since the landless families were also involved in canal repairs with full wage payments.

3.2.11 Weaknesses of the Association

- i) Field channels not yet constructed, irrigation being done through flooding of fields.
- ii) Canal banks were not lined. As a result water accumulated in the field through seepage.
- iii) The village level committees rarely met and took decisions in the interest of all farmers. The attendance at the meetings was also very poor.
- iv) Follow up of the decision of the Distributary Level Committee was hardly taken up.

3.2.12 Overview

3.2.12.1 Despite the fact that the distributary handed over to the farmers committee was in a delapidated condition and its other inherent weaknesses were passed on in legacy, the decision of transferring the management of distributary to farmers was in the right direction. As the financial position of Irrigation Department was not sound, it would not have been in a position to repair and maintain the distributary regularly and properly. Involvement of farmers in the management of distributary develop a sense of ownership among them and for their own survival they could not let it run into disuse, since they knew that without irrigation they might not survive.

3.2.12.2 For proper repairs and maintenance, regular flow of funds would be required which would come from collection of water charges. But collection during the last two years was much below the mark. Since farmers, in general, were habitual defaulters and the same habit persisted, it would be prudent on the part of the Committee to take stringent measures against defaulters. The committee would have to take unpleasant decisions to check cuttings of the banks and the activities like fishing in the canal, crossing it with animals, grazing and unauthorised construction of houses and cow sheds on the canal banks.

3.2.12.3 However, now there was no looking back for the Irrigation Department as well as for the farmers committee. Both of them, in their own interest, might have to work in tandem with close cooperation and better coordination.

3.3 Farmers' Committee for Asarganj Distributary

3.3.1 Introduction

3.3.1.1 Asarganj distributary took off from Kiul Badua left bank canal at 974 chain (29.5 km) in Bhagalpur district. Badua canal had been taken from Badua Reservoir constructed on Badua river. The reservoir gets water mainly from rains and was constructed in 1965. Asarganj distributary started functioning since 1971. It was a medium project. The length of distributary was 396 chains or 12 kms with one minor distributary of 5.5 kms.

3.3.1.2 The design discharge of distributary was 120 cusecs at a time. But only 40 to 90 cusecs of water was delivered because of inadequacy of water in the reservoir which was mainly dependent upon rain water. The over-all maintenance of the distributary was considered to be satisfactory. The CCA was 4200 hect. but the actual irrigated area was 3900 hect. only. Area irrigated during kharif was 3900 hect. but it was only 400 hect. during rabi because of inadequacy of water during rabi. The predominant crop during kharif was paddy while that during rabi was wheat. The intensity of cropping was 110 percent.

3.3.1.3 There was no classification of head, middle and tail of the distributary, since water was delivered equally right from the head of distributary to the tail. However, for the land in the lower reach, there was a time lag of about 5-6 days. The problem was reported only in the case of 5 villages at the tail-end. They got water after closure of the outlets in the upper reaches.

3.3.2 Selection of Sample Households

3.3.2.1 With a view to assessing the functioning as well as impact of the programme, 40 water user farmers were selected at random from 5 villages selected from three different reaches of head, middle and tail, though there was no such distinction in the command of the distributary. This was done with a view to ascertaining the degree of impact on farmers in three different locations. Among the selected farmers, all types of farmers, big, medium, small and marginal were selected from each of the selected villages. About 40 percent of them were marginal and 20 percent small farmers. Another 37 percent had land between 2 and 5 hect. each and only 1 percent had land above 5 hect.

3.3.2.2 15 non-members were selected from the control area of the selected project. The respondents were mostly marginal farmers. Only 13 percent each of them had land holding of 1 to 2 hectare and above 2 hectares each.

3.3.3 Functioning of WUA

3.3.3.1 As per the Govt. of India Policy of 1987, farmers of the area gradually became aware of the possibility of participatory irrigation management (PIM) for which they were also motivated by the officials of the Irrigation Department. Consequently, a Farmers' Committee for Asarganj distributary was formed in 1994. Simultaneously, 33 village level committees (VLC) were also formed. For each VLC three office bearers viz. President, Secretary and Treasurer were elected unanimously. All the presidents of the VLCs became members of the Distributary Level Committee (DLC) and its executive body consisted of 11 members whose details were as under :

President	1
Vice President	2
Secretary	1
Treasurer	1
Members	6
Total	11

3.3.3.2 The election of the office bearers at the DLC level was unanimous. The tenure of the committee both at distributary and village level was three years. But the present one was found to be working for the last 4 years. The committee was, however, not yet registered.

3.3.3.3 There was no dominant group in the committee either at the village or at the distributary level. Though the committees had been formed both at the village and distributary levels, yet the management had not been transferred to the farmers. Water supply, repairs, maintenance, etc. were the responsibility of the irrigation department. The VLCs and DLCs only cooperated with the Govt. officials in managing the water supply and carrying out repairs and maintenance by sharmdan (voluntary labour). Irrigation charges were not being collected since 1978 due to a pending court case filed by the farmers. The farmers plea was that they did not pay water

charges during zamindari period and hence they were not liable to pay it now. Despite this, water was being released every year.

3.3.3.4 Water supply schedule was prepared at the Superintending Engineer level. Based on the rainfall statistics he determined the adequacy of water. However, the water supply schedule was also amended depending upon the availability of water in the reservoir and local conditions. During scarcity water supply was restricted and given for a limited period depending upon water availability.

Training

3.3.3.5 Seven executive committee members and other members of DLC were imparted 3-4 days training in water - management and crop husbandry. They were sent for training to Sriganganagar in Rajasthan, WALMI at Patna and for a visit to Paliganj distributary in the Patna district. The training related to participatory irrigation management, water losses and their prevention, better water management, crop husbandry etc. The training helped the members to reduce distributary water losses through better water management including participatory irrigation management. It also motivated them to think of other farmers who were at the lower reaches and their requirements of water.

Management Committee

3.3.3.6 All the respondents reported that they got adequate chance in decision making in the Management Committee. Similarly, cent percent of them expressed that the decisions were taken through consensus and that there was no group dominance in the management committee. All of them denied any conflict in connection with water distribution.

3.3.3.7 Repair and maintenance was carried out by irrigation department. Social and political tension did exist, but it did not affect irrigation of the farm lands.

3.3.3.8 All the respondent farmers were reportedly happy with the new system of involvement of farmers in irrigation. While only 15 percent felt that the new system was much better as compared to earlier one about 67 percent held that it was somewhat better and for the remaining 18 percent it was more or less the same. More or less the same trend persisted in the three different reaches. In the head reach, for 20 percent of the selected farmers the new system was much better, whereas in the middle and tail end only 10 and 15 percent respectively had this consideration. Again, 70 percent of the selected farmers in head reach considered it somewhat better and this

percentage was 65 in the middle reach. For 20 percent of them each in the middle and tail end and 10 percent in the head reach, the new system was more or less the same. All the respondents, however, suggested that financial assistance be provided to the water users association by the Irrigation Department for construction of pucca field channels to prevent water loss.

3.3.3.9 Irrigation management by farmers themselves in this project was beset with a few problems.

As already explained, though the committees were formed both at the village and distributary level, the management of irrigation of this distributary was not transferred till the date of visit by our study team. As a result, the committee's role was restricted to extending cooperation to the Irrigation Department in managing the water supply and carrying out repairs and maintenance by Shramdan (voluntar labour). The main hurdle in transferring the management of irrigation was non - payment of water charges by the farmers due to the pending court case instituted by the farmers of the command. The non-realisation of water charges virtually paralysed the overall functioning of the committee. It could not function as a vibrant body. It always looked to the Irrigation Department for funds, for repairs and maintenance, though they raised funds through donation and contributions, mostly in the form of 'shramdan', to the extent of Rs. 1 lakh in 1995-96 and Rs. 72,500 in 1996-97 against an estimated annual cost of Rs. 2 lakh towards maintenance of distributary, field channels, etc. It may be worth mentioning here that Irrigation Department spent only Rs. 2 lakh during the last 3 years against the estimated annual maintenance cost of Rs. 2 lakh. The quality of maintenance of the irrigation system could be well imagined with such meagre amount.

3.3.3.10 The water users association and the farmers were very keen to take over the management of irrigation, but in the absence of water charges collection, which was the regular source of funding, the Govt. and the committee were not able to evolve modalities for transfer.

3.3.4 Impact of the Programme

(A) Before and After Approach

3.3.4.1 The economic impact of the programme was assessed in terms of, i) Increase in irrigated area, and quality of irrigation over the period, ii) Changes in the productivity of crops with consequent changes in value of produce grown over two points of time. Besides, views and opinion of respondents on the efficacy of the new system, about managing committee, suggestions for further improvements were also obtained.

Irrigated Area

3.3.4.2 Since the common area of the project stretched over several villages, data are presented reachwise to assess impact of PIM on the farmers in different locations. As discerned from table 3.3.1, while the total irrigated area under paddy showed a modest growth of about 2 percent respectively over the period, the area under potato remained the same.

Table : 3.3.1 Average Irrigated Area per Beneficiary (0.00 hect.)

location	Before				After			
	Kharif		Rabi		Kharif		Rabi	
	Paddy	Wheat	Maize	Potato	Paddy	Wheat	Maize	Potato
1	2	3	4	5	6	7	8	9
Head								
Total area	1.11	0.78	0.37	0.25	1.13	0.82	0.37	0.25
					(1.80)	(5.13)	(0.00)	(0.00)
Irrigated area	0.75	0.72	0.37	0.25	0.78	0.76	0.37	0.25
					(4.00)	(5.56)	(0.00)	(0.00)
Middle								
Total area	1.21	1.01	Nil	Nil	1.24	1.01	0.50	Nil
					(2.48)	(0.00)	–	–
Irrigated area	0.99	0.93	Nil	Nil	1.04	0.96	0.50	Nil
					(5.05)	(3.23)	(100.00)	
Tail								
Total area	0.98	0.63	0.20	Nil	0.98	0.62	0.20	Nil
Irrigated area	0.91	0.63	0.20	Nil	0.91	0.62	0.20	Nil
					(0.00)	(-1.60)	(0.00)	
Total								
Total area	1.13	0.82	0.28	0.25	1.15	0.81	0.39	0.25
					(1.77)	(-1.2)	(39.29)	(0.00)
Irrigated area	0.92	0.79	0.28	0.25	0.94	0.79	0.39	0.25
					(2.00)	(0.00)	(39.29)	0.00

Fig. in parentheses indicate indices of growth over the period.

However, maize was introduced 'after' as new crop in the middle reach. Total irrigated area

across the board increased from 9.4 hect. to 11.5 hect, (22.3%) for 4 respondents. decreased by 11 percent for one respondent, where as for others irrigated area remained static over the period. Taking all respondents into account, average irrigated area per respondent increased from 1.75 hect. to 1.81 hect. i.e. an increase of 3.1%.

Quality of Irrigation

3.3.4.3 As many as 90 percent of the respondents suffered from the constraints of not only inadequacy of irrigation but also untimeliness of water deliveries 'before' formation of the association. The rest also considered irrigation very inadequate and very irregular. The situation, however, did improve 'after' but not much in so far as two - thirds still reported irrigation was inadequate and untimely.

Table : 3.3.2 Average Yield per Hectare (Qtls)

Location	Before				After			
	Kharif Paddy	Wheat	Rabi Maize	Potato	Kharif Paddy	Wheat	Rabi Maize	Potato
Head	22.4	20.1	30.6	60.6	27.4 (22.32)	25.1 (24.87)	35.3 (15.35)	80.0 (33.33)
Middle	23.5	20.9	–	–	29.9 (27.23)	23.4 (11.96)	35.0 –	–
Tail	26.4	22.8	30.0	–	31.4 (18.93)	26.0 (14.03)	33.0 (10.00)	–
Total	24.1	20.7	30.6	60.0	29.7 (23.23)	23.2 (12.07)	35.2 (15.03)	80.0 (33.33)

Figs. in parentheses are growth indices of.

3.3.4.4 It is discernible from the above table that taking all respondent farmers together the average yield registered a growth of 23 percent in case of paddy and 12 and 15 percent in case of rabi crops like wheat and maize respectively. The growth was, however, 33 percent for potato. However, maize and potato were grown by 5 (12%) one (2%) respondents respectively. Growth in wheat yield rate was more pronounced vis-a-vis paddy for respondents in head and tail end.

Value of Produce

3.3.4.5 An attempt was also made to assess the value of produce and compare the same at two points of time 'before' and 'after'. The data so collected are summed up in the table below. Value of

produce for both the periods was computed at current years prices.

**Table : 3.3.3 : Average Value of Produce per Respondent (Rs.)
(at constant prices)**

Location	Before				Total (all crops)	After			
	Kharif		Rabi			Kharif		Rabi	
1	Paddy	Wheat	Maize	Potato	6	7	8	9	10
Head	6,846	7,490	4,506	6,000	16,287	8,620 (25.90)	9,592 (28.06)	5,253 (16.57)	8,000 (33.00)
Middle	9,350	9,765	–	–	19,115	12,504 (33.73)	11,220 (14.90)	7,000 (NR)	–
Tail	9,570	7,057	2,400	–	16,867	11,238 (17.42)	8,202 (16.22)	2,640 (10.0)	–
Total per respondent	8,779	8,519	3,980	6,000	17,846	11,217 (27.77)	10,058 (18.06)	5,080 (27.63)	8,000 (33.0)

Figs. in brackets are indices of growth over the period.

As may be seen from the above table, all the respondents reported growth in average value of produce in respect of all the crops they produced, The increase was 28 percent in respect of paddy and 18 percent in case of wheat. For maize and potato the growth of value was calculated where crops were grown both 'before' and 'after'. Growth in case of maize ranged between 16 and 10 percent in head and tail reach respectively, whereas potato growth by one respondent registered growth of 33 percent

15 non-members were selected at random from the control areas of the selected project. The respondents were mostly marginal farmers, only 13 percent each of them had land holding of 1 to 2 hectare and above 2 hectares each.

3.3.4.6 Water supply was timely, but not adequate because it was dependent on availability of water in the reservoir which was dependent on rains. Against the design discharge of 120 cusecs at a time only 40 to 90 cusecs of water was delivered because there was not enough of water in the reservoir. Farms at the lower reaches had to encounter a time lag of 5-6 days as compared to upper reaches.

3.3.5 Impact of the Programme

(B) With and Without Approach

Irrigated Area

3.3.5.1 Cropwise availability of irrigation in the control area both "before" and "after" was as follows:

Table : 3.3.4 Average Irrigated Area (0.00 hect.) per Respondent

Crop	Before		After	
	No. reported	Irrigated area	No. reported	Irrigated area
Paddy	–	–	–	–
Wheat	15	1.20	15	1.24 (3.30)
Maize	8	0.37	8	0.37 (0.0)
Total per respondent	15	1.25	15	1.29 (3.20)

Figures in brackets are indices of growth.

Paddy was unirrigated, while wheat and maize were irrigated both "before" and "after". The area under irrigation more or less remained same at both points of time. The selected beneficiaries, however, reported irrigation for all crops including paddy both "before" and "after".

Yield Per Hect.

3.3.5.2 The average yield (92.5) rate (qtls.) per hect. of paddy was 28.1 and 30.2 qtls. 'before' and 'after' respectively, growth of about 7 percent for the selected non-members. The yield rate at two points of time reported was higher than the yield rate reported by the selected beneficiaries. For other crops like wheat, maize and potato, yield rate for the selected beneficiaries was comparatively higher.

Value of Produce

3.3.5.3 Average value of produce per respondent is given in the table below. The total value of produce grown with and without irrigation was computed at constant prices based on current year's prices.

**Table 3.3.5 : Average Value of Produce per Respondent (Rs.)
(at constant prices)**

Crop	Before		After	
	No. reported	Value of produce	No. reported	Value of produce
Paddy	15	16613	15	17826 (7.30)
Wheat	15	10033	15	11000 (9.60)
Maize	8	2250	8	2550 (13.33)
Total per respondent	15	23,670	15	25,633 (8.29)

Figures in brackets are indices of growth.

As already indicated, yield rate of paddy grown without irrigation reported by selected non-members was comparatively more at both points of time than the yield reported by selected beneficiaries. Growth in value of paddy was, however, 7.30 percent for selected non - members as against 28 percent reported by the selected beneficiaries. For wheat crop average growth in value per respondent was around 9.6 percent vis-a-vis 18 percent reported by the selected beneficiaries.

Awareness of the New System

3.3.5.4 All the respondents of the control area reported awareness of the new experiment but about half of them considered that farmers participation in irrigation management was not working well and hence did not indicate any preference for the new system. Almost all the respondents reported their satisfaction with their own system and did not want to switch over to the new system. According to them, availability of irrigation, especially in rabi was adequate and timely. However, all of them reported that the canal system was not repaired and maintained by ID and silt deposit and damaged structures had affected availability of irrigation water. It may be mentioned in this connection that due to a long standing dispute before a court ID could not collect water rates from the farmers. The farmers in the selected project areas, however, formed an informal association among themselves and realised water rates for running the affairs of their association. Nothing out of collected water rates from member farmers (collection of water rates was intermitant and irregular for want of strict enforcement by the association) was, however, remitted to ID.

3.3.5.5 About 82 percent of the farmer respondents reported water loss in the distributary or field channels during the last three years (1995-98). As regards three reaches of the distributary the percentages of farmers reporting water loss were 80 each in the middle and tail and 90 in the head reach. The reasons advanced for the water loss were siltation and damaged structures (100%) and unauthorised outlets (58%). Among the reaches, unauthorised outlets were reported by 50 percent of farmers in the tail end, 56 percent in the head and 63 percent in the middle reach. The responses were multiple. About 82 percent considered that the water loss was more earlier, while the remaining farmers (18%) still considered the water loss to be more.

3.3.6 Attitude of Local Govt. Officials

3.3.6.1 Attitude of the Govt. officials was favourable. They wanted that the management of distributary be handed over to the farmers' committee. They were, however, sceptical about the resources of the committee, since the water charges were not realised from farmers due to the pending court case. Farmers might raise fund by contributions, donations etc. But this would have amounted to ad-hoc arrangements, whereas the farmers' association needed regular sources of income

like water charges, for carrying out repair and day to day work on regular basis. The DLC had no office of its own. It functioned from the houses of Secretary and Treasurer.

3.3.7 Overview

3.3.7.1 Management of the irrigation system was not yet handed over to the farmers association. It must be transferred. As regards regular resources for funding in the absence of collection of water charges, an undertaking by the general body of the DLC may be obtained in writing that they would regularly levy some repairs and maintenance charges on the farmers according to the size of the holding in the command.

3.3.7.2 The field study revealed that the farmers were keen to take over the management of irrigation and the government was also willing. But the non-payment of water charges due to pending court case since 1978 was impeding the process to advance further. This impasse had a tendency to shake the confidence of the farmers irrespective of the fact that they were not paying the water charges in the whole irrigation management. On the other hand, Irrigation Department could not be expected go on spending for indefinite period from its own fund which was not augmented by realisation of water charges.

3.3.7.3 During the course of discussions at the time of field visit, it emerged that depending upon the size of holding all the water users were willing to give an undertaking to regularly pay an amount to the distributary level committee for day to day upkeep of the structure and the Irrigation Department should accept the undertaking and handover management to the farmers committee. This may be considered at the government level. However, the fact remains that some way would have to be found out so as to save the structure and help the farmers.

3.4 Vaishali Area Small Farmers Association (VASFA)

3.4.1 Background

3.4.1.1 Vaishali Area Small Farmers Development Project spearheaded by Vaishali Area Small Farmers Association (VASFA) received national and international attention because of its organisational innovation which enabled self-help by small and marginal farmers, bulk of whom had remained handicapped because of their far too meagre resources to take over to improved agricultural practices. It was an unique project and that was why it was selected for the study even though it was realised that its evaluation would be more complex as explained below. Prior to 1971 when the association was formed, there was no irrigation in the area because the small and marginal farmers could not afford a personal tubewell. The long gap between the period before the formation of the association and the year 1997 when the survey was conducted along with the fact that there was no irrigation in the period before implied that 'with' and 'without' analysis would be more meaningful in this project than a 'before' and 'after' one.

3.4.1.2 The guiding light of the project was and continued to be Shri K.D. Dewan who instituted amongst the farmers an idea of community tubewells. The project was the outcome of the efforts of Vaishali Sangh, a local voluntary organisation to support people to liberate themselves from chronic indebtedness and help them maximise agricultural production. The basic element of the project lay in its three tier organisational structure, which helped and encouraged all the member farmers to articulate their aspirations, interchange ideas and pool actions for raising productivity. VASFA started functioning since 1971.

3.4.2 Formation of WUA

3.4.2.1 Farmers with contiguous land holdings were organised into groups, such that each group comprised a compact block of 25 to 40 acres of agricultural land. The groups had been organised into 3 zones viz. (i) Vaishali, ii) Madarna, and (iii) Bibipur. For each group of farmers, there were joint means of cultivation, such as tube-wells, machinery, plant protection equipment, etc. Inputs like seeds, fertilisers, pesticides, technical know-how, etc. were available to each farmer from VASFA which also had an arrangement for repair of threshers. As a result, farmers no longer had to go to long distances, which earlier involved time and money for getting their threshers repaired.

- 3.4.2.2 The total credit requirement of an individual farmer and each group of farmers had been carefully worked out on the basis of detailed surveys, carried out by VASFA after identification of the area and farmers were made members. The farmers deposited money as per the acreage of land in the area. The total cost was met by group of farmers. In preparing the proposal for a tubewell area, land size, size of tubewell, number of members, cost etc. were included.
- 3.4.2.3 The credit requirements of individual groups of farmers were examined by Agricultural Finance Corporation of India and recommended by it to the Central Bank of India. Initial requirements of 35 groups of farmers totalling Rs. 20 lakh was sanctioned by the Central Bank of India. Then Peoples Action For Development India (PADI) an organisation of the government of India, the then Ministry of Rural Development, gave to VASFA Rs. 2 lakh as ways and means fund for initiating action till bank loans were available. PADI also put in Rs. 2 lakh as security money with the Central Bank of India. Thus, against the security of 10 percent provided by PADI the bank was persuaded to take risk to the extent of 90 percent of the credit given to small farmers. What is also significant is that the bank also agreed to provide credit on group guarantee basis without insisting on mortgage of tiny pieces of land owned by small farmers. Later on, subsidies were also obtained from DRDA for tubewell construction.
- 3.4.2.4 In 1992, a proposal for 40 Tubewells installations was sent to CAPART, an organisation of the Government of India, Ministry of Rural Development, formed by incorporating the earlier PADI. CAPART agreed to give 75 percent of the cost and the rest 25 percent was to be met by the concerned farmers. Out of these 40, only 10 were sanctioned and 9 were completed so far. These were mostly substitutes for old T. W. which had become obsolete.
- 3.4.2.5 Besides irrigation development, VASFA had also been engaged in bio-gas installation (No. 1017), training for bio-gas construction (101 masons), construction of harijan awas (22 units or 11 twins), voluntary consolidation of holdings (in 2 villages), latrine construction (No. 701), hand pump for drinking water (30), distribution of coconut plants (750), save grain training (100 persons), help to destitutes (487 No.), road construction under JRY (3.5 kms.) etc.

3.4.3 Selection of Sample Household

- 3.4.3.1 The tubewells under VASFA were constructed since 1971. Bulk of the tubewells were constructed in early seventies with the credit made available by bank. Again, in 1992, 9

tubewells were constructed with funds provided by CAPART. Care was taken by this Institute to select beneficiaries from both the old and new set of tubewells so as to compare the functioning of both of them. In the command area of the tubewell hardly one percent had land holding between 2 and 5 hect. whereas 89 percent had land upto 1 hect. and 9 percent had 1 to 2 hect. each. The sample selected followed similar pattern. Out of 40 selected beneficiaries as many as 77 percent had land holding upto 1 hect. and the rest had 1 to 2 hect. each.

3.4.3.2 Fifteen farmers who did not get irrigation from community tubewells but got water, either from own handpumps or private tubewells, were selected from control area of the selected project for a comparative study of their agricultural status. As many as three-fourths of them were marginal farmers having average land holding of less than 0.5 hect. each. Of the rest, 13 percent each were small and medium farmers. It may be noted that a comparison of association area with non-association area is particularly useful for this case study.

3.4.4 Functioning of WUA

3.4.4.1 VASFA was a registered society working on no profit no loss basis. Farmers of the area were its members. The number of farmers varied from 30 to 40 within the compact block commanded by a tubewell. These members elected Dalpati or group leader who became member of the respective zonal executive committee (three zones). Zonal Pradhan was elected from among them. The Dalpati became member of the VASFA executive committee also. All the farmer members (nearly 910) constituted the general body of the Association. Besides the Dalpati or group leader, the executive body also included a representative each from Vaishali Sangh, CAPART and the Central Bank of India, which adopted the project. Its presidentship rotated zonewise to give equal representation to all the three zones. The executive committee officials included one elected President, three elected Vice-chairmen, three Zonal Pradhans, one General Secretary who was nominated by CAPART and Vaishali Sangh and one Consultant without election from CAPART.

Irrigation Aspect

3.4.4.2 Generally, there was no inadequacy of water because command area of one T.W. covered a compact block of 25 to 40 acres of agricultural land which could get water for irrigation. Water given to member farmers as per demand and priority was fixed according to the demand note filled by member farmers. Forms for demand note were available with the group leader.

Farmers were supposed to deposit 50 percent of the total cost as per the demand note. But it was not mandatory. However, each farmer was required to bring diesel as per the irrigation need. The group of farmers decided the rate for irrigation which was on hourly basis. Besides diesel cost, water charges included operators charge (Rs. 2/ per hour), mobil oil and some overhead charges as decided by the farmers of the group. The overhead charges levied per hour, were kept in the bank for repairs and maintenance of the tube well. The non-members were also given water at rates higher than those charged for member farmers. The group of farmers decided the rates to be charged from members and non-members. Sometimes the rate charged differed from T.W. to T.W. It was owing to the fact that the water charges were decided tubewell wise and the cost of diesel brought by individual farmers were deducted at old rates prevalent at the time of commissioning of each tube well. Field channels were constructed by farmers in their fields. In case of old TW each TW had pucca main channels ranging from 200 to 400 ft. in length. New TW did not have pucca channels. In so far as the size of TW was concerned, due to wide variation in cost, the TW with 4" dia were installed and not with 6" dia.

3.4.4.3 Prior to 1971, there was, by and large, no irrigation facility available in the area, especially for small and marginal farmers. They had no means of their own to have private tube wells. The concept of community tubewell and the formation of VASFA brought about a sort of revolution in agriculture in the area. The small and marginal farmers started irrigating their land resulting in increased productivity. After group formation, the farmers entered into 3 types of formal agreements, one between individual farmers and VASFA, the other between groups and VASFA and third among members themselves. Profoundly convinced of the recurring benefits, all farmers abided themselves by these agreements voluntarily and there had not been any question of coercion by any individual or any agency.

3.4.4.4 Initially during 1971 - 1974, 35 TWs were constructed with the help of bank loan. These were in 46 group TWs out of which 28 were functioning at the time of the study in 1998. Subsequently, new areas were brought under irrigation and the irrigation provided was considered adequate and timely. This resulted in increased production.

Funding

3.4.4.5 VASFA got funds from CAPART (earlier PADI) for tubewell, handpump and low cost latrine.

It got funds from JRY as well for road construction. For bio-gas, it got funds from Action for Food Production (AFPRO) through the Central and State Governments. The Canadian Hunger Foundation (CHF) gave fund for managerial support through AFPRO. From Swish Development Corporation too, it got fund for managerial support for treadle pumps for irrigation, which were supplied to farmers at subsidised rate. The Foundation for Rural Recovery and Development (FORRAD) supplied pump sets for TW to farmers at two / thirds cost. It received funds for construction of 11 twin houses (22 units) at the cost of Rs. 20,000 per unit only for scheduled castes from Indo- German Social Service Society (IGSSS) Besides all these, VASFA had own fund generated out of members' fee.

Training

3.4.4.6 The executive committee members had been sent for training at Rajendra Agricultural University, Pusa, Bihar many times. Besides, they were imparted training locally at VASFA and its Central Growth Centre. The duration of the training was generally 3-4 days and the topics covered were related mostly to improved agricultural practices. Training, by and large, helped them improve their knowledge and techniques pertaining to improved agriculture. VASFA also imparted training to the local people regarding benefits of bio-gas, good drinking water, awareness, etc.

As far as training of farmers in the field of improved agriculture and allied topics was concerned, no selected beneficiary reported to have undergone any training whatsoever.

Management

3.4.4.7 Normally TWs were owned and operated by the groups which were free to decide on any matter concerning the farmers and the TWs. However, those TWs, where some friction among farmers existed or some other problems were reported, were taken over by VASFA till such time the problems were sorted out. This was done with a view to saving the TWs from running into disuse. At the time of the study, there were three such tubewells under VASFA.

3.4.4.8 All the sample beneficiary farmers spoke very high about the functioning of the management committees both at the apex level (VASFA) as well as at the tubewell level. They indicated that all of them got adequate chance in decision making and that the decisions were in all the cases taken through consensus. Similarly, all of them denied having any group dominance or any

conflict with regard to distribution of water. However, control group of farmers reported independent style of functioning of the group leader (Dalpati) in some of the tubewell level committees.

3.4.4.9 All the respondents were of the view that performance of tubewell level committees and VASFA was good. They suggested that the tubewell level committees of VASFA should be provided extra fund for repair and maintenance of the tubewells and field channels. Similarly, all the respondent beneficiaries felt happy with the new system of irrigation. About 32 percent of them reported that the community system of irrigation was much better than the system of irrigation through private tubewells. For 55 percent, it was only somewhat better and for the remaining 13 percent it was more or less the same. All the selected respondents suggested that financial assistance should be provided for construction of pucca channels so that water loss might be prevented. They also suggested that for repair and maintenance of the tubewells, some extra fund be provided.

3.4.5 Impact of the Programme

(A) Before and After Approach

Change in Irrigated Area

3.4.5.1 It was observed that during the period 'before' there was no irrigation either during kharif or rabi. With the introduction of tube-wells, new areas were brought under irrigation.

Table 3.4.1 : Average Irrigated Area per Respondent

(0.00 hect.)

		Before		After		
	No. reported	Total area	Irrigated area	No. reported	Total area	Irrigated area
1	2	3	4	5	6	7
Paddy	40	0.91	—	40	1.02 (12.09)	0.68
Rabi						
Wheat	40	0.66	—	40	0.79 (19.70)	0.60
Maize	25	0.33	—	25	0.31 (- 6.10)	0.31
Potato	5	0.44	—	5	0.35 (- 20.5)	0.35
Total per	40	1.83	—	40	2.05	1.52

Figs. in parentheses are indices of growth over the period

It is discerned from the above table that while there was no irrigation 'before', irrigation facility was extended to all crops grown by the respondents 'after'. With the introduction of irrigation the total area under wheat registered an increase of about 20 percent mainly at the cost of area under maize and potato which was reduced by 6 and 20 percent respectively. Taking all respondents into account, average irrigated area per respondent increased from Nil to 1.54 hect.

Quality of Irrigation

3.4.5.2 During the course of the study, it was gathered that, by and large, the quality of irrigation was also good. As reported by all the respondents, crops like paddy wheat, maize and potato, which were not at all getting water before the farmers involvement in irrigation, started getting adequate and timely water.

Yield Per Hect.

3.4.5.3 Figures on average yield per hectare both 'before' and 'after' are given below to gauge the impact of the WUA.

Table 3.4.2 : Average Yield per Hectare (Qtls.)

Season / Crop	Before without irrigation	After
Kharif		
Paddy	9.43	29.35 (211.24)
Rabi		
Wheat	11.03	27.87 (152.67)
Maize	14.23	36.42 (155.93)
Potato	24.77	107.43 (333.71)

Figures in parentheses are indices of growth over the period.

As may be seen from the above table, all major crops grown 'after' with irrigation registered an impressive growth in yield rate, ranging from more than 300 percent for potato to 153 percent for wheat. Yield rate of paddy & maize also increased by 211 and 156 percent

respectively over the period. Average irrigated area under potato was 0.35 hect. and obviously the marginal and small cultivators took more care in increasing yield of cash crop like potato grown with tubewell irrigation, by applying improved inputs. It is evident from the figures that availability of assured irrigation was a boon to the farmers which heralded impressive growth in yield rate vis-a-vis crop grown 'before' without irrigation. The difference in yield, however, can not be attributed entirely to formation of the association alone since there was little irrigation before. Much of the difference might be due to irrigation as such. A 'with' and 'without' comparison in this case would be more illuminating. This is attempted later on.

Value of Produce

3.4.5.4 The comparison of value of agricultural produce in terms of 1997-98 prices for the period 'before' and 'after' revealed that the same had registered a phenomenal increase in case of almost all the crops over the period, as may be seen from table below. The crops grown 'before' were all without irrigation.

Table : 3.4.3 Average Value of Produce per Respondent (Rs.)

(at constant prices)

Season crops	Before		After	
	No. reported	Value of produce	No. reported	Value of produce
1	2	3	4	5
Kharif				
Paddy	40	3,433	40	7,926 (130.87)
Rabi				
Wheat	40	3,662	40	8,299 (126.62)
Maize	25	1,795	25	4,147 (131.03)
Potato	5	4,360	5	13,673 (213.60)
Total	40	8,807	40	22,680
per respondent				(157.52)

Figures in parentheses are indices of growth over the period.

The value of produce in case of paddy, wheat and maize registered a net growth of about 130 percent, while potato value registered three fold increase over the period. Value was computed at current year's prices. The phenomenal increase in value of produce may be attributed to the creation of irrigation potential and introduction of high yielding varieties with adoption of improved agricultural practices. In the case of majority of respondents the span of period between 'before' and 'after' had been as long as 26 years during which agricultural techniques had taken many strides, especially in case of paddy and potato. Here also, as in the case of yield and other variables, a 'with' and 'without' analysis would be more useful. This is attempted later on.

3.4.6 Impact of Programme

(B) With and Without Approach

Change in Irrigated Area

3.4.6.1 The crops grown by the non-members were mainly paddy and wheat. Average irrigated area per respondent are indicated below :

Table 3.4.4. : Average Area per Respondent (0.00 hect.)

Crop	Before		After	
	No. reported	Area (without irrigation)	No. reported	Area (with irrigation)
Paddy	15	0.83	15	1.00 (20.48)
Wheat	15	0.43	15	0.51 (18.60)
Total	15	1.26	15	1.51(19.84)

Figs. in brackets are indices of growth

With irrigation facilities paddy and wheat area per respondent increased by 20 and 18 percent respectively

The respondents reported no irrigation earlier.

Yield Per Hect. of Major Crops

3.4.6.2 Relative yield position "before" and "after" are given below :

Table 3.4.5 : Average Yield Per Hect. (Qtls.)

Crop	Before	After
Paddy	18.20	25.80 (41.76)
Wheat	10.00	40.00 (300.00)

Figures in brackets indicate indices of growth.

Increase in yield of paddy was around 42 percent for the respondents, whereas the selected beneficiaries reported increase in yield of about 211 percent over the same period. The phenomenal growth in yield of paddy reported by the selected beneficiaries was due to the fact that they grew paddy 'before' without irrigation and hence yield rate was abysmally low, 9.43 qtl/hect., although their yield rate was much less than yield rate of 18.2 qtl/hect. for the selected non-members which was also grown without irrigation. As regards wheat, the net increase in yield rate between two points of time was 300 percent for the selected non-members, vis-a-vis 152 percent reported by the selected beneficiaries.

Value of Produce

3.4.6.3 Commensurate with the increase in productivity, value of agricultural produce increased by 47 and 377 percent for paddy and wheat respectively. The value was computed at latest year's prices for both the periods to ward off temporal fluctuations. The increase in value of produce between two points of time was much less than that reported by the selected beneficiaries in case of paddy, while for wheat, rate of increase was much more for the non-members, vis-a-vis the beneficiaries. The data are brought out in the table below :

Table 3.4.6 : Value of Produce per Respondent (Rs.)
(at constant prices)

Crop	No. reported	Before	No. reported	After
		Without irrigation		With irrigation
Paddy	15	6,245	15	9,200 (47.32)
Wheat	15	2,160	15	10,303 (376.99)
Total per respondent	15	8,405	15	19,503 (132.04)

Figures in brackets are indices of growth

Awareness of the New System

3.4.6.4 All the respondents reported timely and adequate irrigation during rabi. They were also aware of the new experiment. But they were not willing to join the new system, although reasons cited for not joining the new system were different. Those having their own handpumps obviously did not want to participate in the new system. Others also reported against the attitude of the present Dalpatis being not conducive to cohesiveness in amicably behaving with other farmers. As suggestions, they had indicated that there should be regular election of Dalpatis so as to infuse new leadership. They, however, reported that there was practically no repair and upkeep of field channels in their own system which should be regularly attended to. On the whole, they were satisfied with their own arrangements and did not consider the new system any better.

3.4.7 Analysis of With and Without Comparison

3.4.7.1 VASFA demonstrates a unique scenario where both selected beneficiaries as well as non-member respondents did not have any irrigation "before". For the selected beneficiaries the time lag between "before" and "after" (present position) was more than 20 years and therefore, any comparison of their agricultural status "before" when entire cultivation was without irrigation with their present agricultural status will not be very illuminating for our purpose. However, a comparison between selected beneficiaries and selected non-members, during the "after" period, would throw more light on the benefits, if any, derived by the selected beneficiaries by becoming members of the farmers' association vis-a-vis selected non-members.

3.4.7.2 As regards irrigated area per respondent, the selected beneficiaries reported more irrigated area per respondent than the non-members both in respect to paddy and wheat, the principal crops grown by both groups of respondents. Yield rate of paddy (29.35 qtls./hect.) for selected beneficiaries was about 13 percent more than the yield per hectare of 25.80 qtls. reported by non-members. For wheat, however, yield rate reported by non-members was 40 qtls./hect., vis-a-vis, 27.87 qtls. per hect. reported by the selected beneficiaries.

3.4.7.3 Average value of produce grown per selected beneficiary at Rs. 22,680/- was about 16 percent more than the average value of produce of Rs. 19503 per respondent computed for selected non-members. This was mainly due to other crops like maize and potato grown by the selected VASFA members as better irrigation facilities afforded them to grow more crops. It can be inferred from the above that the formation of the association was a positive factor

even in the case of tubewell irrigation. It might have resulted in economies of scale. This is in addition to the enabling function performed by it namely it enabled the poorer farmers to avail the benefits of irrigation.

3.4.8 Attitude of Local Govt. Officials

3.4.8.1 There was hardly any role for the Govt. officials to play. This was purely a self help scheme. However, their attitude was by and large, favourable.

3.4.9 Panchayati Raj

3.4.9.1 No problem reported. No role of Panchayats to play. Even otherwise, Panchayats hardly functioned in Bihar since there had been no election since 1978

3.4.10 Strengths and Weaknesses

(A) Strengths

- (i) Knowing fully well that canal irrigation could not be extended to all the area, installation of tubewells and distribution and management of water by the groups of farmers was definitely a better alternative. This helped big, medium, small and marginal farmers alike on first-come-first serve basis in irrigating their lands and obtaining various agricultural inputs, and functioned at no-profit-no-loss basis. The non-members were also given water for irrigation. The disputes with regard to water distribution, etc., were settled at the farmers level. The democratisation of the whole process was in tune with the Panchayati Raj system which enabled the farmers to sort out the problems at their own levels without any delay. This system also helped the small and marginal farmers get irrigation for their fields, which otherwise would have been difficult for them. The creation of community irrigation facilities also helped them achieve better yields.
- (ii) Out of the total selected beneficiaries as many as 78 percent reported water loss in field channels during the last three years and the reasons cited for this phenomenon by 87 percent of them were siltation and damaged channels as a result of their being katcha, while 48 percent reported water loss due to unauthorised outlets. The responses were, multiple.

(B) Weaknesses

- (i) Due to fund crunch, the distribution channels could not be made pucca in most of the cases which also resulted in loss of water, thereby increasing the cost of cultivation. The elections

which should have been held every year as per provision, were not held regularly. The group leaders or Dalpati elected once, continued for years. This invariably resulted in growth of vested interest and change in their style of functioning not in conformity with the democratic system. Similarly, due to shortage of staff at the VASFA level in comparison to the number of activities taken up, the accounts of the tubewell committees were not audited regularly and in some of the cases fudging of accounts was also reported. Not being happy with the situation some of the control group farmers expressed unwillingness to join the association. It was also gathered that though few of the Tubewell committees could generate surplus for undertaking major repairs or replacement, in most of the cases, especially in that of tubewells installed in the early seventies which were on the verge of becoming obsolete, no such surplus could be generated. Once these tubewells became non-functional, the farmers or VASFA would have to look to other sources like CAPART, for funding new tubewells and the time lag in the whole process might put the farmers in disadvantageous position leading to drop in yield. There was non uniformity in realisation of water charges. For most of the tubewells it differed considerably owing to pricing of diesel brought by farmers at the old rate.

3.4.11 Suggestions

- i) VASFA should consolidate whatever it had done earlier. Out of 46 TWs only 28 were functioning. This was a loss to small and marginal farmers. Efforts should be made to increase the number and extend the benefits to the whole of Vaishali area. Funds be also made available for replacement of old TWs.
- ii) VASFA should arrange for the training to farmers in areas like better water management, optimum use of water and reduction of water loss.
- iii) Election of group leaders of each tubewell (Dalpati) should be held annually as per the provisions in the bye-laws. Similarly, the accounts should also be audited regularly by VASFA.
- iv) Second line of leadership may also be developed who could take over in case the first line leadership defaulted. There should also be a provision of deputy group leader (Up-Dalpati), so that the group leader did not resort to arrogance.

3.4.12 Overview

3.4.12.1 From the very beginning the present system had been a good attempt to provide irrigation to areas devoid of irrigation. This also added new dimensions to the whole programme by evolving

self-help by farmers, especially small and marginal, who could not afford to have their own tube wells. Over the years, on account of other development activities taken up, VASFA with the same staff strength, could not exercise proper control over the whole system. As a result, accounts of the tubewell committees could not be audited and their elections too were not held in time. All these factors led to independent style of functioning of the group leaders (Dalpatis) which proved detrimental to the committees in the sense that accounts were not maintained properly and surplus could not be generated for major repairs and replacement in the event of tubewells rendered non-functional. Despite this, it can be concluded that Tubewell irrigation on community basis had been good and innovative exercise worth extending to other areas. The weaknesses mentioned earlier can be rectified so as to make the TW committees more vibrant and democratic, enabling them to stand on their own feet.

3.5 **Overview of the selected projects in the State (Bihar)**

- 3.5.1 The Paliganj distributary of the Sone Canal system typifies an ideal scenario of the command area fit for participatory management of irrigation system by farmers themselves under patronage and guidance of ID. The role of WALMI officials in motivating farmers of fifty five villages out of 76 villages within the command area to take up irrigation management was no less important. Such a huge body of farmers who were long accustomed to getting irrigation direct from ID, deciding to take responsibility of irrigation management by themselves is worth emulating in other areas. There was, however, various bottlenecks like frequent breaches in canal bandhs deliberately created by other farmers, non-repair and maintenance of canal including desilting operations by ID primarily for lack of resources resulting from non payment of water charges by farmers in the command area etc. which bedevilled smooth working of the irrigation management. However, the association braved all these impediments and with the help of village level committees set up in each village, endeavoured not only to ensure equitable distribution of water throughout all reaches of the distributary, but at the same time persuaded the beneficiary farmers to pay irrigation charges. Although collection of irrigation charges by farmers association every year was a tiny fraction of the total annual demand raised by ID, it also persuaded farmers to pay arrears of irrigation charges side by side with current irrigation charges. That the total collection by the association was hardly sufficient to enable ID to take up repairs and maintenance of the canal system as against almost nil collection of irrigation charges per year earlier, is however, a different issue. A question mark on the long term sustainability of the model arises on account of the delapidated condition of irrigation system handed over to WUA. It is beyond the capacity of WUA to mobilise adequate funds needed for renovation of the system. It is here that a major initiative is needed from government or any other funding agency.
- 3.5.2 In another selected project Asarganj, the farmers who were not paying irrigation charges since the Zamindari days had volutarily formed an informal association to take up irrigation management. They also raised contributions from the members for day to day maintenance work, although nothing was given to ID. An old dispute over collection of irrigation charges by ID was still pending before a court. In this project, however the farmers' association was formed under an informal agreement with ID and no memorandum of understanding

was signed with them.

- 3.5.3 The third selected project VASFA is a glaring example of how local leadership inspired farmers, mostly small and marginal, to unite together for irrigation with cluster of deep tubewells with assistance from CAPART and other external agencies. In this project the land was without irrigation prior to installation to Deep Tubewells. The tangible benefits derived "after" was irrigation with increase in crop productivity. In some cases new crops were also introduced with the prospect of irrigation. Though certain problems like intransigent attitude of some of the local leaders (Dalpati) at cluster of tubewells level due to non election of new leaders for long time, the benefits of irrigation with consequent increase in crop productivity was derived by the farmers, as far as sample beneficiaries were concerned. This also throws up an institutional model which can be emulated in other areas, as it has already been done in a few nearby districts in both Bihar and Uttar Pradesh for providing tubewell irrigation to small and marginal farmers.
- 3.5.4 In all the projects the new experiment had resulted in increase in crop productivity, although there was no significant increase in acreage under irrigation after farmers participation came into being. The comparison of the agricultural status of the sample farmers in control area where farmers received irrigation direct with or without payment of irrigation charges (in Asarganj farmers did not pay irrigation charges at all to ID due to the reasons stated earlier) indicated that in their case also increase in crop productivity with consequent betterment of their economic status had taken place over the period, but, by and large, not in the same proportion of the selected members of the farmers' association.
- 3.5.5 The study underscored the merits of participatory management of irrigation system which would not only free ID officials from the drudgery of entering into agreement with innumerable individual farmers (the resultant casualty being lack of up-keep and maintenance of distributary channel) but the system also infused new responsibility amongst farmers to think of irrigation management as their own.
- 3.5.6. The studies underline the role of motivator in promoting WUA. Such a promoter could be a government agency also like the WALMI at Patna or a dedicated individual like Shri K.D. Diwan in Vaishali.