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Impact of Participatory Irrigation Management on economic growth

Policy brief

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Study on Impact of Participatory Irrigation Management (PIM) on economic growth

Case studies of Water Users Associations (WUAs) in Gujarat, Andhra Pradesh (AP), Madhya Pradesh (MP) and Maharashtra

Development Support Centre (DSC) has been working on participatory irrigation management since 1994-95. Over the years, it has directly promoted PIM in four major and three medium irrigation projects across Gujarat and MP. In 2007, DSC conducted a regional workshop on PIM during which, a three-state study (AP, MP and Gujarat) on the performance of WUAs was presented. Besides limitations of the WUAs, the study also highlighted some successful WUAs in these states. It was therefore felt that an in-depth understanding was on the economic impact of such successful WUAs which would provide valuable learning for others also. Thus a four-state study was undertaken to look at the economic impact of PIM on farmer's livelihoods, taking case studies of WUAs across four States.

The four states selected for the study were AP, Maharashtra, Gujarat and MP as the functioning of PIM is comparatively more effective in these states. The rationale behind studying the 'best cases' of WUAs in these states was to identify the strengths and limitations of the participatory method of water management. While many earlier studies had highlighted issues and problems in this model of water management, some had even questioned the efficacy of the PIM approach. In this background, the study was aimed at generating a better understanding of the credibility of the programme and the insights the 'best cases' had to offer to the policy framework. The study primarily included farmers taking water from the canal while the term 'livelihood' was interpreted as encompassing income, production, productivity and profitability from agriculture and allied activities. The study, which was conducted by WASSAN¹ in AP, IWMI² in Maharashtra, GIDR³ in Gujarat and TAAL⁴ in MP was guided by Dr. R. Parthasarathy, Professor, CEPT University, Ahmedabad, Sachin Oza, Executive Director, DSC and Mohan Sharma, Director programmes, DSC.

Sixteen best case WUAs – four from each State – were selected for the purpose of the study based on the parameters described below. The methodology for selection included a mix of surveys of suggested sites, consultations with different stakeholders (including State Irrigation Departments, NGOs, WUA Managing Committee members etc.) and exercises with WUAs to test their managerial capabilities and financial abilities. Adequate care was taken to ensure that the selected WUAs represented the head and tail reaches of both major and medium irrigation projects. In addition, it was also ensured that there was representation from WUAs which were promoted by the State Irrigation Department as well as by NGOs/civil society.

¹ Watershed Support Service and Activity Network

² Institute of Water Management, India

³ Gujarat Institute of Development Research

⁴ Towards Action And Learning

PARAMETERS FOR SELECTION OF WUAS	
1. Experience of the WUA	
The WUA should have experience of at least three irrigation seasons. Preference should be given to WUAs with more experience.	
2. Opinion of the Department and /or support agencies on the best performing Water User Association on the basis of:	
(a) Managerial capability	(b) Financial performance
<ul style="list-style-type: none"> i. Regularity in holding meetings, ii. Maintenance of structures, iii. Water distribution, iv. Tail-end villagers' share of water, v. Compliance to rules and norms. 	<ul style="list-style-type: none"> i. Ability to cover operating cost, i.e. maintenance of structures and management cost, ii. Maintaining books of accounts, iii. Practice of financial budgeting.

DETAILS OF WUAS AND THEIR PROMOTING AGENCIES

	Name of selected WUA	WUA promoting agency
Andhra Pradesh		
1	Chelpuru	NGO and Command Area Development Authority (CADA)
2	Talavallasa	NGO & CADA
3	Ponugodu	NGO & CADA
4	Chapirevla	NGO & CADA
Gujarat		
1	Kesimpa	NGO and Irrigation Department
2	Parabada	NGO and Irrigation Department
3	Isar	NGO and Irrigation Department
4	Kakdiamba	NGO and Irrigation Department
Madhya Pradesh		
1	Koncha	NGO and India Canada Environment Facility (ICEF)
2	Satak	NGO and ICEF
3	Harsi	NGO and World Bank
4	Tawa	Irrigation Department
Maharashtra		
1	Brahmni	NGO and Irrigation Department
2	Ozar	NGO and Irrigation Department
3	Boregaon	Irrigation department
4	Malegaon	Irrigation department

Policy Brief

This policy brief which is based on the study 'Impact of PIM on economic growth; case studies of WUAs in Gujarat, AP, MP and Maharashtra' discusses the nature and extent of economic impact of PIM on farmers' livelihoods, constraints to the effective scaling up of this impact and recommendations on how to tackle these constraints. Instead of advocating a particular course of action, the policy brief presents a wider set of suggestions, the adoption of some or all of which, may lead to a greater and more equitable spread of the benefits of PIM across the country.

This policy brief is divided into three parts:

Part 1 presents a brief summary of the nature and extent of economic impact of PIM in the case study states.

Part 2 highlights constraints to the effective scaling up of the economic impact of PIM while

Part 3 discusses ways in which these constraints can be overcome through policy intervention

Part 1: Economic impact of PIM in selected States

The economic impact of PIM is examined by analyzing change in the following components:

1.1 Irrigated area

An increase in irrigated area was found in WUAs across all the four States. Post PIM, the area under irrigation in MP increased between 13 to 16 per cent in three cases and 9 per cent in one case on account of canal as well as conjunctive use of canal and well irrigation. In AP, only a part of the assigned command area under the WUAs received water before PIM. However, through effective management and significant investment in the construction of new canals and water channels after PIM, the entire original command area plus some additional area beyond the command also started receiving adequate water supply. As stated by an ex-president of one of the WUAs – Ponugonda – in AP, "Previously only about 800 hectares of the assigned 1063 hectares would receive water. Now the entire area receives water and there is no tail-end due to the Neeti samgam (WUA) efforts". This increase in cultivable land has encouraged farmers to toil for better yields and further improve their income from agriculture.

In the case of Maharashtra, the irrigated area pre and post PIM was found to have increased both in rabi and summer seasons. Farmers in the command area were traditionally growing rain-fed crops because of good amount of rainfall in the region but after implementation of PIM, there was a shift towards water intensive crops like wheat and sunflower as they were now assured of getting water

in the rabi season. Interestingly, due to assurance of irrigation in the summer season as well, farmers started to go for intensive cropping of grapes. In Gujarat, execution of repair and rehabilitation work on the canal post PIM led to improved flow of water to the tail end eventually resulting in expansion of area under irrigation. For example, in Isar, construction of a lined field channel in the tail portions of the Devgadhi Minor benefited 70 tail end farmers and enabled the WUA to cover more area under irrigation as compared to the situation before its formation.

1.2 Cropping pattern

Change in cropping pattern was observed in almost all the WUAs across the four States. In some cases, new crops were added after PIM, while in others, some crops were given more preference than before due to assured water, like wheat in Gujarat and MP and paddy in AP. In MP, the cropping pattern changed from crops that were suited for dry land agriculture towards crops that required irrigation. Also seen was a move from agriculture for food security to agriculture that could ensure better economic returns to farmers from their fields. However, better management of canals post PIM, although a crucial factor, was not the only reason behind this shift. Table 1 describes some of the other key factors which led to change in cropping pattern in MP and may be able to explain this phenomenon in other states as well.

Table 1: Factors leading to change in cropping pattern in MP

Factors that promoted change, and trend of change		
Factors that promoted change	Nature of Change	Impact of change
Agriculture Input Market	<ul style="list-style-type: none"> • Formation of Agricultural Societies • Opening of private shops in the command area • Private market to provide tools, equipment and repair services to farmers 	<ul style="list-style-type: none"> • Availability of new variety of seeds (hybrid/GM seed) • Seeds of new crops introduced (Soybean) • Easy access to fertilizers and insecticides
Changes in Infrastructure	<ul style="list-style-type: none"> • Opening of branches of banks in command area • Better road network • Access to mandi increased 	<ul style="list-style-type: none"> • Easy access and availability of cheap credit • Credit used for purchase of tractors and motorcycle • Increased availability of housing loans.
Changes in the Labour Market	<ul style="list-style-type: none"> • Increased in-migration from local areas • Immigrants settling down within the command area • At Harsi migration of labour from Bihar for paddy cultivation 	<ul style="list-style-type: none"> • Large variations in labour rates • At Tawa, farmers preferred Combiners which replaced labour in a major way • Increased use of tractors for tilling decreased opportunity for labour • Paddy, chilly, sugarcane and cotton are labour intensive crops. In such cases, labour rates increased considerably during harvesting season
Other Factors	<ul style="list-style-type: none"> • Number of Ginning units increased near the command area (Satak) • Establishment of sugar factory (Tawa and Harsi) • Warehouses established in the area (Tawa) 	<ul style="list-style-type: none"> • Crop preference of farmers changed due to local demand from industrial units • Linkage with local mandi increased

In AP, while the cropping pattern largely changed in favour of paddy cultivation, there was also an increase in chilly, jowar and mustard cultivation. Tobacco had also entered the cultivation scene in AP as it provided huge returns and required a low investment. In Maharashtra, the new crops which were never grown before included soybean, tomatoes, turmeric, onion, sunflower and grapes. In Gujarat, the advent of irrigation, followed by improved water distribution and management through WUAs led to an increase in cropping intensity and a resultant change in cropping pattern. In tribal areas, subsistence agriculture turned into a profitable occupation with the area under newly introduced crops like wheat, groundnut, vegetables, sugarcane and green gram increasing and area under small millets decreasing. Cultivation of fennel also increased and BT cotton replaced desi un-irrigated cotton.

In Maharashtra, the new crops which were never grown before included soybean, tomatoes, turmeric, onion, sunflower and grapes.

1.3 Crop productivity

Increase in crop productivity was recorded in all the three reaches - head, middle and tail for all the major crops. In MP, an average productivity increase of 43 per cent was found in wheat (except in Satak where it was 20 per cent). Increase in productivity of soybean was found to be 55 per cent in Harsi. Other crops like gram, pulses and sugarcane showed an increase between 7 to 20 per cent post PIM. In AP, an increase in productivity was also found in the case of all the crops adopted for cultivation. In Maharashtra, increase in crop productivity on account of assured and timely irrigation post WUA formation was highest for wheat, followed by grapes.

In the case of Gujarat, the productivity analysis was done on the basis of irrigated and un-irrigated crops, instead of before and after implementation of PIM. Some of the crops which could be cultivated both in rabi and kharif showed change in their productivity. For example, the productivity of maize was 1441kg/ha when un-irrigated, and 1903kg/ha when cultivated with irrigation, showing an increase in productivity of 66 per cent. Similarly, productivity of cotton when un-irrigated, was 694kg/ha which rose to 2094kg/ha in case of irrigated cultivation, marking an increase of 300 per cent. Similar was the case with paddy, tuvar, groundnut etc. where productivity increases between 120 and 340 per cent were witnessed as can be seen from the following table:

Table 2: Average yield of major crops in Gujarat

Major crops	Yield (kg/ha)		
	Irrigated crop	Un-irrigated crop	% increase
Maize	1903	1441	66
Cotton	2094	694	300
Paddy	3622	1444	151
Tuvar	824	371	122
Groundnut	1085	247	339

Although availability of water was a major factor for productivity enhancement, availability of good quality seeds, application of a package of practices and favourable climatic conditions also contributed to this increase.

1.4 Employment generation

In all the four States, an increase in employment generation and increase in wage rates was observed post PIM. In Maharashtra, with the increase in agricultural activity, availability of labour work also increased in the command area. There was an increase in the number of months that labour work was available from 3-4 months pre WUA formation to 6-7 months post WUA formation. In Gujarat, a majority of both command and non command farmers reported increase in days of employment in agriculture for which increased irrigation was reported as one of the important contributing factors.

The increase in incomes could be attributed to an increase in wage rate, number of days labour was available and in the number of persons working as labourers.

In AP, agriculture was the major occupation of the WUA farmers, followed by agricultural labour. Besides, other businesses such as fertilizer stores, agricultural necessities, common general stores, etc. had also grown over time due to the flourishing agriculture. In MP, the increase in income from labour had been in the range of 23 to 29 per cent in different regions of the canal. This

increase in incomes was attributed by farmers to an increase in wage rate, increase in number of days labour was available and increase in number of persons working as labourers.

1.5 Livestock and fodder availability

An improvement in dairy business was found in MP where PIM had helped reduce the water cost incurred for growing fodder resulting in an increase of 47 per cent in the net income through dairy. In Gujarat, a majority of farmers reported an increase in the number of milch animals post WUA formation. Two important reasons attributed by farmers for this increase were hike in milk prices and irrigation-led increase in fodder. Availability of green fodder due to improved access to irrigation had also led to an increase in the number of Jersey cows, particularly in Parabada. What was significant was that all these reasons were reported largely by marginal farmers which pointed to the fact that efforts had been made to improve equity in spreading the benefits of PIM to marginalised groups.

About 12 percent of the farmers also reported that they were now having cheap and easy access to fodder, which had encouraged them to rear milch animals to supplement their income. These labour/tenant farmer households got fodder from the farmers' fields where they went to work, in most cases for no cost. This was a unique arrangement between the landed and the landless households to meet each other's requirements - the former needed their groundnut fields to be weeded and the latter needed green fodder for their animals. Landless households went for

weeding these fields and got green fodder as their wages. The landed households did not have to pay anything and their fields were weeded.

On the contrary, farmers in Maharashtra were reported to have left the dairy business post PIM - the major reason for it being that both time and labour involved in dairying were much more as compared to the profit from it. There was also a corresponding decrease in the population of milch animals even though fodder was never a problem at any time. This trend was seen across all the four sample WUAs of Ozar, Boregaon, Malegaon and Brahmni in Maharashtra. The shift to agriculture was primarily because of more availability and, most importantly, assured and timely supply of water for irrigation in the command, which made agriculture a more lucrative occupation.

1.6 Other benefits

Environmental: One of the important impacts of surface irrigation had been a rise in groundwater levels that benefited farmers using groundwater for irrigation. In Maharashtra, an increase in the number of wells and tube wells could be seen as an indication of improvement in the groundwater table. In Gujarat, 50 percent of the farmers in the sampled non-command area reported a positive change in groundwater levels and attributed the change to both good rainfall and irrigation.

In Gujarat, 50 percent of the farmers reported a positive change in groundwater levels attributing this change to good rainfall and irrigation.

Credit: In two of the WUAs sampled in Maharashtra, there was generally no difference in pre and post PIM savings even though the overall standard of living had improved. This was due to the fact that irrigation had led to an increase in the gross area under cultivation which required more agriculture inputs. Also, input cost of cash crops was reported to be higher than that of food crops. In the other two WUAs in Maharashtra, about 27 percent of the respondents reported an increase in savings.

In Gujarat, close to one third of the farmers reported an increase in their credit needs after the formation of the WUAs. 56 percent of the respondents attributed it to the increase in area under irrigation and cropping intensity which required more inputs to agriculture, and 32 percent attributed it to the hike in prices of inputs like seeds, fertilizers, pesticides, labour and diesel. At the same time, about 30 percent farmers also reported credit availability to have increased in the post WUA period. Not only had banks increased the amount of credit, cooperatives, Gramin banks and private traders had also started offering credit for agriculture inputs after the formation of WUAs.

Part 2: Constraints to scaling up of economic impact of PIM

To a large extent, all the case study WUAs pointed to the fact that the PIM programme had led to better water management, lower wastage and consequent direct and indirect benefits to the farm households. However, there were some areas of concern, which could broadly be identified as:

- Inadequate funding for rehabilitation, repair and maintenance of canal system
- Weak institutional set up for PIM
- Lack of trust between WUAs and the government

2.1 Inadequate funding for rehabilitation, repair and maintenance of canal system

The approach towards funding rehabilitation and regular operations and maintenance (O&M) of the canal system tended to be ad-hoc and varied from state to state. MP had a provision for providing a grant of upto Rs. 80/- per ha to the WUAs for regular O&M even as there was no provision for one time rehabilitation of the canals. In Gujarat, funding support was provided for one-time canal rehabilitation in addition to a rebate on water charges which the WUA could utilise for O&M and administrative expenses. Similarly, Maharashtra also had provision for providing rebate to WUAs on the water charges collected.

The approach towards funding rehabilitation and regular repairs and maintenance of the canal system tended to be ad-hoc and varied from state to state.

In Gujarat and Maharashtra, the Government Order (GR) for transferring canal management to farmers after the rehabilitation of canals by the government had to be modified and provision was made to transfer without rehabilitation, as unavailability of funds with the government delayed the process of transferring canal management to the farmers. The Gujarat Irrigation Department subsequently issued a GR for handing over of canal management to the WUAs prior to rehabilitation. In many cases, repair work was carried out by WUAs themselves from their own funds. Though it was occasionally affordable in case of established WUAs, the newer WUAs (which did not have a corpus fund) often struggled.

2.2 Weak institutional set up for PIM

Poor coordination between WUAs and government departments was a key constraint in scaling up impact of PIM. For example, in AP, due to poor coordination between WUAs and the Revenue Department, WUAs lacked information about water tax payments like tax already paid and tax to be paid by each farmer or the WUA. Also, factors such as insufficient water supply and leakages during tax collection by the revenue department proved to be further disincentives, resulting in delays and

Poor coordination between WUAs and government departments was a key constraint in scaling up impact of PIM

non-payment of water tax by farmers. This in turn adversely affected collection, maintenance, organisation and release of funds to the WUAs by the revenue department. In AP and MP, the institutional set up was such that control over funds and most of the decision making powers lay with officers of the Irrigation department. Also, except in the case of Gujarat, all

records of the WUAs were kept with the Irrigation department. As a result, WUAs were often neither aware of the works that had been identified, nor of the status of their implementation.

In AP, despite a long period of PIM intervention, some of the WUA office-bearers seemed to lack information about the systems and good practices adopted by other villages in the command area indicating that the process of community mobilisation and exchange needed to be more robust. Absence of hand-holding support to the WUAs in MP to help them carry out the functions envisaged in the PIM Act or to facilitate them to take up self-monitoring (as in done in AP) remained a weak area. Added to this was the inability and reluctance of the department to deal with conflicts of interest amongst different farmers' groups due to lack of adequate training and absence of monetary/non-monetary incentives.

Another issue related to the lack of provision of federating the WUAs at upper levels in Gujarat. Therefore, while MP, AP and Maharashtra had provisions for three-tier organisations including WUA at the minor, Distributory or Branch Committee at the middle and Project Committee at the topmost level, the Gujarat PIM Act was unclear on the issue of federating the WUAs. In the absence of a Distributory Committee, the WUAs functioned like separate islands. Even in states where upper level organisations existed, whether regular elections were conducted for these organisations or not remained a matter of concern.

2.3 Lack of trust between WUAs and the government

Despite the fact that PIM started with the basic premise that it would give WUAs greater autonomy in decision making (regarding repair and maintenance of the canal system, amount of water charges to be levied and their collection, managing rebate provisions etc.) and management of the canal system, state governments found it difficult to trust the capacity of the WUAs to carry out their new role. According to the study, farmers in AP and MP still perceived themselves as recipients of irrigation services provided by the government and like all government services, there was little sense of ownership for the maintenance of the canal system even after formation of WUAs. This was due to

Despite the fact that PIM started with the basic premise that it would give WUAs greater autonomy in decision making and management of the canal system, state governments found it difficult to trust the capacity of the WUAs to carry out their new role.

the fact that the department was wary of signing an MoU/agreement with the WUAs for formal hand over of the canals. This situation was in contrast to Gujarat where due to the system of formal handover of canals to the WUAs, there was a perceptible difference in members' sense of ownership.

Part 3: Recommendations

3.1 Allocating adequate funds for canal rehabilitation and O&M

At the outset, there needs to be more clarity on who will fund rehabilitation of the canal system and expenses related to its O&M as well as whether canals would be handed over to WUAs for management prior to or post rehabilitation. Secondly, alternative sources of funding canal systems need to be explored in view of the experience with government funding of canal rehabilitation, repair and maintenance in different states. The XII Five Year Plan Working group on Major and Medium Irrigation Projects recommends setting up of a national fund for operations and maintenance of irrigation canal systems as well as giving a 30 per cent incentive on Irrigation Service Fee ISF collected by a state through WUAs.

However, considering that this national fund may take some time to get operationalised, inviting corporate houses and industries to provide such funding from their Corporate Social Responsibility (CSR) budgets could be looked at.

3.2 Establishing a robust institutional mechanism for PIM

There is a need to put in place a robust institutional mechanism for all states which clearly lays down responsibilities for funding of canal rehabilitation, collection of water charges and granting of permission to WUAs to retain water charges. Along with this, steps to ensure greater transparency in the working of the Irrigation department and more effective functioning of upper level organisations (Distributory Committee, Project Committee etc.) in PIM need to be urgently taken.

The possibility of inviting village leaders to organise the farmers and help them plan and chalk out their priorities as well as involving an NGO to build capacities of the WUA through trainings and exposure visits also needs to be explored simultaneously. Even as it is important, building the capacity of WUA members alone may not be able to ensure greater collaborative working between WUAs and the government. Irrigation department officials also need to be sensitised to deal with farmers and given training to address conflicts of interest amongst different farmers' groups. Often, this may require bringing about a change in mindsets – a process which is both time taking as well as difficult.

Lastly, incentives to ensure greater participation from irrigation officials need to be designed and accordingly, changes in policy are required. Taking a leaf out of MP's experience where measures like giving certificates of appreciation and also cash awards to WUAs, department officials and NGOs produced encouraging results, some of these incentives could be:

1. Since a person from the same area may be able to work better than an outsider, staff could be placed to work in their home district at least for a period of 3-5 years so as to have better and more effective social interaction with the farmers.
2. Officers who have an interest in PIM and participatory approaches could be posted for supporting PIM activities and WUAs with appropriate Transfer policy.
3. Cash prizes/award/recognition based on performance could be introduced.
4. Staff engaged in PIM activity could be given preference in training/exposure/study tours related to irrigation management within the country and overseas.
5. Additional conveyance and overtime allowances could be provided to staff for visiting villages to meet WUA members during odd hours.

3.3 Encouraging closer partnership between WUAs and Irrigation department

A formal handover of canals to the WUA members can be a huge step towards improving their sense of ownership, giving them confidence and encouraging them to build a stronger working relationship with the Irrigation department.

About DSC

Established in 1994, Development Support Centre provides knowledge based support to Community Based Organisations, Non Government Organisations and government functionaries. DSC helps in capacity building of key functionaries in rural development, performs hand holding operations in the field, takes initiatives for policy change, and carries out field studies and research projects related to issues in policy and practice. It directly implements key projects in more than 200 villages in rainfed and irrigated areas across the two states of Gujarat and Madhya Pradesh.



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