

## Participatory Irrigation Management in India: Implementations and Gaps

Mamata Swain<sup>1</sup> and Deepak Kumar Das<sup>2</sup>

<sup>1</sup> Japan Foundation Visiting Fellow, Graduate School of Life and Environmental Sciences, University of Tsukuba

<sup>2</sup> Associate Professor of Water Resources Engineering, Water and Land Management Institute, Orissa, India

During the last decade, most of the major states of India have undertaken profound reform measures in the irrigation sector to facilitate farmers' participation in irrigation management either under externally aided irrigation development and agricultural intensification programs or through state government initiatives. These states emphasize decentralization of water management and empowerment of water users by encouraging the farmers to form Water Users Associations (WUAs) to take over the responsibility of operation and maintenance of downstream parts of the irrigation system, distribution of water among water users, and collection of water rates. Although thousands of WUAs have been formed across India and these have taken over the management functions of irrigation systems, the functional efficiency of WUAs in ensuring efficient water use and equitable water allocation is far from satisfactory. A careful examination of the implementation of participatory irrigation management (PIM) in India reveals that the process is fraught with many difficulties due to heterogeneity of farmers, caste-class cleavages, physical system inefficiency, half-hearted support from the irrigation bureaucracy, lack of committed local leadership, inadequate capacity building, and lack of proper incentives. The ultimate success and sustainability of the PIM movement depends on some fundamental factors, such as cohesiveness, common interest and collective efforts of water users, effective leadership of the office bearers of WUAs, political will of the party in power, bureaucratic commitment of irrigation executives, governmental patronage, legal support, financial viability of WUAs, and the catalyzing role of the change agents. To achieve the intended benefits of PIM, an integrated and comprehensive reform is necessary.

**Key words:** India, Participatory Irrigation Management, Water Users Association

---

### Introduction

Starting from the very inception of planning in India and in subsequent five-year plans, a major portion of plan outlay has been allocated to irrigation development in order to increase agricultural productivity and eradicate rural poverty. As irrigation projects are capital intensive in nature, with a

long payback period and many positive effects on society, irrigation development has been the sole responsibility of the state. The major and medium irrigation projects in India are mostly state owned, state funded, and are departmentally managed by a hierarchical bureaucracy with a centralized top-down approach.

There is no denying that during the 1960s irriga-

---

Received: October 31, 2007, Accepted: February 20, 2008

Corresponding author's current address:

<sup>1</sup>Japan Foundation Visiting Fellow, Graduate School of Life and Environmental Sciences, University of Tsukuba, 305-8572 Japan, Associate Professor of Economics, Nabakrushna Choudhury Centre for Development Studies (An Indian Council of Social Science Research Centre), Bhubaneswar, Orissa, India-751013, Phone: +81-90-3546-8368, Fax: +81-29-853-4648, E-mail: mama\_swain@hotmail.com

<sup>2</sup>Associate Professor of Water Resources Engineering, Water and Land Management Institute, Cuttack, Orissa, India-753051, Phone: +91-9338206720, Fax: +91-671-2686430, E-mail: deepak\_das62@yahoo.com

tion coupled with fertilizer application and high-yielding varieties of seeds played a key role in ushering in a green revolution and making India self-sufficient in food grain production (Dhawan, 1988; Bharadwaj, 1990). Nevertheless, a scrutiny of irrigation sector performance in India reveals that the overall performance of irrigation systems is suboptimal, inefficient, and inequitable, falling far short of expectations. The irrigation sector suffers from many problems, such as deteriorating physical structures, poor maintenance, low recovery of project costs, under-utilization of created potential, tail-end water deprivation, uncontrolled water delivery, siltation, water logging, soil salinity, disintegration of indigenous irrigation institutions, and, above all, poor quality of irrigation service. In spite of massive investments made in irrigation projects, the physical and financial performances of the irrigation sector are quite dismal. The yield-increasing potential of irrigation is rarely achieved. As regards the financial performance (leaving aside the capital costs of irrigation projects), even revenue receipts from the sale of water hardly covers the recurrent operation and maintenance expenses due to high subsidies for water rates and low collection efficiency (Svendsen and Gulati, 1995; Swain, 1998). Thus, the irrigation sector is not able to generate resources internally for carrying out the operation and maintenance of the irrigation structures.

On the other hand, since the 1990s, under the new economic policy and structural adjustment program, there has been a general resource crunch and fiscal compression. The state budgetary allocation for the irrigation sector has been squeezed. Moreover, nearly 70% of the operation and maintenance budget is spent on employee salaries and establishment expenditures, leaving an insignificant amount for the works component and for actual repair and maintenance of the infrastructure (Swain, 1998). Thus, due to inadequate preventive and regular maintenance, the conditions of the irrigation structures have deteriorated significantly, causing system inefficiency and poor-quality irrigation service; this poses a threat to the sustainability of the created irrigation structures.

To improve the irrigation system performance, the government has to secure funds by increasing water rates and reducing irrigation subsidies,

whereas the farmers insist that they would pay the increased water rate only if there were improvements to the quality of the irrigation service. Thus, the irrigation sector is confronted with a vicious circle and a deadlock situation. As an escape from this impasse, most of the state governments in India have undertaken profound institutional and financial reform measures in the irrigation sector during the last decade (Vaidyanathan, 1994; Svendsen and Gulati, 1995; Mitra, 1996; Swain and Das, 1999; Kar and Swain, 2000).

Prior to the 1980s, irrigation was mainly considered a technical enterprise aimed at construction of physical structures, such as dams, reservoirs, weirs, barrages, and canals. The management part of the system was grossly neglected. It is now increasingly recognized that the mere provision of an irrigation facility does not ensure enhanced agricultural production. The effect of irrigation on productivity is critically dependent on the way water is applied and used. The quality of an irrigation service in terms of adequacy, timeliness, equity, dependability, and convenience in its supply greatly affects the yield from irrigation commands. With modern agricultural technology, proper water management holds the key to increased agricultural productivity.

To establish such an improved water delivery system and for optimal use of scarce water, new trends advocate much more active participation of the water users in all aspects of water resources development and management, which includes planning, design, construction, operation, maintenance, on-farm development, rehabilitation, modernization, water distribution, financing, resource mobilization, collection of water rates, monitoring, and evaluation (Wade, 1987; Chambers, 1988; Baland and Platteau, 1996; Meinzen-Dick *et al.*, 1997; Vaidyanathan, 1999).

As a matter of fact, in India during the early 1990s, participatory irrigation management (PIM) through irrigation management transfer (IMT) to farmers was officially recognized as the most appropriate mechanism to bring about efficient utilization of irrigation water, its equitable distribution, and sustainable irrigation service. No doubt the concept of PIM is based on laudable ideologies, such as democratization, decentralization, debureaucratization, and, above all, the empowerment of water users who are the ultimate beneficiaries of an irriga-

tion system. During the last decade, most of the major states of India, such as Andhra Pradesh, Madhya Pradesh, Gujarat, Maharashtra, Karnataka, Tamil Nadu, Bihar, West Bengal, and Orissa, have undertaken systematic institutional and organizational changes to increase farmers' participation in irrigation management either under externally assisted economic restructuring programs, such as the Water Resources Consolidation Project funded by the World Bank, European Commission aid for minor irrigation projects, the agricultural intensification program with assistance from the Japan Bank for International Cooperation, PIM in lift irrigation projects funded by the Department for International Development (UK), or through state government initiatives. These states are putting emphasis on decentralizing water management by encouraging the farmers to form Water Users Associations (WUAs) to take over the responsibility of operation and maintenance of downstream parts of the irrigation system, distribution of water among water users, and collection of water rates.

Liberalization, delicensing, and decontrol have been ongoing in India since 1991, and their impact on the irrigation sector is obvious (Saleth, 1999). There is a growing realization that unnecessary bureaucratic control in management of the irrigation system at tertiary levels should be reduced to improve irrigation efficiency and to check corruption. As the farmers have better knowledge of their field conditions and eco-environment, they can more efficiently and effectively manage the irrigation system, which is truly a common pool resource. Usually the farmers believe that the canals belong to the government and that they are the beneficiaries of the public irrigation system. The farmers do not have any role and responsibility in upkeep of the physical structures. In the changed institutional context, irrigation will be considered as a common pool resource and will be managed by the farmer community (Sengupta, 1991; Singh, 1994), and its maintenance and sustainability will be the responsibility of the WUAs.

### Evolution of Participatory Irrigation Management in India

In India, the concept of PIM has evolved gradually through three distinct phases (Maloney and Raju, 1994). In the early 1980s, the concept was in

its nascent stage and was limited to **farmers' participation** through their representatives. It was felt then that in the decision-making process of the irrigation sector, the views of farmers should be taken into account and they should be consulted in the planning, development, and management of the system. However, merely having farmers' representation in project management committees was not successful.

In the latter part of the 1980s, it became clear that farmers could not have a significant role in irrigation management without a formal structure or forum to express their views. Therefore, the catchword became **farmers' organization**. In various states, such as Andhra Pradesh, Tamil Nadu, and Maharashtra, thousands of outlet associations and chak (outlet) committees were formed. But these committees remained on paper only and became dysfunctional after a short period. By the 1990s the concept of PIM had received recognition through the implementation of the Water Resources Management and Training Project of the Government of India, supported by the United States Agency for International Development. Motivating farmers to foster WUAs was an essential feature of the action research program carried out by Water and Land Management Institutes in 11 states of India. By the early part of the 1990s, it became apparent that the concept of farmers' participation in a few activities was not sufficient. Because irrigation is for the farmers, irrigation systems should be owned and managed by them. Therefore, a radical concept of creating **farmers' organizations and of system turnover to farmers** was adopted under the World Bank-funded Water Resources Consolidation Project, in which thousands of WUAs were formed that took responsibility for operation and maintenance, including the allocation of water among farmers and collection of water charges from water users. During the late 1990s, most of the state governments in India (Andhra Pradesh, Gujarat, Maharashtra, Madhya Pradesh, Orissa, and others) made policy decisions and enacted exclusive legislation to implement PIM (Maloney and Raju, 1994; Brewer *et al.*, 1999; Jairath, 2001; Hooja *et al.*, 2002).

### Water Policy and the Legal Environment

Water is a prime natural resource, a basic human

need, and a precious national asset. Therefore, it is stressed that planning, development, and management of water resources need to be governed by national perspectives. In India, the first National Water Policy was adopted in 1987. As regards PIM, this policy envisages that “efforts should be made to involve farmers progressively in various aspects of management of irrigation systems, particularly in water distribution and collection of water rates. Assistance of voluntary agencies should be enlisted in educating the farmers in efficient water use and water management”.

The National Water Policy, 2002, however, is more explicit in emphasizing the need for farmers’ participation in irrigation management and broadly outlines a participatory approach to water resources management as follows: “Management of the water resources for diverse uses should incorporate a participatory approach: by involving not only the various government agencies but also the users and other stakeholders, in an effective and decisive manner, in various aspects of planning, design, development and management of the water resources schemes. Necessary legal and institutional changes should be made at various levels for the purpose, duly ensuring appropriate role for women. Water Users Associations and the local bodies such as municipalities and gram panchayats should particularly be involved in the operation, maintenance

and management of water infrastructures/facilities at appropriate levels progressively, with a view to eventually transfer the management of such facilities to the user groups/local bodies.”

As irrigation is included in the state list of the Indian constitution and comes under the purview of the state government, the irrigation policy, acts, rules and regulations differ from state to state. In this paper, we are depicting the Indian scenario with special reference to Orissa, which is a pioneering state in implementing PIM in mission mode.

Recognizing the need for a sound legal framework for PIM in the country, the Ministry of Water Resources recommended a model act to be adopted by the state legislatures for enacting new irrigation acts and amending the existing irrigation acts for facilitating PIM. In accordance with the model act, 10 state governments, namely Andhra Pradesh, Goa, Karnataka, Madhya Pradesh, Orissa, Rajasthan, Tamil Nadu, Kerala, Bihar, and Maharashtra, have legislated new acts or amended existing acts. Details of the acts and rules enacted by the different states are given in Table 1.

Andhra Pradesh was the first state to enact an exclusive law for PIM, which is the Farmers’ Management of Irrigation Systems Act, 1997. Madhya Pradesh and Rajasthan have promulgated laws based on the Andhra Pradesh model. The Government of Orissa enacted the Orissa Pani Panchayat

**Table 1.** State-wise position of enactment of new acts and amendments to the existing Irrigation Act

Serial No.	State	Act or Amendment
1.	Andhra Pradesh	Andhra Pradesh Farmers’ Management of Irrigation Systems Act, March 1997
2.	Goa	Goa Command Area Development Act, 1997 (Goa Act 27 of 1997)
3.	Karnataka	Ordinance on 7 June 2000 amending the existing Karnataka Irrigation Act, 1957
4.	Madhya Pradesh	Madhya Pradesh Sinchai Prabandhan Me Krishkon Ki Bhagidari Adhinyam, September 1999
5.	Orissa	The Orissa Pani Panchayat Act, 2002
6.	Rajasthan	Rajasthan Sinchai Pranali Ke Prabandh Me Krishkon Ki Sahabhogita Adhinyam, 2000
7.	Tamil Nadu	Tamil Nadu Farmers’ Management of Irrigation Systems Act, 2000
8.	Kerala	The Kerala Irrigation and Water Conservation Act, 2003
9.	Bihar	The Bihar Irrigation, Flood Management and Drainage Rules, 2003 under the Bihar Irrigation Act, 1997
10.	Maharashtra	The Maharashtra Management of Irrigation Systems by Farmers Act, 2005

Source: Ministry of Water Resources, Government of India, 2006.

**Table 2.** Number and Coverage of State Water Users Associations

Serial No.	State	Number of WUAs	Area covered ('000 ha)
1	Andhra Pradesh	10790	4800.00
2	Arunachal Pradesh	2	1.47
3	Assam	37	24.09
4	Bihar	37	105.80
5	Chhatisgarh	945	N.A.
6	Goa	42	5.00
7	Gujarat	576	96.68
8	Haryana	2800	200.00
9	Himachal Pradesh	875	35.00
10	J & K	1	1.00
11	Karnataka	2284	1062.10
12	Kerala	3930	148.48
13	Madhya Pradesh	1470	1501.45
14	Maharashtra	1299	444.00
15	Manipur	62	49.27
16	Meghalaya	99	N.A.
17	Nagaland	25	N.A.
18	Orissa	12688	995.00
19	Punjab	957	116.95
20	Rajasthan	506	219.65
21	Tamil Nadu	7725	474.28
22	Uttar Pradesh	24	10.55
23	West Bengal	10000	37.00
Total		57174	10,327.77

Source: Ministry of Water Resources, Government of India, 2006.

Act in 2002. In Uttar Pradesh, Maharashtra, and Orissa, membership in the WUA is mandatory for water users. In Andhra Pradesh and Orissa, political support from the party in power has resulted in more than 10,000 WUAs being formed with the target being to cover the entire irrigated command area under PIM within a couple of years. Some states, such as Gujarat, experimented with the idea of the farmers' cooperative movement in irrigation management. Subsequent to the enactment of laws on PIM, various states of India have taken steps to form WUAs. The details of WUAs formed in the various states are provided in Table 2, which indicate that Andhra Pradesh has the highest coverage under the PIM program followed by Madhya Pradesh, Karnataka, and Orissa.

### Approaches to Participatory Irrigation Management

International experiences in PIM implementation have shown that there are two types of approaches to program execution: gradualism and "big bang". In countries such as the Philippines and Indonesia, the program has been implemented gradually and incrementally. By contrast, in Mexico and Turkey, PIM was implemented rapidly over several thousands or even millions of hectares. The latter is referred to as the *big-bang* approach. In some cases, government mandates transfer of all targeted systems (as in Turkey or Indonesia), while in other cases, the government negotiates on a case-by-case basis, and systems are only transferred if water users agree (such as in The Philippines). Many advocate the big-bang route, as the impact is

rapid, deep, and sustainable (Groenfeldt, 2000).

In India, PIM is implemented using two approaches: target-oriented and motivational. Andhra Pradesh and Madhya Pradesh first enacted legislation and then introduced PIM rapidly and extensively (i.e., a top-down approach). Maharashtra and Gujarat, however, adopted the motivational strategy (i.e., a bottom-up approach). In Andhra Pradesh, where the big-bang approach was adopted by formation of nearly 10,000 WUAs within a year of legislation of the Farmers Management of Irrigation System Act of 1997, the performance of the WUAs has been poor, with many problems, such as the capture of power by the rural elite and political interference (Jairath, 2001). In contrast, the motivational approach adopted in Maharashtra and Gujarat may not have achieved wide-spread implementation across the state but the motivated water user groups have had spectacular success in several of the irrigation projects.

On the other hand, Orissa has adopted a sequential approach using a motivational strategy to initially implement PIM and then, after achieving some level of momentum, adopting a top-down strategy through the enactment of the Orissa Pani Panchayat Act, 2002. This strategy, adopted by the state of Orissa, is proving to be more effective and is showing steady progress in achieving the goals of PIM.

### Structure and Functions of Water Users Associations

In this section, we briefly discuss the organizational structure and functions of WUAs using the state of Orissa as a case study. As envisaged in the Orissa Pani Panchayat Act, 2002, the principal objectives of Pani Panchayat or the farmers' organization shall be "to promote and secure distribution of water among its users, adequate maintenance of the irrigation system, efficient and economical utilisation of water to optimise agricultural production, to protect the environment, and to ensure ecological balance by involving the farmers, inculcating the sense of ownership of the irrigation system in accordance with the water budget and the operational plan."

A Pani Panchayat is an association of all persons owning land within a hydrologically delineated portion of the command area, which can range in size

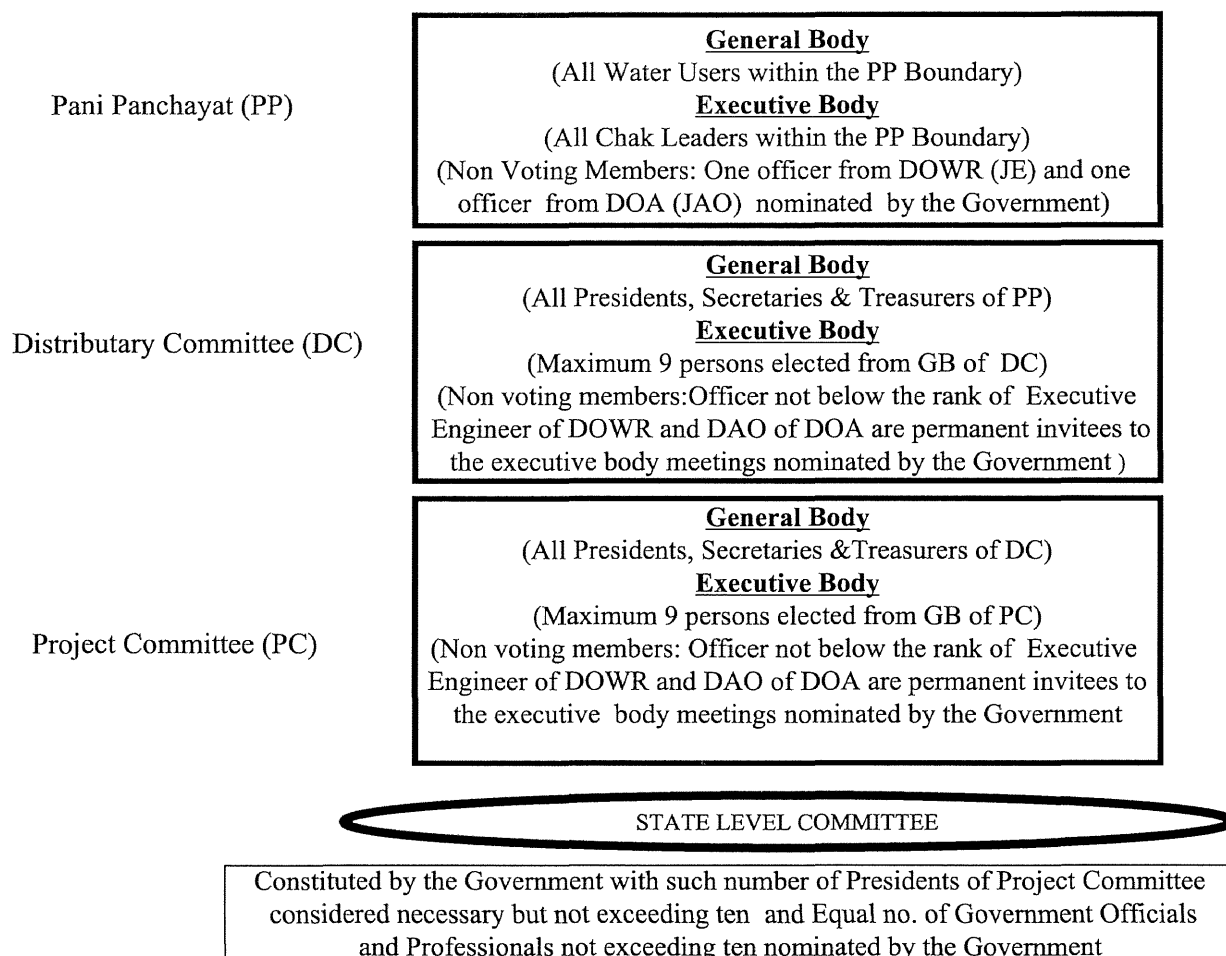
from approximately 300 to 600 ha depending on the size (major, medium, minor) of the irrigation project. The Pani Panchayat may also address minor, sub-minor, or direct outlets from the main or branch distributary of the project. In the case of a minor flow or lift irrigation, the delineated area is the project command area when the project command area is less than 300 ha. All water users are members of the general body of the Pani Panchayat. At the lowest level of this organization, an outlet (chak) committee is formed composed of three elected farmers, one from each of the reaches (head, middle, and tail) of the outlet command area. An elected representative from the chak committee members (chak leader) is a member of the executive committee of the Pani Panchayat. The president, secretary, and treasurer of each Pani Panchayat are elected from its executive body. The details of the organizational structure of the Pani Panchayat are shown in Figure 1.

In Orissa, the Pani Panchayat is a three-tiered organization for medium irrigation projects and has four tiers for major irrigation projects as described below:

- (i) the primary level (all projects) consists of several chak committees;
- (ii) the secondary level (major projects) has a distributary committee, which is a federation of all the Pani Panchayats under the distributary canal;
- (iii) the project level of major projects has a project committee, which is a federation of all the distributary committees; for medium irrigation projects, a project committee is a federation of all the Pani Panchayats;
- (iv) a state level committee, which is constituted by the government, is composed of not more than 10 presidents of the project committees.

As specified under the Act, the major functions of Pani Panchayats shall be as follows:

- To prepare a cropping programme suitable for the soil and agro-climatic condition with due regard to diversification;
- To prepare a plan for the maintenance of irrigation system in the area of its operation at the end of each crop season and carry out the maintenance works with the funds of the Pani Panchayat;
- To regulate the use of water among the various



**Fig. 1.** Organizational Structure of Pani Panchayat  
(JE: Junior Engineer, DOWR: Dept. of Water Resources, DOA: Dept. of Agriculture, DAO: Dist. Agril. Officer, JAO: Junior Agril. Officer)

pipe outlets under its area of operation according to the warabandi (rotational water supply) schedule;

- To promote economy in the use of water allocated;
- To assist the revenue department in the preparation of demand and collection of water rates;
- To resolve disputes between the water users;
- To raise resources;
- To conduct regular water budgeting;
- To conduct annual audit of its accounts and periodical social audit, as may be prescribed.

For successful implementation of the Pani Panchayat program, the implementation process is divided into several phases: (i) preparation, (ii) assessment, (iii) organization, (iv) joint management, and (v) turnover. By 2006, this implementa-

tion process has resulted in irrigation management functions being transferred to as many as 57174 WUAs, covering about 10.32 million ha of command area of surface and lift irrigation projects in India (Table 2). The results from decentralized irrigation management are mixed and context-specific. The benefits that have accrued in most of the cases include an increase in irrigated area, improved maintenance, fewer water conflicts, crop diversification, improved interaction with the irrigation department, increased lobbying activity for common benefit, and improved water rate collection (Singh, 1991; Maloney and Raju, 1994; Svendsen *et al.*, 1997; Pant, 1999; Meinzen-Dick *et al.*, 2000; Parthasarathy, 2000; Marothia, 2005).

## Constraints in Implementing Participatory Irrigation Management

Crafting a new institution for the management of irrigation infrastructure through a social engineering approach is obviously a difficult task. Changing the mindset and ingrained attitude of farmers and officials of a water agency is not easy. Motivating farmers to form WUAs and to manage irrigation systems can result in many problems in the field, and these act as impediments to the formation of WUAs and their sustainability in the long term. Some major constraints in organizing farmers and operationalizing PIM, as documented by many research studies (Bardhan, 2000; Jairath, 2001; Reddy and Reddy, 2005) and as experienced by the authors in implementing PIM programs in Baghua and Hiradharabati medium irrigation projects in Orissa during 2002-2004, are discussed in the following sections.

### (i) Physical System Inefficiency

Due to resource constraints, most of the older irrigation projects suffer from several physical system inefficiencies. Many irrigation structures, such as head regulators, outlets, cross-drainage works, village road bridges, and falls, have deteriorated and are derelict. Siltation has affected reservoirs and canals, and these are in need of repair. Unless the faulty structures and canal networks are restored and become fully operational, there is little likelihood that farmers will take on the responsibility of operation and maintenance. Hence, it is imperative that irrigation structures be kept fully operational so as to facilitate a smooth transition of irrigation system to farmers. When modernizing and rehabilitating an irrigation infrastructure, WUAs should be involved and views of the farmers should be taken into consideration.

Before turning over the minor and sub-minor canals to WUAs for operation and maintenance, the project authority should hydraulically test the irrigation system in the presence of WUA executives and farmers. The water users of the concerned WUA should be satisfied that the canal is discharging the designed volume of water and that water is proportionately distributed in different reaches of the canal without any tail-end deprivation.

### (ii) Socio-economic Heterogeneity

Peasant agriculture is most often confronted with the problems of a heterogeneous and stratified society having several caste and class cleavages. In addition, there are political differences and farmers have different political affiliations and differences of opinion. In a socially and economically differentiated society, it is very difficult to inculcate community feeling and facilitate farmers' participation in irrigation management. The unequal production relations, community segregation, caste antipathy, class differential, and political differences observed among water users in a village or within a WUA have significant implications for the formation of a WUA and its sustainability. If the inter- and intra-village socio-economic and cultural conflicts are severe, organizing a WUA is difficult. The implementing personnel must use their ingenuity to overcome location-specific problems. A "learning by doing" approach should be followed to determine the model and modalities of organizing WUAs based on the socio-economic conditions, psychology, and cultural heritage of the farmers in the locality (Ananda and Crase, 2006).

As the boundaries of WUAs are determined on a hydraulic basis (i.e., minor or sub-minor), most of the WUAs cover more than one village. If historically the villages coming within the hydraulic boundary of a single WUA have a hostile relationship, this may pose a serious obstacle in forming a WUA.

### (iii) Capture of Power

Many problems develop during the election of committee members and office bearers of a WUA. Most of the office bearers are elected uncontested on consensus. Although this appears to be fair, in reality manipulation by the rural elite is quite rampant. Potential candidates are persuaded in various contrived ways not to contest the election. It is surprising to find that non-farmers, such as contractors, businessmen having charismatic leadership quality and political influence, are elected as farmers' leaders. Many consider holding a position in a WUA as a starting point for a political career. Although the election procedure as laid down in the Act has no provision for a political party role, the unwanted political interference in the election process creates many problems and creates barriers to



interaction between the water users.

The election of office bearers for WUAs should be fair, and no money or muscle power should be used to persuade or pressure the farmers into casting votes against their conscience. Success of any democratic institution depends on an enlightened and informed electorate. Therefore, the water users should be made aware of the details of the PIM program, such as the objectives and benefits of forming the WUA, its structure, the organizing procedure, functions, rights, and duties and responsibilities of different stakeholders as enshrined in the PIM Act. Utmost care should be taken to ensure that the rural elite do not capture power (Bardhan, 2002).

One important constraint that affects the efficiency and sustainability of a WUA is the lack of faith of water users in the credibility of office bearers or leaders. Unless the leaders are honest, dynamic, and farmer-friendly, the program may not be successful. The role of the office bearers, such as the president, secretary, and treasurer, is crucial for obtaining the intended benefits of the PIM program.

The general body and executive committee should meet regularly for making decisions on water management issues. Water users should be informed of the convening of each general body meeting and of all decisions and actions taken. No room should be left for arousing suspicion in the minds of water users regarding misuse of administrative and financial powers by the executives. A local accountability mechanism should be strengthened. In the Pani Panchayat Act of Orissa, 2002, there is a provision to recall the president of a Pani Panchayat if he is not responsive to the farmers' needs and misuses his power and position.

#### **(iv) Information, Education, Training, and Incentive Gaps**

In most of the transitioned irrigation projects, water users have little knowledge about the PIM program, such as the expected benefits, structure and functions of the WUA, rights, and duties and responsibilities of the Water Resources Department and the WUA, and their active participation is very low. The water users need to understand and appreciate the goals and objectives of the program. However, in some cases, farmers wrongly infer that

it is a government privatization process to divest the problem of distribution and operation by simply handing over the system to the farmers. Some farmers consider the operation and maintenance of the irrigation system to be the task of irrigation staff and feel that the department is shifting its responsibility and unnecessarily exerting extra pressure on farmers without providing any additional benefits. These types of misgivings and misconceptions pose an obstacle to the smooth formation of WUAs. Hence, farmers should be made aware of the pros and cons of the PIM program in its right perspective.

Farmers will form WUAs and will take on additional responsibility if they are convinced that the benefits due to participatory management will exceed their costs of participation. As most of the Indian farmers are not educated and lack vision to comprehend the future benefits of participation, motivating the farmers should focus on convincing them that the benefits from participation will be substantial, tangible, quick-yielding, and also sustainable. Farmers will not evince interest in a program introduced and implemented through a government directive. The Government of Orissa's Department of Water Resources has declared many incentives for forming a Pani Panchayat; these include annual maintenance grants and prizes for the best-performing Pani Panchayats. In transitioned projects, the department is providing grant-in-aid to each Pani Panchayat at the rate of Rs100 per ha. The Government of Orissa has increased the per-hectare water rate for a kharif paddy (Class I irrigation) from Rs39.54 to Rs100 in 1998 and again to Rs250 in 2002. Farmers are extremely reluctant to pay the increased water rates and have vehemently protested the arbitrary increase. As a consequence, the Government of Orissa has declared that 40% of the water charges collected from water users will be given to the concerned Pani Panchayat as an operation and maintenance grant. These incentives have induced the farmers to form Pani Panchayats to take advantage of the financial benefits. The Pani Panchayats should be financially viable if they implement proper resource mobilization measures, such as collecting membership fees, share capital, and water rates, and undertaking commercial activities, such as the sale of agricultural inputs and the marketing of outputs.

For sustainability of a Pani Panchayat, its activities need to be monitored and improved upon from time to time by applying learning by doing approach.

The WUAs will be able to operate and maintain the minors and sub-minor irrigation systems, provided their personnel have the expertise, technical knowledge, and ability to manage the irrigation system. Being aware of the need for capacity building, many state governments in India are providing appropriate managerial, technical, and financial training to office bearers of WUAs and farmers through Water and Land Management Institutes. Irrigation officials as well as field staff are also provided occasional training to develop the right mindset and technical expertise required for participatory irrigation management. During the joint management phase before taking over the operation and management of an irrigation system, the office bearers of a WUA should strengthen their knowledge and skills in the operation and maintenance of canal structures to address their concerns. There should be a good relationship and mutual reciprocity between the departmental irrigation engineers, field staff, and office bearers of WUAs, with the common objective being the improvement of the quality of the irrigation service for the benefit of the farmers.

### Conclusions and Policy Implications

In summary, the ultimate success and sustainability of WUAs depend on some fundamental factors, such as cohesiveness, common interest and collective efforts of water users, effective leadership of office bearers of WUAs, capacity building of farmers and irrigation officials, political will of the party in power, bureaucratic commitment of irrigation executives, governmental patronage, legal support, financial viability of WUAs, proper monitoring and evaluation, and catalyzing role of the change agents.

While introducing institutional and organizational change in the management of an infrastructure, which is crucial for agricultural production and a common pool resource, a careful and cautious approach should be followed. We suggest the following measures for the effective implementation of PIM through formation of WUAs and strengthening them to efficiently carry out the devolved irrigation management functions in a sustainable

manner:

- ◆ As far as possible, the formation of WUAs should be need-based and demand-driven. The WUAs should be endogenously created based on identified needs, common interests, and collective effort. The existing social capital, such as social networks, kinship ties, and community solidarity, should be used to foster WUAs. The approach should be a synthesis of a bottom-up and top-down approach having proper synergy. There is no model to be prescribed for adoption; the WUA should be location-specific and flexible.
- ◆ Successful implementation of a PIM program requires involvement and cooperation of multiple stakeholders, including farmers, the state government, the Department of Water Resources, the Department of Agriculture, the Department of Revenue, and the implementing NGOs. Political will of the party in power and bureaucratic commitment are essential for decentralizing irrigation management. The role of both external and internal change agents is important in speeding up the process.
- ◆ The dilapidated irrigation system should be improved and a fully operational and fault-free irrigation system should be turned over to WUAs for its operation, maintenance, and management.
- ◆ The organizing efforts should be closely integrated with physical improvements to ensure that the farmers are committed to maintaining the improvements.
- ◆ Farmers' representatives should not misuse their power. There should be transparency and accountability to member farmers. The Department of Water Resources must support the group decision regarding their internal affairs and refrain from interfering.
- ◆ The WUA should become a socially inclusive institution by reserving seats on the executive committee for women, Scheduled Castes, Scheduled Tribes, and weaker sections. Women's requirements should be addressed during the planning and designing stages of the irrigation structures.
- ◆ Not only landowners but also other users of water, such as fishermen, artisans, livestock rearers, and agroindustries, should be allowed

to send representatives to the executive committee to voice specific problems.

- ◆ Regular monitoring and evaluation of the PIM program is necessary for rectification and improvement.
- ◆ Appropriate managerial, financial, and technical training should be provided to office bearers of WUAs in order to build their capacity for managing the irrigation system efficiently. Irrigation officials as well as field staff should be provided with occasional training in order to develop the right mindset and technical expertise required for PIM.
- ◆ There should be downward accountability of irrigation officials to client farmers.
- ◆ WUAs should have proper legal status and a clear water right. The Department of Water Resources should supply canal water through an agreement between the WUA and the Department.
- ◆ There should be a regulatory body to adjudicate any conflict or breach of contract between WUAs and the Department. This body would set the criteria and principles for fixation of the water rate and regulate the levy of water rates by the WUA.
- ◆ Land reform measures should be undertaken to recognize and record tenancy contracts so that tenants, who constitute an important segment of the peasantry, can become members of the WUA.
- ◆ Setting targets based on benchmarks is necessary in order to identify shortfalls in the achievements of the PIM and to improve performance. Benchmarking is a continuous process of measuring one's own performance and practices against those of the best competitors and learning from other's experiences. Opportunities for improvement are identified by conducting an internal assessment and comparing the progress towards meeting benchmark targets with the best-performing WUAs to determine performance gaps between current practice and best practice. Selected best practices can then be suitably adopted to fit into a WUA's need and implemented to make it effective and sustainable.
- ◆ PIM is a tool to improve irrigation system performance with the ultimate goals of increasing

agricultural productivity, thereby providing food security and sustainable rural livelihoods. Comprehensive micro-planning, including crop planning, market mapping, and various farm and nonfarm livelihood options, are considered to be functions of a WUA. Decentralization of irrigation management should be accompanied by an agricultural intensification program to increase agricultural productivity. The WUAs should be multifunctional. Along with the management of water, WUAs need to facilitate the timely supply of good-quality agricultural inputs, such as improved seeds, fertilizer, farmyard manure, and farm implements, at reasonable prices. The WUAs may also adopt other allied activities, such as technology transfer, providing micro-finance through the formation of self-help groups, postharvest management, marketing of agricultural produce, and agro-processing for value addition, so that agriculture can be a profitable enterprise.

To conclude, the various factors that impinge on the effectiveness and sustainability of WUAs can be grouped into internal factors (intrinsic to the farmer community), such as inequality, leadership, education, urban access, scale of farming, land tenure, commercialization of agriculture, and occupational diversification, and external factors, such as water governance, the legal and policy framework, rural institutions, financial and technical assistance, land reforms, agricultural policies, input delivery, and markets. Indeed, in India, integrated and comprehensive reform is necessary to ensure that the WUAs are an effective and successful institution for increasing irrigation efficiency, enhancing agricultural productivity, and improving rural livelihoods.

### References

- Ananda, J. and Crase, L., 2006. A Preliminary Assessment of Water Institutions in India: An Institutional Design Perspective. *Review of Policy Research* 23 (4).
- Baland, J.-M. and Platteau, J.P., 1996. *Halting Degradation of Natural Resources: Is there a Role for Rural Communities?* FAO and Clarendon, Oxford, England.
- Bardhan, P., 2002. Decentralization of Governance and Development. *Journal of Economic Perspectives*. 16 (4), 185-205.
- Bardhan, P.K., 2000. *Irrigation and Co-operation: An Empirical Analysis of 48 Irrigation Communities in South India.* Economic Development and Cultural Change.

- 48 (4), 847-865.
- Bharadwaj, K., 1990. Irrigation in India: Alternative Perspectives, ICSSR Research in Economics. Second Survey, Monograph — 3.
- Brewer, J.S., Kolavalli, S., Kalro, A.H., Naik, G., Ramanarayan, S., Raju, K.V. and Sakthivadivel, R., 1999. Irrigation Management Transfer in India: Policies, Processes and Performance. Oxford and IBH publishing House, New Delhi, India.
- Chambers, R., 1988. Managing Canal Irrigation: Practical Analysis from South Asia. Oxford University Press, New Delhi, India.
- Dhawan, B.D., 1988. Irrigation in India's Agricultural Development: Productivity, Stability and Equity. Sage Publisher, New Delhi, India.
- Government of India, Ministry of Water Resources, 1987. National Water Policy.
- Government of India, Ministry of Water Resources, 2002. National Water Policy.
- Government of Orissa, Pani Panchayat Act, 2002.
- Groenfeldt, D., 2000. News Letter, International Network for Participatory Irrigation Management (INPIM). <http://www.inpim.org/>
- Hooja, R., Panagare, G. and Raju, K.V., (eds.), 2002. Users in Water Management. Rawat Publisher, Jaipur, India.
- Jairath, J., 2001. Water User Associations in Andhra Pradesh, Center for Economic and Social Studies, Hyderabad., Concept Publisher, New Delhi, India.
- Kar, G.C. and Swain, M., 2000. (eds.), Farmer and Local Participation in Irrigation Management. Commonwealth Publisher, New Delhi, India.
- Maloney, C. and Raju, K.V., 1994. Managing Irrigation Together: Practice and Policy in India. Sage Publisher, New Delhi, India.
- Marothia, D.K., 2005. Institutional Reforms in Canal Irrigation System: Lessons from Chhattisgarh. Economic and Political Weekly. 40, 3074-3084.
- Meinzen-Dick, R., Mendoza, M., Sadoulet, L., Abiad-Shields, G. and Subramanian, A., 1997. Sustainable Water User associations: Lessons from a Literature Review. In Subramanian, A., Jagannathan, N.V., Meinzen-Dick, R., (eds.); User Organizations for Sustainable Water Services, World Bank Technical Paper No. 354.
- Meinzen-Dick, R., Raju, K.V. and Gulati, A., 2000. What Affects Organization and Collective Action for Managing Resources? Evidence from Canal Irrigation Systems in India. EPTD Discussion Paper No. 61, Environment and Production Technology Division, International Food Policy Research Institute, Washington, D.C.
- Mitra, A.K., 1996. Irrigation Sector Reforms - Issues and Approaches. Economic and Political Weekly. 31 (13). A 31-37.
- Ministry of Water Resources, Government of India, 2006. [http://www.wrmin.nic.in/The Orissa Pani Panchayat Act, 2002.](http://www.wrmin.nic.in/The%20Orissa%20Pani%20Panchayat%20Act,%202002)
- Pant, N., 1999. Impact of Irrigation Management Transfer in Maharashtra: An Assessment. Economic and Political Weekly, 34 (13), A17-A26.
- Parthasarathy, R., 2000. Participatory Irrigation Management Programme in Gujarat: Institutional and Financial Issues. Economic and Political Weekly. 35 (35-36), 3147-3154.
- Saleth, R.M., 1999. Irrigation Privatisation in India: Options, Issues and Experience. Economic and Political Weekly. June 26, pp.A86-A92.
- Sengupta, N., 1991. Managing Common Property: Irrigation in India and the Philippines, Sage Publisher, New Delhi, India.
- Reddy, V.R. and Reddy, P.P., 2005. How Participatory Is Participatory Irrigation Management? Water Users' Associations in Andhra Pradesh. Economic and Political Weekly, 40 (53), 5587-5595.
- Singh, K.K., 1991. (ed.) Farmers in the Management of Irrigation Systems. Sterling Publisher, New Delhi, India.
- Singh, K., 1994. Managing Common Pool Resources: Principles and Case Studies, Oxford Publisher, New Delhi, India.
- Svendsen, M. and Gulati, A., (eds.), 1995. Strategic Changes in Indian Irrigation. ICAR, New Delhi. IFPRI, Washington DC, USA.
- Svendsen M., Trava, J., Johnson III. and Sam H., 1997. Participatory Irrigation Management: Benefits and Second Generation Problems. Economic Development Institute, World Bank.
- Swain M., 1998. Water Rate Fixation in Major and Medium Irrigation Projects in Orissa: Issues and Problems. Water and Energy International. 55 (2), 63-72.
- Swain, M. and Das, D.K., 1999. Emerging Trends and Reforms in Irrigation in India: A Perspective of Orissa, MD Publisher, New Delhi, India.
- Swain, M., 2005. Organizing Farmers for Water Management in Orissa: Policies, Programmes and Implementation. Indian Association of Social Science Institutions Quarterly. 24 (1), 102-128.
- Vaidyanathan, A., 1994. 'Better Resource Management for Poverty Alleviation', Economic and Political Weekly. 31 (23), 1397-1404.
- Vaidyanathan, A., 1999. Water Resource Management: Institutions and Irrigation Development. Oxford Publisher, New Delhi, India.
- Wade, R., 1987. Village Republics: Economic Conditions for Collective Action in South India. Cambridge University Press, Cambridge, England