At the Doorstep of Transfer: Paliganj Distributary of Sone Canal System, Bihar, India

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ABSTRACT

THE ACTION RESEARCH Program (ARP) of the Water and Land Management Institute (WALMI), Patna, though initiated in an open ended mode, necessitated the involvement of farmers in the operation of a canal system, resulting in early perceptible improvement in water distribution. Operation led to identification of priority maintenance and subsequently to assessment of irrigated area and water charge collection. Farmers demanded the transfer of irrigation management. The process was self evolving rather than an imposition of pre-formulated prescription.

The "macro-to-micro approach" adopted in the ARP in Paliganj indicates that farmers can organize other farmers if adequately motivated and properly trained. With the increased capability of farmers organizations (FOs), the turnover can be effected without restoring or improving the system. Immense potential inherent in farmers for sustained maintenance of the system has been explored and has brought the program [to the doorstep of Irrigation Management transfer (IMT)].

INTRODUCTION

Irrigation management transfer (IMT) from government agency to the organizations of local beneficiary farmers is the need of the time in order to address the problem of under performance of irrigation projects, caused by the bad maintenance of the system due to fund constraints in government agencies. IMT is also needed to democratize the irrigation process and to create a sense of ownership among beneficiaries which in turn provides solutions to many unresolved problems. The importance of IMT has been internationally accepted. Since the last few years, the participatory management approach, which is [a gateway to IMT], is gathering momentum in India. The policy document of the Eighth Five-Year Plan of India (April 1992-March 1997) and the National Water Policy of India (1987) clearly outline the importance of beneficiary participation in irrigation management. Following the IMT policy of WALMI, Bihar; Patna started an Action Research Program in the command of the Paliganj Distributary of the Sone Canal Irrigation Project in 1988 under the leadership of the author of this paper, for improvement of irrigation management status in the area.

The ARP team started its activities to address specific problems (to be discussed subsequently) which needed immediate focus. Against many odds in the socio-economic-political arena, the team started its work with an approach, which though very logical in the view of the team members, did not gain the confidence of many experts. The team started with the macro-to-micro approach. A large area was selected because it was thought that to address the immediate problems of the beneficiaries, a small area would not do. Also the results of this approach would be replicable quickly at an acceptable cost if the area is large. The ARP team stood firmly with its belief and kept on working to achieve its goal. As time passed, the team started getting success in its work and praise from the persons visiting the area. Now the work done by the team is internationally accepted. This is clear from the article "Bihar, India: Turnover in Paliganj Distributary, Sone Command" which appeared in the *IIMI Review*, November 1992. It amply illustrates the situation in the area, and the [amicable work] done by the ARP team of WALMI, Patna. It says :

> "This experiment, admirably attempted in a challenging environment, is in need of a larger strategic framework. Rather than occurring as part of an overall state policy and strategic plan, this action experiment arose as a locally induced initiative. To sustain it and encourage dissemination, a more systematic policy and comprehensive program will be needed at the state level."

As will be clear subsequently, the research is getting more and more support from state-level policy and has taken a clear further step after the appearance of this article in the *IIMI Review* of November 1992.

THE CONTEXT

Bihar is a state in the eastern part of India. In spite of good rainfall and productive soil, the state has the lowest average crop yield among other states in the country. Its density of population is high and per capita income is the lowest in the

country. The area of the state is about 5 percent of the country but, it contains about 10 percent of the population. Eighty percent of the population resides in villages and their subsistence economy depends on agriculture.

The Sone Canal System, a century old first major canal system of the state (Figure 1) was managed under the Bengal Irrigation Act of 1876. Under Article 99 of the Act the government is empowered to formulate rules for the management of the system. Elaborate rules were formulated through which farmers under the command of an outlet were to file a joint application for water through their representative called *Sattedar* or *Lumberdar* who was appointed by the canal authorities. He was paid 2 percent of canal revenue collected in his area to oversee water distribution and help the canal authorities in the general management of the system. The canal authorities were responsible for getting the water to the outlets and the *Sattedar* managed distribution below outlet. Permits were issued by the canal authorities only to those lands which could be irrigated without much difficulty and where chances of wastage of water do not exist. In the beginning heavy water rates were charged since the system was considered to be a commercial enterprise. Penal water rates were charged for unauthorized use of canal water without permit. Very heavy penalties were imposed for wastage of water which was computed on a volumetric basis.

The damage of canal banks, structures or interfering with the flow were cognizable offenses. Canal Officers were vested with legal powers and they exercised their powers well in the management of the system. The annual canal revenue collection was good (97%) and the expenditure on establishment was low (20%).

After independence in 1947 the objective of the irrigation system changed. The Sone Canal System which was constructed and opened in 1874 for protective irrigation as an insurance against recurring famines and droughts (duty 133 acres per cusec), was now to meet the demands of intensive cultivation with modern agricultural developments. The system which was conceived as a commercial enterprise became a public utility scheme for the poor rural population of the area. The irrigation systems became highly subsidized by the government and the water rates were kept low considering the paying capacity of the farmers. A study of the variation of water rates indicates that in terms of labor, present water rate is only about one-eight of what it was 100 years ago, and in terms of value of crop produced, only one-tenth.

With India becoming a democratic nation, there was a marked change in the perception and attitude of the people. Independence was interpreted in its own terms by individuals. It had adverse effects on irrigation system management. The administrative and socio-political environment changed. Powers of canal officers were gradually eroded with time. Modification in the existing rules of management (1974) suggested the demarcation of the area of assured water supply to simplify the working and reduce malpractices prevalent in the field. However, this could not be fully implemented and further deteriorated the situation. Farmers started interfering with the canal flow. They put obstructions to raise the water level to irrigate high patches of land which were earlier [out of command of canals] and cut the banks of the distribution system to quickly irrigate their land and store as much water as possible. The availability of canal water became uncertain while the area under cultivation increased manyfold with time (Figure 2). Water did not reach the lower portions of the channels. Farmers became more and more dissatisfied and their relations with the canal authorities worsened. They abused the canal officers and considered them to be the main cause of their miseries. Canal Officers with their eroded powers and due to poor working environment could not redress even the petty grievances of farmers. The control of farmers on canal, which was earlier below the outlet, extended to the distribution system; and the canal officers' effective control remained on the main and branch canals only. The old rules were reimposed in 1988 but could not be fully implemented. This may be due to managerial maladjustment in a fast changing democratic development process. The performance of the canal system remained low.

The Sone Canal System is a run-of-the-river system not supported by any reservoir. The discharge at the head of the Paliganj Distributary varied. Canal capacity was inadequate (60%), specially considering demand during the *kharif* season. There were no minor canals and, the outlets drew directly from the distributary and sub-distributaries. The canals had weak eroded banks with breaches. The full supply level of the canals was lower than required for irrigating lands under the command. Also the conveyance loss was high (45 cusecs per million sq. feet).

Water courses (village channels), usually one per village, [in place 3 to 4 remaining side by side] feed different villages. These village channels rarely reached the ends of the commands. No structures existed in the village channels and water was drawn by cutting the banks. Sections of village channels were not maintained and seepage losses were high (15-30 cusecs per million sq. feet). Irrigation was done by field-to-field flooding for ponded as well as nonponded crops. Irrigation application efficiency was usually low, about 45 percent.

The Paliganj Command area lies wholly within the Gangetic Plain. The plain consists of deep alluvium deposited by the tributaries of Ganga. The soils are very productive. The sub-strata is permeable and there is less chances of waterlogging. The Paliganj area receives about 1,000 mm of rainfall each year, mostly from June to October. The real problems in distributing water during kharif are inadequate canal capacity and long dry spells within the rainy season.

Secondary- or tertiary-sector occupations within the command area are negligible. Dependability on agriculture is for more than 95 percent of the population. The landless work in the area as agricultural laborers.

ARP OF WALMI, PATNA

ARP was started by WALMI, Patna, in 1988 simply as one of its activities among many others. Though the purpose of ARP was open ended, it was started with an idea to address the immediate needs of the beneficiary farmers and to act as a field laboratory for trainers and trainees of the institute. The immediate problems to be addressed in the area were water not reaching the tail end of channels, and the distinct disparity existing between head-reach and tail-reach farmers. Tail-reach farmers were blaming the head-reach farmers as well as the irrigation officials for this state of affairs.

When the research team made its first reconnaissance visit to the field in June 1988, the farmers refused to cooperate. As such, the ARP team confined its initial activities to hydraulic measurements and observations of the irrigation system and collecting baseline agricultural and socioeconomic data. The first formal meeting of farmers could be held on 17 March 1989 after 9 months, for which about 80 farmers of the lower reach of the system participated.

The ARP team diagnosed the following main constraints in the system:

1. Canal operation was not synchronized with the demand of the crop. Generally, water was available when not required causing damage to the crop and was not available when required, resulting in water stress in crops. Thus, operation of the canal was not being properly attended to by the personnel responsible for the same.

2. The canal operation schedule was not known to the farmers. So, they did not know when water would come. This hampered their cultivation planning. Thus, there was a communication gap between farmers and managers.

3. The head-reach farmers used obstructions, locally called *gassi* in canal flow to raise water level and irrigate high patches of land.

4. Inter-village rivalry was common for getting canal water. While farmers of one village acted as one unit for getting canal water, the lack of an inter-village farmers' cooperation was badly felt.

Now, it was time to go in for proper interventions. Obviously, the strategic intervention was [a socio-technical one] to tackle the above situation. Consequently, a meeting was organized on 9 June 1989 in the center of the ARP area which was attended by 75 farmers, Water Resources Department (WRD) officials and ARP team members. The ARP team called on farmers to participate in the operation of the system and form their informal committee at the distributary level. After great persuasion, the farmers reluctantly agreed upon and pointed out that committees should be formed not only at the distributary level but also in each village so that the cooperation of more farmers in the program be ensured. To start quickly, the farmers identified 20 villages along the canal network that were notorious for interfering with canal flow. These were the villages in the first phase of organization with which the ARP team interacted thoroughly for two years before 15 more villages joined the organization.

During these two years (1989-1991), various activities were conducted in the research area (Table 2) such as the formulation of an operation plan for the canal network, identification of priority maintenance needs for preparation of maintenance plan after a ["walk-thru"] survey of the canal network, crop cutting experiments to identify the agricultural constraints in the system, agricultural demonstration and outlet studies, etc. The committee members were brought to WALMI, Patna and trained on the topics identified after training needs assessment [while taking into consideration the stage of development of the farmers organization (FO)].

The participatory operation of canal and the formation of FOs were approved by the Engineer in Chief cum Addl. Commissioner cum Special Secretary, WRD, Government of Bihar. Early and continuous improvement in distribution of canal water and area irrigated was achieved without much physical improvement in the canal network with this intervention (Tables 3 and 4).

[Operation leads to identification of priority maintenance needs. Early improvement in canal water distribution can be achieved without much physical improvement in the system.]

A two-day farmers camp was organized (28-29 April 1991) in which about 250 farmers participated. The concluding session of the camp was attended by the Hon. Minister WRD, Bihar. Farmer representatives conveyed to the minister that the farmers are participating in the operation of the system, and that their organization could take on the responsibility of maintenance and revenue collection, if the government so desires. But, the minister could not clear his doubts about the farmers' capability at that stage. The existing socio-political situation of the state was also adding to this doubt. As a result no decision was taken by the government at that time.

With time more and more villages wanted to participate in the program and till December 1991, 15 new village-level FOs were formed with the help of distributary-level committee (DLC) members. When research scholars after a months field survey, in their report pointed out the weaknesses of the existing 35 village FOs, DLC members appreciated it and decided to strengthen the existing village-level committees (VLCs) before creating new ones. Thus FO increased its capability with time.

The ARP started getting support from the Irrigation Support Program for Asia and the Near East (ISPAN), a wing of USAID, in June 1993. After that, the DLC members moved into the area and created 17 more VLCs and strengthened 22 existing VLCs (Table 5) by changing 72 under performing members on various grounds. In total, 55 VLCs were formed till April 1994. Thus in the case of Paliganj, farmers organized farmers!

[Farmer representatives, if properly motivated and trained, can organize other farmers in the command of an irrigation system.]

Farmers also organized continuous voluntary maintenance, collected money and opened bank accounts for VLCs and generated their resources by collecting grains (Tables 6, 7 and 8).

IRRIGATION MANAGEMENT TRANSFER PROCESS

Mistrust is the cause of most evils. The ARP team put its best efforts to creating a healthy environment based on trust, cooperation and fraternity. The farmers of Paliganj, with the help of a little technical input (Table 7) from the research team and various Indian and foreign experts, demonstrated their immense potential. The ARP team kept the minister and the top irrigation bureaucracy informed about the developments in the ARP area, and the minister finally got convinced about the capabilities of the FO. When a team of senior experts including the author commended the achievements of the ARP and capabilities of the farmers in an informal meeting with the minister (25 August 1993), he immediately agreed on IMT to FOs. This included transfer of responsibility for operation, maintenance and water charge collection to the FOs. The decision of the minister was sudden and came as a surprise to all related to ARP, including the farmers. At the same time, the decision also entrusted the ARP team and the farmers with a great responsibility.

The farmers workshop of 55 DLC members of Paliganj (29-30 August 1993), planned earlier for finalizing the one-year program of ISPAN-supported activities, was utilized for discussion on IMT issues like the following: whether they are ready to take up responsibility of total management; what support the FO would require from WRD, CADA, [Agr.] and other government departments and agencies; who would be the legitimate member of the FO; and what responsibilities are assigned to various office bearers of DLC, etc. On many issues views of different groups of participants differed. Consensus on these issues was also reached in the next workshop (17-18 September 1993). This helped them to prepare themselves for IMT.

The two-tier Paliganj FO, the Distributary-Level Committee (DLC) and the Village-Level Committee (VLC), after thorough consideration, were to be registered under the Society Registration Act of 1860 for its legal identity. Section 1 of this Act says:

> "Any seven or more persons associated for any literary, scientific or charitable purpose, or for any such purpose as is described in Section 20 of the Act, may by subscribing their names to a Memorandum of Association, and filing the same with the Inspector General of Registration form themselves into a society under this Act."

Section 20 of the Society Registration Act 1860 includes the societies established for the purpose of the promotion of agriculture and the diffusion of useful knowledge.

The Memorandum of Association (MOA) required under the Act was already drafted by the research team after consultations with the DLC member in 1991. A Memorandum of Understanding (MOU) to be signed by the FO and representative of WRD, was drafted in 1993 by the research team of WALMI and state consultants provided by ISPAN, discussed with farmers in village meetings and with WRD Officers. The changes required in existing irrigation rules were also identified and documents related to turnover process were prepared.

The decision of the Hon. Minister for IMT to Paliganj FO was followed [with adequate attention on ARP] by the senior irrigation bureaucracy. A coordination committee at the government headquarter was formed which was chaired by the Commissioner, WRD to help and monitor ISPAN-supported activities. Actions were taken to declare Paliganj and the other three ARP areas of the institute as pilot areas where organizational and procedural changes (OPC) can be implemented on an experimental basis. In one of the coordination committee meetings, it was decided to constitute a task force to examine the various documents prepared relating to turnover and recommend to the government for suitable action. The task force after several meetings gave its recommendations and the government has accepted the

recommendations. The formal transfer of Paliganj Distributary to FO is likely to be effected during the current kharif season of 1994. [Yes, we are at the doorstep of IMT!]

While drafting the MOU and formulating the IMT process, the old traditions, related to water, in the area have been kept in view. In the state of Bihar, prior to execution of Sone Canal System, indigenous small irrigation systems of *Pynes* and *Ahars* (inundation canals and small reservoirs/tanks) were constructed, maintained and managed by farmers themselves. Local kings called *Rajas* or *Zamindars* helped farmers and took the lead in construction and maintenance activities. A large number of dugwells were also used for irrigation. The right to utilize water diverted from *Pynes* or stored in *Ahars* was linked with landholdings, and the government had nothing to do with the irrigation or charges for irrigation water.

The Indian Easement Act of 1882 gave the right to farmers to utilize the water of natural rivers and streams for irrigation of their land for crop production. It states the following:

> "The right of every owner of land that the water of every natural stream which passes by, through or over his land in a defined natural channel shall be allowed by other persons to flow within such owners limits without interruption and without material alteration in quantity, direction, force or temperature. (Article 7H).
>
> "The right of every owner of land abutting on a natural stream, lake or pond to use and consume its water for drinking, household purposes and watering his cattle and sheep; and the right of every such owner to use and consume the water for irrigating such land, and for the purpose of any manufactory situated thereon, provided, that he does not there-by cause material injury to other like owners." (Article 7J).

However, the Article 2 of the Act did not derogate from any rights of the government to regulate the collection, retention and distribution of the water of rivers and streams flowing in natural channels and of natural lakes and ponds; or of the water flowing, collected, retained or distributed in or by any channel or other works constructed at the public expense for irrigation.

With the construction of the Sone Canal System by the British, commanding about 7.0 lakh ha, the government for the first time involved itself in the irrigation sector in the state. Till the independence of the country (1947) these systems performed well, to the satisfaction of farmers.

Under the Bengal Irrigation Act of 1876, the Executive Engineer (in charge of about 50,000 ha of irrigation) is empowered to assign the job of water distribution and canal revenue collection to a person *(Sattadar)*. Person is defined in the Act as a group of persons acting jointly. FO is presently interpreted as a group of persons acting jointly. In the MOU it has been agreed upon that the FO will deposit 30 percent of the anticipated canal revenue based on the previous three years reported irrigated area and keep 70 percent of the amount for its management expenditure, maintenance and improvement of the system. This is on an ad hoc basis and on the understanding that the 30 percent of amount deposited to the government is for the upkeep of the parent channel from which water is drawn into at the turnover point for the farmer-managed system. The system is transferred as it exists without improvement. But, after turnover any further grant or benefit, if provided for other areas, will also be made available to the system through FO. In case of any natural calamity, the government will come forward with special help to the FO. The existing field officers of WRD will continue their support to the FO in increasing their capability and advising them on technical issues. The canal revenue wing may provide on-the-job training for a few seasons free of charge to the FO on the matter of keeping relevant records, if so desired by the FO. Canal authorities can examine the records maintained by the FO but regular interference in the working of FO is avoided. The MOU will be signed for a period of 10 years, as the maximum period of long lease done earlier under the existing rules, but FO will also pay water charges for *rabi* crops which were available free earlier for such long-lease farmers. Any increase in the canal revenue, due to increase in irrigated area, due to efforts of FO will go to FO as incentive for five years, after which it will be reviewed by the WRD.

[IMT can be effected to capable FOs without restoring or improving the canal system.]

FURTHER DISCUSSION ON RESULTS

1. Farmer participation was a necessity to attend operation, which called for organizing of farmers. Participatory operation leads to the identification of maintenance needs and voluntary labor and [resource generation by FO started in the system.] The disputes in distribution of water during scarcity periods (1992) drew attention of the FO to those who were not paying water charges but taking canal water. Irrigated area increased on record. During this process capability of FO increased and they demanded the taking over of the management. IMT was not thrust upon them. Although in May 1993 the state declared its irrigation policy commitment on the line of national policy (1987)

in which promotion of FOs and IMT are favored, in the case of Paliganj it is self-evolving and not done by enactment or pre-fixed government rules. Also, the research has helped to influence the bureaucracy and WRD officials orienting towards farmer-managed irrigation system (FMIS).

2. It was seen that a comparatively small, manageable number of farmer representatives (20), if properly motivated and trained, can function as community organizers to organize other farmers of the command. Visualizing the financial constraints of the state, farmers mobilized their own resources. They could attend to the maintenance of the system in a much cheaper way. There is a vast potential inherent in the farmers and as they take up the management, the damage to the system usually caused by them is also going to reduce. As such, there seems to be the possibility of the system becoming economically self sustaining for its annual maintenance and management.

3. The approach to the research program was from macro to micro in which farmers were loosely organized on the issue of canal water distribution and efforts were made to consolidate and strengthen the FO. This macro-to-micro approach proved to be cost and time effective and has many advantages such as quick spread and easy replicability, doing away with recruiting outside community organizers, etc., which may not be available in the area after the program is withdrawn. The input to the research area is low in the form of a catalyst; about 12 lakhs (US$40,000) over a period of 6 years.

   [**The macro-to-micro approach in which farmers are loosely organized in a comparatively large area and efforts are made to consolidate and strengthen their organization is cost and time effective.**]

4. The experience and findings of Paliganj were directly applied to a similar situation in the extreme other end of Sone Canal System, i.e., Gara Chaubey Branch Canal, another field research area of the institute. Within a period of 9 months farmers were organized in Dangri and Barhupur distributaries. They conducted a "walk-thru" survey (December 1993) and farmers of Dangri Distributary organized voluntary labor (28 February 1994) in which about 1,100 farmers from 20 villages participated. They are now working on formulating operation plans for the distributary. Farmer training imparted by the institute is reported to be the main source of their enthusiasm. Field-level officers of WRD are also considered to be responsible for the success in this research area which was lacking in Paliganj. WALMI, Patna is already planning to extend this activity in 15 more distributaries with the help of suitable WRD officers posted as in charge of those systems. In Indonesia too, organizing of the farmers is reported to be accomplished with the help of trained in-line agency personnel.

EXPERIENCES AND LESSONS LEARNT

During the last two decades, like many other states in India, in Bihar too, attempts were made under the CAD Program to create water users associations (WUAs). However, these WUAs were formed for a single village under an outlet command, or for a few villages under the command of a minor. The approach was to organize 100 to 200 farmers of each water course and then federate them at minor level. The result is that these WUAs could not sustain themselves nor could the good work spread to new nearby areas. This is discouraging. There seems to be no justification in pursuing the efforts of IMT in the manner in which it was attempted. To make the efforts of promoting farmers' organizations and IMT more meaningful and effective, new concepts and approaches are needed. The lessons learnt from ARP in Paliganj may help in expediting the process and spread of IMT in major canal systems in the state of Bihar, and provide some insights and clues to professionals engaged in the field of promotion of FO and IMT.

The important lessons learnt from ARP in Paliganj can be summarized as follows:

1. The worse the situation of irrigation management, the greater the chances of quick improvement.

2. Mistrust between farmers and government agency professionals causes greater adverse effect on the performance of the irrigation system. Transparency on the part of government personnel can greatly help in removing this mistrust.

3. Farmer representatives, if motivated and trained, can organize other farmers in the command.

4. It takes time to convince the bureaucracy and field-level government officials, but it is easier to convince farmers on the effectiveness of farmer-managed irrigation systems. Action-oriented programs of FO resulting in improvement in the performance of the system enhances the IMT process.

5. Farmers served by a canal system have immense potential to take up management of the system on an economically sustainable basis.

6. In the situation of disparity in water distribution between different villages, the macro-to-micro approach is very effective.

7. Capability building efforts for FO facilitates the IMT process. IMT can also be effected without physical improvement of the system.

CONCLUSION

The Paliganj research is an eye opener. The high potential of farmer capability is explored. The process of transfer of management of part of a major canal system has been engineered. The mistrust between farmers and WRD personnel has been reduced and the operationalization of state policy is evolved. WALMI, Patna has acquired adequate experience in the field of promotion of FO and can go a long way in working as a catalyst for the IMT process.

However, there are limitations to ARP. It conducts regional research, and adoptive researches are required for implementation in varied situations. As such, much is left to be studied, modified methodologies are to be evolved and refined for implementation in other parts of the state. On the basis of further learning in the field the policies will have to be modified.

Nongovernment organizations (NGOs) in the state so far are active in the field of education, health and culture. In the absence of NGOs active in the field of irrigation management, the WRD personnel will have to take up the mission of IMT, since management of the irrigation system is their basic responsibility and they are already aware of the existing problems in irrigation management. If the existing staff of WRD learn to work with farmers in a participatory way this would prepare them to better guide and assist WUA after IMT. For this, initially people of strong personal commitment are to be identified and positioned for the job of the promotion of FO for IMT.

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[The Indian Easement Act 1882.]

Table 1. Paliganj Distributary.

1. Parent channel	Patna Canal
2. Total length of parent channel	125 km (78 miles)
3. Discharge of parent channel at offtake of Paliganj Distributary	31.5 cumecs (1100 Cusecs)
4. Offtake point of Paliganj Distributary	75 km (46.2 miles)
5. Total length of Paliganj Canal Network including Chandos and Bharatpura Subdistributaries	40 km (25 miles)
6. Discharge at the head of Paliganj Distributary.	5.1 cumecs (180 cusecs)
7. Gross command area (geographical) under Paliganj Distributary	14,867 ha
8. Culturable command area under Paliganj Distributary	12,197 ha
9. Reported *kharif* area (paddy) in rainy season (June-Nov. 1993)	4,960 ha
10. Reported average *rabi* area (wheat, pulses, oil seeds in winter season, Dec.-March)	2,000 ha
11. Cultivation during hot season (40-45°C, April-May)	Nil
12. Total number of villages under hydrological command boundary of Paliganj Distributary	76
13. No. of villages under irrigation as per record	58
14. Population under 76 villages (1981)	Over 11.4 million
15. No. of households (1981)	Over 16,000
16. Landholding	0.5 to 15.0 ha (average 3.0 ha)
17. Landless	27% of the population
18. Caste matrix	Mixed (no one caste predominates in the area, although particular castes dominate particular villages).

Table 2. Activities of ARP during the year.

Year	Activities	Main topics for discussion
1988	Nil	Hydraulic measurement, base line data collection.
1989	Farmers meeting - 8 Farmers training - 1 Study tour - nil Farmers camp - nil	Initial reconnaisance survey, outlet study socioeconomic survey, farmers views, need of FO at distributary level with representatives from 20 villages, ad hoc canal operation committee. [water does not reach to the tail end of canals.]
1990	Farmers meeting - 8 Farmers training - 1 Study tour 1 (Orrisa) Farmers camp - nil	Operation plan, crop cutting experiments, survey for maintenance plan, obstruction removed from canal with the help of committee members, study of different models of farmers organization and formulation of by laws for FO.
1991	Farmers meeting - 19 Farmers training - 4 Study tour - 1 (Rajasthan) Farmers camp - 1	Crop demonstration, registration of FO, maintenance work by farmers, soil testing, problems can be solved if the work of operation, maintenance and rent collection is given to FO, after 10-12 years water reached up to the tail end, revenue officials' cooperation needed, areas out of command are being irrigated.
1992	Farmers meeting - 12 Farmers training - 7 Study tour - 2 (Tamil Nadu, Gujrat) Farmers camp - nil	Repair of canal through voluntary labor, training and selection of community organizers among farmers, evaluation of 35 VLCs, importance of organizational strength, strengthening of VLC, dependence on govt. should be stopped, operation plan, committee can collect the water rate, water below the H/R should be given to farmers committee, strengthening of existing and formation of new VLC.
1993	Farmers meeting - 16 Farmers training - 5 Study tour - nil Farmers camp - 1	Program of FO for the year, turnover process, contribution of paddy 1 mund/acre encroachment of chat land of canal, demand for turnover of system, documents to be handed over to the farmers committee, discussion on MOU, responsibilities to be undertaken by the farmers committee members.
1994	Farmers meeting - 6 Farmers training - 1 Study tour - 1 (U.P., H.P., Delhi) Farmers camp - nil	Training to committee members to maintain revenue records and accounts, voluntary maintenance, opening of bank account, collection of grains.

Table 3. Kharif water distribution in Paliganj Distributary (1988-1993).

Part of command	% kharif area under the reach	Percentage actual kharif delivery					
		1988	1989	1990	1991	1992	1993
Paliganj Reach I	19.0	43.9	42.6	46.0	45.7	39.5	30.1
Chandos Sub-disty.	19.9	14.3	11.9	10.9	10.2	13.4	13.4
Paliganj Reach II	16.1	24.7	30.9	21.0	13.8	16.2	17.4
Bharatpura Sub-disty.	14.3	04.4	03.8	04.1	12.0	12.8	16.9
Paliganj Reach III	30.7	12.7	10.8	18.0	18.3	18.1	18.2

Note: Disty. = Distributary.
Sub-disty. = Sub-distributary.

Table 4. Kharif irrigation of Paliganj Distributary (acres).

Sl No.	Name of Disty./Sub-Disty.	1955	1980	1985	1990	1991	1992	1993
1.	Paliganj Disty.	6,638	8,918	8,918	8,929	9,750	10,750	10,750
2.	Chandaus Sub-Disty.	516	638	638	639	800	800	900
3.	Bharatpura Sub-Disty.	764	868	868	868	700	600	600
	Total	7,918	10,424	10,424	10,436	11,250	12,150	12,250

Notes: 1. The irrigated kharif area 7,918 acres denotes the maximum area for which water can be given by the system at the end of year 1955. (*Source* : Irrigation Manual, GOB Publication.)
2. The current water rate for kharif Irrigation is @ Rs 36.20/acre (US$1.20 per acre)
3. 1 ha is equal to 2.47 acres
Disty. = Distributary.
Sub-disty. = Sub-distributary.

Table 5 : Farmers organized farmers (17 June to 3 July 1993).

1.	Total no of villages contacted	34
2.	No. of proceedings prepared by farmers for meetings and submitted to ARP team	28
3.	New villages contacted for formulation of VLC	12
4.	Old villages approached for reorganizing the existing VLC (out of 35)	22
5.	No. of villages which preferred to change their committee members	19
6.	No. of members changed in existing 19 VLCs	72

Table 6. Voluntary maintenance done in Paliganj (Aug '93 to May '94).

1.	No. of villages participated	24
2.	Total no. of work-days at different places	48
3.	Maximum no. of work-days in a village	8
4.	Person days (4 to 10 hrs.) at work	1,679
5.	Maximum no. of farmers participated in a village	200
6.	Minimum no. of farmers participated in a village	10
7.	Normal working hours per day	4 to 10
8.	Approximate amount of work done	Rs 48,900 (US$1,600)

Note: Govt. department also taken up repair of canal banks between 28/05/94 to 01/06/94 just before the opening of canal near six villages.

Table 7. Resource generation: Collection of funds (Jan. to May 1994).

1.	No. of villages participated	16
2.	Amount deposited on the first day	Rs 21 to 151 (US$0.7 to 5.0)
	Total amount deposited	Rs 1,207 (US$40)

Notes: 1. The account can be opened in post offices, nationalized banks and regional rural banks.
2. The account is operated jointly by two VIC members.

Table 8. Collection of grains (Jan. to May 1994).

No. of villages participated	24
Grain collected	Paddy/rice
Agreed rate of contribution	1 kg/*bigha* (4.5 kg/ha)
Total quantity of grain collected	3,125 kg.

Table 9. Technical input to the research area.

Year	Senior level	Middle level	Junior level	Total
1988-89	1	4	2	7
1989-90	11	38	21	70
1990-91	9	64	33	106
1991-92	30	79	53	162
1992-93	3	48	18	69
1993-94	29	35	24	88
1994-95 (up to May '94)	2	9	7	18
Total	85	277	158	520

Note: Senior Level includes Indian and foreign experts coming from outside the state, chief engineers and superintending engineers, state-level consultants, etc.

Figure 1. Index map, Sone Canal System.

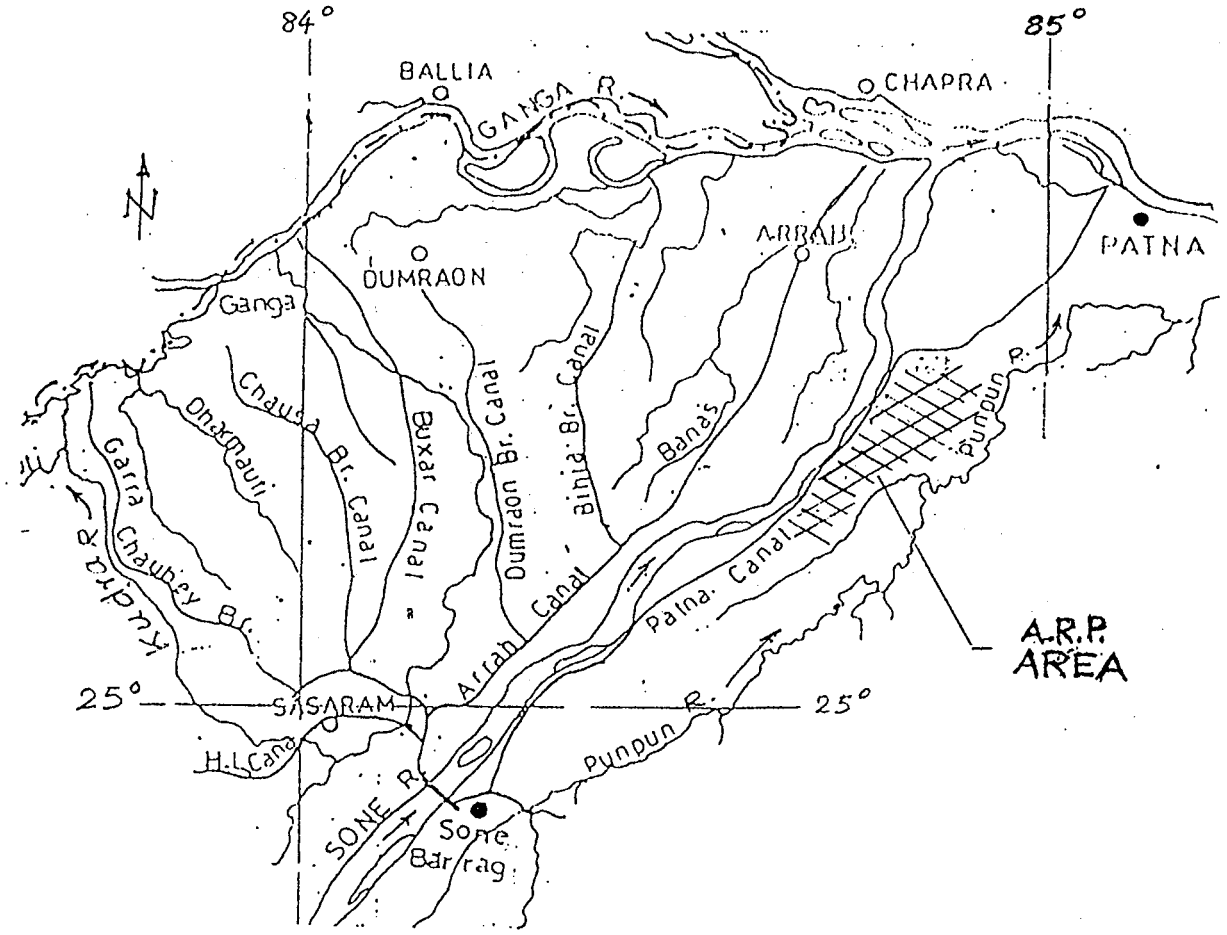

Figure 2. Sone Canal System, Bihar.

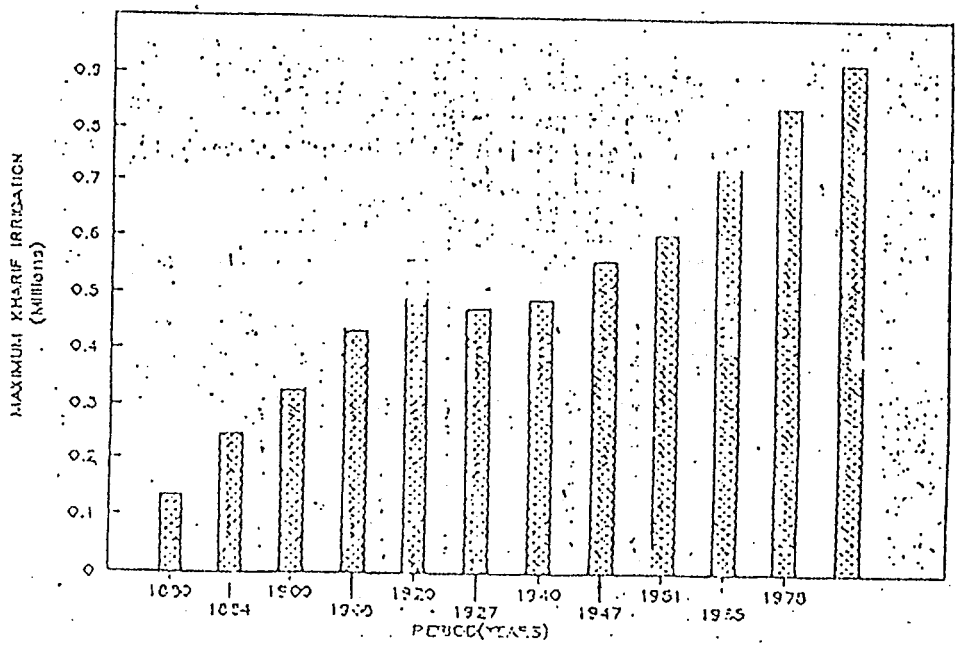

Figure 3. Index map of Paliganj Distributary, Sone Canal System.

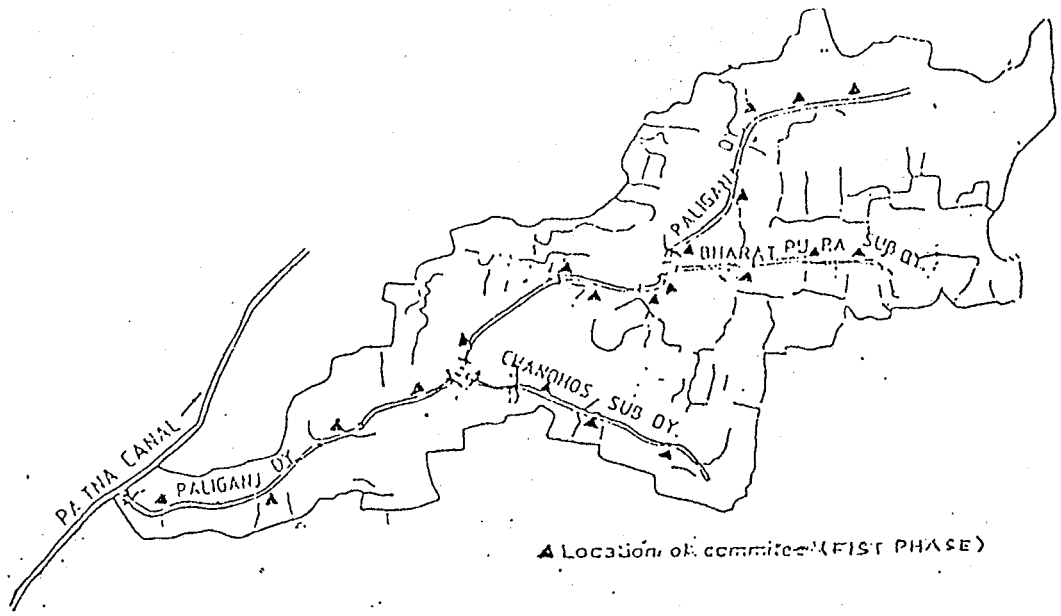

Figure 4. Paliganj Distributary Canal Network.