Brick by Brick: Building a System of Participatory Irrigation Design in Gujurat, India

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A strong superstructure of participatory policy can be raised only by laying brick by brick the decision processes that make farmer participation effective, productive and responsible.

INTRODUCTION

ADVOCACY FOR THE management of irrigation systems by farmers envisages their involvement in planning, execution, and when a project is ready, in management. However, it is not always understood that farmer involvement in planning can be meaningful only if the process employed is such that government staff have a genuine desire to take farmers into confidence about details of the proposed plan and design. In practice, government officials must encourage farmers by listening to their ideas and be willing to seriously consider and adopt their suggestions when they could improve the design and productivity. This paper presents a detailed description of such an experience on the Pingot Project in Gujurat, India. The results of the pilot test reinforce the assumption that genuine use of farmer knowledge of local conditions in the designing of canal project helps in building up understanding and confidence between the farmer community and the irrigation agency. By using farmer knowledge, the irrigable area in the two pilot schemes was increased by 50 and 49 ha, respectively, at less than a tenth of the cost of developing the equivalent area of new irrigated land. The process also ensured smooth transfer of management from the government department to the farmers' organizations. In contrast, Appendix I documents how token attempts at consulting farmers about plan and design has limited value to either the irrigation department or to farmers.

Since 1987 the Government of India has emphasized that:

.....optimum benefits from irrigation projects in general and equitable distribution of water and management and maintenance of irrigation system in particular, cannot be realized unless the beneficiary farmers are effectively involved in an organized way in the system management and maintenance, at least at the minor level (Pathak, 1991).

The World Bank Policy Paper on Water Resource Management is more explicit and comprehensive:

Increasing user participation improves the flow of information, establishes a sense of ownership, and gives proper incentives to farmers to ensure systems sustainability.....When knowledge and experience of the farmers have been included in the planning, development and operations of an irrigation system, its performance improves (World Bank, 1993).

Indeed partnership between a government agency, farmers' organization and, where available an NGO, increases productivity and it uses the strengths of the groups and also takes care of the needs of each partner. The participatory approach requires that policy announcements are supported by appropriate changes in the planning process, clarity about rights and obligations of each partner, appropriate operational procedures, and delegation of discretionary powers.

SETTING

The research activities in this paper are in the State of Gujurat. As can be seen in Box 1,within the state there are in excess of 12 million million cultivable hectares with an irrigation potential of 1.4 million hectares.

IRRIGATION IN GUJARAT

Total cultivable area	12.4 million hectares			
Net sown area	9.5 million hectares			
	No.	Investment (million Rs.)	Irrigation potential	Utilization (%)
No. of major & medium projects completed	83	27,000	1.25	78%
Minor irrigation projects	1283	3,000	0.19	54%

Sardar Sarovar (Narmada) irrigation scheme expected to be completed by 2000 AD is estimated to irrigate 1.7 million hectares at a cost of Rs. 12 billions.

As presented in this paper, experience with pilot projects at Pingot, Baladava, and Chopadvav in the State of Gujurat, illustrates the importance, indeed prerequisite, of participation of concerned farmers in the planning of the distribution system, including determining location of outlets, watercourses, turnouts, and field channels. Senior officers in the irrigation establishments often do not have a clear idea how micro planning of water distribution is done, or they may not realize its significance in effectively irrigating the planned command area. The value of farm level experience in a pilot project is multiplied several times if there is a well-designed mechanism to bring to the attention of the senior engineers the valuable lessons that are taught while operationalizing the participatory approach.

Developments in Pingot and other pilot projects are being periodically reviewed by a high-level Working Group. The Working Group obtains direct reports of progress in the field along with the emerging issues which require attention at a higher-level. The presence of community organizers working closely with farmers helps not only in organizing them but also in frankly presenting their combined views before the authorities. When essential components of the pilot projects are combined, there is a good chance that suggestions reaching the Irrigation Department at higher levels will receive serious attention. A good example is the case of Pingot where they included consultation with concerned farmers about the tentative plan of water distribution before it was sent to higher authorities for official approval.

Essential components leading to success included: (1) the Working Group, (2) establishing pilot projects as a learning experience, (3) using community organizers to motivate and encourage farmers to participate and work jointly with the government organization, and (4) process documentation giving honest feedback to the working group. Without these essential components in place, clear instructions to consult farmers in designing minors and subminors may be reduced to a formality, or as a farmer put it, *consultation on paper.*

It is important that the senior staff members in the Irrigation Department understand and support the participatory approach. Without support from the top, field staff cannot be expected to maintain their enthusiasm for change [(Smith, 1990)]. When instructions to consult farmers in designing the distribution system are integrated into standard departmental procedure, it permits questionaing and revising, thus encouraging departmental staff to develop the capacity for **learning to learn**. If departmental staff are involved in the learning process during the pilot phase, when they are trained, they can assist with community organizing. However, this will not happen unless they are properly instructed and supported by senior staff members [(Smith, 1989).]

Involvement of farmers in micro planning of water distribution is the latest in a series of proposals that has emerged from operational experiences of the Pingot pilot project. When policy declaration is accompanied by a transparent participatory process that makes it obvious to the farmers the system is being planned to meet their requirements and expectations, farmers are more inclined to accept ownership of the irrigation scheme. By feeling ownership for the irrigation system, farmers are much more likely to pay their water fees and to contribute towards the cost of construction and rehabilitation.

Irrigation Development

The Aga Khan Rural Support Programme--India (AKRSP) is a professional NGO which has been working in India since 1985. AKRSP is involved in promoting participatory management of natural resources, particularly land and water. AKRSP is working to provide assistance for irrigation management transfer of irrigation projects to farmers organizations. As can be seen in Box 2, between 1985 and 1993, AKRSP has invested more than 35 million rupees in irrigation.

AKRSP'S CONRIBUTION IN WATER RESOURCES DEVELOPMENT - 1985-1993

Scheme	No.	Investment (Rs. in million)
Co-operative lift (pump) irrigation societies	13	13
Percolation Tanks	15	15.5
Checkdams	37	6.0
Canal irrigation	6	0.5

In the process of promoting participatory irrigation program, AKRSP influenced the state government of Gujarat:

1. To treat NGOs, undertaking construction of government-aided projects not as contractors, but as partners in progress.

2. To approve a special form for agreement between NGO and government agency.

3. To allow the Association to decide water fees after the government transfers canals to a Farmers Associations.

4. To form a high-level Working Group of Senior Officers and NGOs with Chief Secretary as the Chairman, to promote & guide participatory irrigation development in Gujarat, the only such Working Group in India. The first meeting held in May 1994, decided to set up 1-2 pilot projects in agro-climatic regions with emphasis on process of Community Organizing and Process Documentation Research.

When AKRSP became involved in the transfer of the Pingot project, the government was also ready to issue similar orders for four more projects in the same district. Prior to transfer, AKRSP however, insisted that the canal system should be satisfactorily rehabilitated before the project was transferred to [the] farmer organization. While the canal system was being rehabilitated, it became clear that farmer involvement in the planning and design, particularly of the distribution system below the outlet, was required to improve the efficiency and economic returns from the project. Box 3 presents detail profiles for three of the systems.

PROFILE OF IRRIGATION PROJECTS

SR.NO.		PINGOT	BALADAV A	PINGOT
1.	Year of completion of construction of earthen dam on a river with a masonary spillway and canals	1983	1983	1984
2.	Investment Head works (millions Rs.) Canals (million Rs.) TOTAL	 20.00 27.38 48.18	 25.00 21.00 46.00	 33.50 8.70 42.20
3.	Service area (hectare)	1406	2240	1460
4.	No. of irrigation wells	6	22	25
5.	Profile of farmers small (%) Trial (%)	90 90	89 50	90 95
6.	Crops grown Monsoon Winter Summer	 Paddy Wheat Groundnut	 Sorgum Pulses Green pea	 Groundnut Vegetables
7.	Actual irrigation before AKRSP's intervention (hectare)	20	-	25
8.	Actual irrigation in 1993 after AKRSP's intervention in 1990, 1992 & 1993 respectfully (hectare)			

Traditional Irrigation Planning

When AKRSP started working in the Pingot project (see [Map 1]) which is located in the Bharuch District in the State of Gujarat, some farmers served by three out of eight watercourses complained that water was not reaching their fields, even though they were served by newly constructed watercourses. Other problems that were identified by AKRSP included:

* Farmers served by two watercourses faced the problem of improper layout of pipelines, depriving them of their due share of irrigation water;

* A farmer served by another watercourse could get water only if he constructed a channel cutting through the middle of the field of another farmer; and

* There were depressions in the land between turnouts and farmer fields over which water could be carried only through channels with costly embankments, which were difficult to construct and maintain. Only eight of the planned 18 channels were completed, and there were problems with six of them.

* The Chopadvav irrigation project in the same district has nine minor canals taking water from the main canal. Three minors had been completed with prefabricated outlets. Before testing the system, a group of engineers, AKRSP workers and concerned farmers inspected Minor II (see Map 2). During the inspection, the following problems were identified:

* One outlet opened in a depressed section and therefore water would never reach all the land it was designed to irrigate. After inspection, the engineer agreed that the outlet would have to be shifted to a higher level; and

* Before reaching the end of the minor, which was supposed to serve about 31 hectares, the party asked the local engineer about two other fields close to the minor. How could water reach these fields? The sharp reply was that they would remain *out of the command*. However, the engineer was finally persuaded to consider shifting the location of the outlets to make it possible to bring the fields into the irrigated area.

Whether planning water distribution directly from the outlets on the canals, or through the watercourses according to a rotational water supply system, it is clear that engineers undertaking planning based on the usual contour survey method will miss many depressions and high points. These topographic irregularities keep parts of the land out of the irrigated area. The normal process of irrigation design based on unverified topographic maps often denies access to water for farmers whose lands contain topographic features not detailed on the maps. This normally holds true even though the land can be served if an alternative turnout is used or the channel alignment is changed to accommodate the topographic feature.

Participatory Approach

The following section provides a brief description of the participatory approach for planning irrigation improvements in the Pingot project. In order to persuade the Chief Engineer of the irrigation department the value of the participatory approach, problems experienced in the construction of watercourses were identified and reviewed with the Chief Engineer. After discussing the problems, he instructed his field staff to start construction only after the farmers served by a watercourse were consulted about alignment of watercourse canals, field channels and location of outlets and turnouts. AKRSP staff were instructed to help facilitate consultative dialogue between engineers and farmers.

Following the Chief Engineer's instructions, after making certain the concerned farmers were present, department engineers and AKRSP staff visited water courses requiring improvements. During this visit, an engineer would explain on a well drawn map the planning of watercourses, including the signs for field channel, outlet and turnouts. After viewing the proposed layout on the map, the group started from the outlet and walked along the watercourse, discussing each structure and alignment to ascertain if the farmers had any suggestions. Even tribal farmers with no experience in irrigation surprised the engineers with their accurate knowledge of the topography in the command area. Perhaps this should not be surprising, since from childhood these farmers have seen the flow of rain water over the fields. Those who are surprised about farmers' detailed knowledge of the topography are only betraying their own lack of experience working with small farmers.

After this experience, engineers started handing over their preliminary design maps to concerned farmers. These farmers took less than one hour to identify potential problems and work out alternatives, which then had only to be verified by the engineers during their field visits. The outcome of this exercise was highly satisfactory as a number of positive design alterations were made. These include:

* The contour survey map which showed smooth gradients, was questioned by farmers who pointed out a depression between two contour lines across which proposed field channels could not carry water. As a result, the alignment was changed.

* Farmers helped relocate outlets to avoid digging a field channel through the middle of another farmer's field.

* The paper plan developed by engineers for two watercourses would have required cutting through a set of small hills, costing Rs. 58,000[1]. Farmers suggested an alignment which avoided cutting and the same area was served by putting up two additional turnouts, costing Rs.7,130.

* In some cases the planning of tertiary distributaries was flawed. For example, in one case an expensive arrangement for conveyance of water was planned on the assumption that the land in the area was undulating. In fact, farmers pointed out that the land had only a falling gradient and a simple open channel would be adequate. This saved Rs. 25,000.

[1]Indian Rs 26 = ± US$ 1

* When a plot of land could be served by either of two watercourses or turnouts, the farmers were able to pursuade the engineers to allow them their own preference in terms of deciding which turnout they wished to use. This often had advantages not considered by the engineers.

* Using the topographic maps for designing the watercourses clearly illustrated the unreliability of the survey map of the command area. In one case, proposed field channels were shown in the map while the natural drains were not included. Since the field channels would have to cross these drains, it was clear that changes had to be made. Planning of these watercourse channels was redone to avoid cutting the natural drains.

Results

Based on experience in the Pingot project, Table 1 presents data that documents the financial impacts of the participatory approach. In seven out of 18 cases farmers' suggestions led to increases in the length of watercourses totaling 1,380 meters. Farmers' suggestions in six other cases resulted in reduction in the channels by a length 950 meters. Thus, the suggested changes resulted in a net increase of only 430 meters, costing Rs. 46,000. When engineers agreed to increase the number of turnouts by eight, the additional cost was offset by a decision to drop five turnouts. Therefore, the net additional cost for new turnouts was only Rs. 10,700. But the real benefit was in bringing under command 50 hectares of land which would have been left out if the original plan had been executed without consulting the farmers (See [Maps 3 and 4]).

Detailed analysis of the modifications to the planned watercourses revealed that 32 hectares could have been subsequently brought under command with substantial expenditure on constructing banks and cutting channels, but 18 hectares would have remained out of the command area unless extensive modifications were carried out. The average cost of bringing one hectare of land under irrigation in the project is Rs. 32,000, Therefore, the real long term benefit of the approach used is Rs. 1,600,000 worth of additional irrigated land, against an additional expenditure of Rs. 57,000.

The results of a similar study of cost implications due to farmers' design suggestions in the Baladava project in the same district are presented in Table 2. Data from this table shows that farmers' suggestions led to a net increase of pipeline length of 179 meters, requiring an additional cost of Rs. 191,000. However, there was a reduction in the number of turnouts by five, thus reducing expenditures by Rs. 15,000. This resulted in a total increase in expenditure of Rs. 176,000. Again, the real benefit is bringing under command 49 hectares of additional land which would have been left out unless expenditure was incurred on the construction of banks and the cutting of new field channels. Baladava's project cost per hectare is Rs. 24,000. Therefore, participatory design planning resulted in the creation of an additional Rs. 1,176,000 worth of irrigated land.

Since the system was designed and is to be operated by the farmers, it is expected to be easier to maintain, which will facilitate long-term sustainability. Utilizing a design process with farmer involvement and investment can be the cornerstone of system sustainability (Vermillion, 1989). Yet, in contrast to the participatory approach followed in Pingot, Baladava and Chopadvav, many Irrigation Departments in India continue to make only a token gesture of consulting farmers. For example, Appendix I describes how time and lack of commitment to the participatory approach in the Narmada Canal resulted in a token consultative exercise, rather than a means of obtaining valuable information to improve the design of the irrigation system.

References

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APPENDIX I

Participation Gaps - Narmada Canal

A visit to one of the villages covered under the proposed Narmada Canal of the Sardar Sarovar mega-project on the river Narmada was recommended to enable the writer of this paper to see how farmers were involved in the designing of [subminors] canals. The visit started with the local engineers familiarizing the writer with the instructions of the Narmada Authorities to consultants who were engaged to design the distribution system below the branch level. The instructions were very clear that farmers must be consulted before the designs were finalized.

From the village we met a farmer informant and proceeded to visit his field which was under the command of a subminor. He showed us the outlet from which his land was to receive water from the canal. When asked how he learnt about it, he informed us that although the survey party had engaged him as a laborer, he was not consulted about the appropriateness of the location of outlet or other aspects of the design. While in the field, we sighted another farmer (Parbat Lavji) engaged in irrigation from his well. Parbat Lavji informed us that he was not aware of any discussion about the location of outlets along this canal. Perhaps his father would know about it. When we returned to the village we met Lavji Tribhovan, Parbat's father. He said if there were any consultation he would have known because he read the announcements of such events, usually written on the village panchayat notice board. He was once a member of the village panchayat for a 5-year term. When we told him categorically that there had been a consultation, his response was, *It must be on paper only* and added, *as is usually the case with the government.*

In the village, an informal meeting with about 20 farmers was held. We asked them if they were aware of consultation about planning of canal irrigation in their village. None of them was sure such a meeting took place. The engineers then showed me the proceedings of a meeting that was held in the village on 10 June 1992, when 10 farmers had attended the meeting and signed the following document.

10th June 1992 - Village Duban - Block No. 33

> *Today in village Duban, Taluka ..... A meeting of farmers and village leaders was held when the local Deputy Executive Engineer, with his technical staff, explained how water would be distributed and which farms would get water from which outlet. Whatever questions were raised by the farmers were satisfactorily answered by the officer and staff. When there were no more questions, the meeting was concluded and the farmers present signed the document.*

Twenty plus farmers present in the meeting with me had the same mocking comments as were earlier given by Lavji Tribhovan. Intrigued by their cynicism I asked them to guess who must be these 10 farmers who attended the meeting. They could guess correctly four names and so I enquired how were they able to do so. They replied that those are mostly the old people who have no other work and therefore the Sarpanch (Chairman) and the Secretary of the village Panchyat (Council) will call them whenever government officers want to have some official work. The rest of the village may not know what happened in such meetings. Fortunately, of the ten who had signed the proceedings, two were present in our meeting. They could recall that they attended the meeting but were unable to remember when and for what purpose.

The record available with the local engineer indicated that for block No. 33 they had in three days (6, 8 and 10 June 1992) visited 12 villages and in the presence of 6 to 8 farmers drawn up the same proceedings. For block No. 34, a similar exercise was carried out on 3, 4 and 5 June in 10 villages when 6 to 13 farmers were present. Out of these 22 villages, it was only in the Bhojwa village that the minutes of the meeting indicated that the farmers had requested to ensure fields at higher levels were provided the benefit of irrigation waters. In the remaining 21 villages, the process adopted was only a formality for the purpose of record and report.

When I described the process that was followed at Pingot and Baladava, where farmers of a particular outlet were informed in advance to remain present in their field and the proposed plan was discussed with them on site, the farmers of Duban definitely felt that most of the farmers would participate in such an activity. The accompanying engineers also appreciated the benefit of such an approach but felt that the process would require more time than was available in the tight timetable. They were also concerned as they did not have community organizers to prepare farmers for participation in such an exercise.

Table 1. Cost implications of changes in water courses and turnouts - Pingot Irrigation System.

W.C No.	Changes in Length		Cost Differences		Turnout		Cost Differences		Net or Excess (saving)	Additional (ha)	Addtl. (ha)
	Increase (mt)	Decrease (mt)	Excess Rs.	Saving Rs.	Increase No.	Decrease No.	Excess Rs.	Saving Rs.			
1	-	75	-	8025	1	-	3565	-	(-4460)	8.07 ha. of original command proposed can be covered now.	8.07
2	-	50	-	5350	1	-	3565	-	(-1785)	Some command with decreased pipeline length.	-
3	-	-	-	-	-	-	-	-	-	-	-
4	-	125	-	13375	-	2	-	7130	(-20505)	Much of the command could be covered with the curtailed length.	-
5	125	-	13375	-	-	-	-	-	13375	2.5 ha. of original which would have missed can be covered now..	2.5
6	-	100	-	10700	1	-	3565	-	(-7135)	3.5 ha. of original area can be covered now.	3.5
7	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-
9	75	-	8025	-	1	-	3565	-	11590	2 ha. can be covered	2.0
10	-	50	-	5350	-	1	-	3565	(-8915)	3 ha can be covered	3.0
11	-	-	-	-	-	-	-	-	-	-	-

12	-	550	-	58850	-	1	-	3565	(62415)	-	-
13	250	-	26750	-	2	-	7130	-	33880	To cover 5 ha. of command could not be covered by WC.2	5.0
14	-	-	-	-	-	1	-	3565	(-3565)	Survey no. 37&38 could not covered by this WC shifted to WC.15	-
15	150	-	16050	-	-	-	-	-	16050	5 ha. additional area can be covered	5.0
16	380	-	40660	-	1	-	3565	-	44225	To be shifted upstream to cover around 8 ha. of land	8.0
17	50	-	5350	-	-	-	-	-	5350	Extension is required to cover additional 3 ha. of land	3.0
18	350	-	37450	-	1	1	3565	-	41015	Otherwise 10 ha. command would have been lost	10
Total	1380	950	IE+05	101650	8	5	28520	17825	56705		49

Notes:
a) Cost of 1 Turnout - Rs. 3565
b) Cost of pipe per running meter - Rs. 107
c) In 1992 US$ 1.00 = Indian Rs. 26.00

WC - Water Course

Table 2. Cost implications of farmers participation, Baladava Irrigation Project.

Sr. No.	WC No.	Changes in Length of UGPL		Cost Differences		Turnouts		Cost Differences		Net or Excess (saving)	Additional Benefits	Addtl. Benefit in ha.
		Increase	Decrease	Excess	Saving	Increase	Decrease	Excess	Saving			
1	2	3	4	5	6	7	8	9	10	11	12	13
1	7	-	-	-	-	1	-	3565	-	3565	To cross the valley additional T.O. is necessary	5.80
2	9	360	-	38540	-	-	-	3565	-	42005	Extension is necessary to accommodate the design command	1.83
3	10	325	-	34775	-	-	-	-	-	34775	Extension is necessary to accommodate the design command	5.80
4	6	-	-	-	-	-	-	-	-			
5	8	-	-	-	-	-	-	-	-	-	There is change in alignment but length is not increased	
6	11	550	-	58850	-	-	-	-	-	58850	Extension is necessary to accommodate the design command	6.35
7	12	25	-	2675	-	-	1	-	3565	(-890)	Extension is necessary to accommodate the design command	3.93
8	13	-	-	-	-	-	-	-	-	-		
9	14	-	500	-	53500	-	3	-	10695	(-64195)	Saving is due to new WC proposed	

10	14	290	-	31030	-	2	-	10695	-	41725	New WC is proposed	
11	15	-	150	-	16050	-	1	-	3565	(-19615)	Length is curtailed without any loss of command	
12	16	240	-	25680	-	-	-	-	-	25680	Extension is necessary to accommodate the design command	4.84
13	17	75	-	8025	-	-	-	-	-	8025	Extension is necessary to accommodate the design command	6.00
14	18	-	50	-	5350	-	2	-	7130	(-12480)	Length of UGPL & TO No. 2 are curtailed without any loss of command	
15	22	330	-	35310	-	-	-	-	-	35310	Extension is necessary to accommodate the design command	4.98
16	23	-	210	-	22470	-	2	-	7130	(-29600)	Length of UGPL & TO No. 2 are curtailed without any loss of command	
17	24	400	42800	-	-	-	-	-	-	42800	Extension is necessary to accommodate the design command	6.56
18	25	106	-	11342	-	-	-	-	-	11342	Extension is necessary to accommodate the design command	2.95
				246227	97370			17825	32085	177377		49.04

Notes:

WC - Water Course

a) Cost of underground pipeline (UGPL) - Rs. 107/running meter
b) Cost of one Turnout (TO) - Rs. 3565
c) In 1992 US$ 1.00 = Indian Rs. 26.00