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Preface

Most of irrigation systems, whether large or small, are reported to have serious problems relating to the distribution of water and its use efficiency. The irrigation department, which is responsible for building, operating and maintaining the structures, has been found to be inadequate for keeping the systems in proper shape. Importantly all the governments are short of funds necessary to carry out the repair and maintenance work of the systems. Therefore, a solution that has been tried in various places is participatory irrigation management (PIM) or irrigation management transfer (IMT) to water user group. At present most state governments in India encourage the formation of water user group and transfer the responsibility of operation, maintenance and management of the system to it. The efforts undertaken were based on the assumption that the things could be set right by the organization of irrigators / farmers at local level. There have been achievements as well as criticisms of these efforts, which are attributed to the differential functioning of the groups depending upon the circumstances at local level, management at higher level of the system and group dynamics. There are certain factors, which influence functioning and effectiveness of water user groups and in this regard a strategy for the mobilization of effective water users group is of paramount importance. Irrigation management is shifting from a culture of supply management to that of demand management. In this context, present study was conducted to study the water user group dynamics and formulation of strategy for strengthening the efforts under PIM programmes. A conceptual model and group dynamics effectiveness index have been developed and used to understand group dynamics effectiveness of selected groups identifying important dimensions contributing to it followed by the conceptualization of the steps to mobilize water user groups for PIM. The findings of this study are discussed in this bulletin. It is hoped that the information presented in this bulletin will be useful to the researchers, policy makers, development officials and others who want to make further progress in their respective activities related to participatory irrigation management and thereby benefiting the farmers.

The authors are grateful to the Director General, Deputy Director General (NRM) and Assistant Director General (IWM), ICAR for their support in carrying out this research work. Our sincere thanks are also due to all the colleagues and staff members of WTCER, Bhubaneswar for their help at the time of need. Thanks are also due to all the selected respondents including farmers for their co-operation and responses during the study.

AUTHORS

CONTENTS

EXECUTIVE SUMMARY

Participatory Irrigation Management (PIM) Programme has been implemented by the government through the formation of water user group (WUG) / water users association (WUA) with the assumption that farmers' group can take up the responsibility of management below the outlet level resulting into higher irrigation efficiency and efficient management of the system. However, group dynamics plays pivotal role in the functioning of group in an efficient manner; there are certain factors, which influence on group functioning and group effectiveness. In this context present study was undertaken to explore the nature and functioning of water users groups, to study the group dynamics of selected groups and to identify the important dimensions contributing to it, to assess the influence of economical, communicational and socio-psychological characteristics of group members on group dynamics and to formulate a strategy for the mobilization of effective water user group for participatory irrigation management.

The study was conducted in the state of Orissa, where concerted efforts have been made since 1996 to ensure people's participation in irrigation management through farmers' group i.e. *Pani Panchayat* / WUA. A total of 17 different groups (4 *Pani Panchayats* under lift irrigation (LI) projects, 2 WUAs under minor irrigation projects, 2 *Pani Panchayats* under major irrigation projects and 9 small WUGs formed under NATP-Coastal project) were selected from which 218 farmers were chosen as the respondents.

Group Dynamics Effectiveness Index (GDEI) was formulated to measure group effectiveness of selected groups identifying different dimensions and their relative importance in it. The development of GDEI initiated with item analyses following Likert's summated ratings method and indexing the items with respect to respective weightage delineated through scale product method. The GDEI included ten items *viz.* participation, decision making procedures, operation, maintenance & management functions, interpersonal trust, fund generation, social support, group atmosphere, membership feelings, group norms and empathy, which received different weights for calculation of overall group dynamic effectiveness. The study is accomplished following interview schedule survey of selected member-farmers of the groups.

There is a gap between the prescribed and performed functions of the selected *Pani Panchayats* / WUAs / WUGs. The gap is wider in case of major irrigation *Pani Panchayats*. However, farmers' group functions effectively in managing the relatively smaller system like minor and lift irrigation where the system is fully turned over to the group.

Group dynamics effectiveness indexes of selected groups revealed that most of the parameters of the index were perceived highly by the farmers of lift irrigation *pani*

panchayats followed by minor irrigation WUAs while it was quiet low for many of the parameters (participation, decision making procedure, group atmosphere, empathy, interpersonal trust and social support) in case of major irrigation *pani panchayats;* most of the parameters are found to be at medium level in case of small WUGs. The groups are varied in their functioning with differential levels of the parameters of GDEI.

Overall group effectiveness of different types of groups in decreasing order was *pani panchayats* under lift irrigation command, WUAs under minor irrigation command, small WUGs and *pani panchayats* under major irrigation command. The differential group effectiveness may be attributed to the temporal and spatial variation in the irrigation command areas where the groups are functioning. Unlike the major irrigation, in case of both lift and minor irrigation farmers' group has the control and access over the resources because of irrigation management transfer. It has created an ownership feeling leading to the effective group performance and better management of the system.

Socio-personal, economical, communicational and psychological characteristics of group members significantly influenced group dynamics effectiveness. Evidently education, caste, farm size, income, social participation, scientific orientation and attitude of group members were significantly related with group dynamics effectiveness.

Strategy for mobilization of effective user group for participatory irrigation management was developed for 3 distinct phases viz. group formation (0-3 months), group stabilization (4-15 months) and group independency phase (16-36 months) in which 8 main steps and 45 sub-steps were conceptualized.

1. INTRODUCTION

India has an extensive government controlled irrigation system; however, it faces difficulty of managing irrigation in existing command areas resulting into low irrigation efficiency. All most all governments are short of funds necessary to carry out the repair and maintenance work of the systems (Tanwar, 1998 and Parthasarathy, 2000). Inequitable water distribution among the farmers over space and time leads to the injudicious use of water in the irrigation commands. Farmers at head reach of water delivery system under the irrigation scheme have an advantage in terms of water allocation over their fellow farmers down the laterals (Ghosh *et al*, 2005). An unpredictable water supply encourage top-end users to take more water than they actually need in order to protect themselves against any future uncertainty of water supply. This leads to the waste of water resources and increase in inequity within the same unit of command area.

It is perceived that the capacity to cater to adequate operation and maintenance requires involvement of farmers (Chambers, 1988). Organised farmers group activity can manage the systems (Wijayaratna and Valdez, 1996; Karunasena, 1997). Keeping this in view, Participatory Irrigation Management (PIM) Programme has been implemented by the government with the formation of users group / Water Users Association (WUA). The objectives of PIM are: to initiate participation of farmers in water management, irrigation scheduling, distribution and maintenance of a system at micro level; to develop a sense of economy in water use among the users; to allow the users a choice in selecting crops, cropping sequence and timing of water supply; to delineate responsibility in water distribution and maintenance of a system between the users and the departments for attaining high serviceable standards; to promote incentives to the farmers; to entrust collective and community responsibility on the farmers to collect water charges and payments to governments; to improve deliveries as per crop needs and; to create a healthy atmosphere between the managers and the users in the entire operation (Misra, 1993).

Farmers are the first and main stakeholders in a water management programme. Being key persons they have been utilizing and managing land and water based resources for generations. They exactly know what is going on in their surroundings and determine the fate of their environment on which depend their future livelihoods; therefore, they are the real decision-makers (Pramanick and Mallick, 1996). Organised irrigators' associations (WUA) are expected to serve as channels for feedback and feed forward information to improve the performance and services provided by irrigation department (Ferrer and Lucero, 1998). WUA ensures voluntary and active involvement of partners in all decisions related to objectives and activities as well as direct involvement in the execution of the activities themselves under water management programme. It develops a process and group dynamics in which affected

populations collectively discuss and find out ways and means to tackle their own problems rather than waiting for others to do it for them (Samad and Vermillion, 1999).

The group dynamics plays pivotal role in the functioning of group in an efficient manner. There are certain factors, which influence on group functioning and group effectiveness. Formulation of a strategy for the mobilization of effective users group for participatory water management is of paramount importance. In this context, a study was carried out with the objectives to explore the nature and functioning of water user groups under PIM programme, to study the group dynamics effectiveness of selected user groups for PIM and to identify the important dimensions contributing to it, to assess the influence of economical, communicational and socio-psychological characteristics of group members on group dynamics and to formulate a strategy for the mobilization of effective user group for PIM.

2. METHODOLOGY

The location of study and progress of PIM, conceptual model, group dynamic effectiveness index (GDEI), sampling plan, data collection and data analyses based on the objectives are discussed below:

2.1 Location of the Study

The study was conducted in the state of Orissa, where concerted efforts have been made since 1996 to ensure people's participation in irrigation management through farmers' group i.e. *Pani Panchayat* / WUA. The geographical extent of the programme covers the entire State comprising of about 16.00 lakh hectares of Major, Medium & Minor irrigation command areas in all the 30 districts of Orissa (Department of water resources, Govt. of Orissa, 2001).

***Pani Panchayat* (PP) / Water User Association (WUA) in Orissa**

Conforming to the policy guidelines of National Water Policy (1987) and State Water Policy of Orissa (1994), the government of Orissa with a view to providing equitable, timely and assured irrigation has introduced the concept of *Pani Panchayat* for PIM. The concepts finally lead to transfer of tertiary irrigation networks (Minor/Sub-minors) to registered *Pani Panchayat*s. The responsibility of operation and maintenance (O&M) of the reservoir/diversion weir (as the case may be), dam, spillways, sluices, primary and secondary distribution networks etc. rests with the Department of Water Resources, where as the responsibility of O&M of the tertiary systems i.e. (Below minor/sub-minor) is with *Pani Panchayat*. This programme envisages making farmers to participate in the water resources planning and management and to hand over the system to the farmers for which suitable legislation has already been done. The Orissa *Pani Panchayat* Act-2002 and Orissa *Pani Panchayat* Rules-2003 are concrete steps in this direction (Department of Water Resources, Govt. of Orissa, 2001)

A *Pani Panchayat* / WUA is an association of all persons owning land within a hydraulically delineated portion of the command area ranging in size approximately from 300 to 600 ha. In case of major / medium / minor irrigation project, it may be in respect of minor or sub-minor or direct outlets from the main or branch distributary of the project. In case of lift irrigation or minor flow irrigation projects, the area is limited to project command area when the project command area is less than 300 ha.

Pani panchayat is in three tiers for Medium and four tiers for Major Irrigation Projects consisting of farmer organization, as indicated below:

i. *Pani Panchayat* at primary level consisting of several *Chak* or Outlet Committees

ii. Distributary Committee at secondary level (major projects) as a federation of all the *Pani Panchayats* under the distributary

iii. A Project Committee at project level as a federation of all Distributary Committees for major projects. Similarly for medium irrigation projects, a Project Committee at project level is a federation all the *Pani Panchayats*.

In case of minor irrigation having larger ayacut area it may be three tier otherwise it is two tiers i.e. at primary level consisting of several Chak or Outlet Committees and at secondary level *Pani Panchayat*. Similarly in lift irrigation and small tanks with around 40 ha. ayacut area it is single tier i.e. *Pani Panchayat*.

The primary objectives of the PIM through *Pani Panchayat* are the following:

- To create awareness amongst farmers in the irrigated commands towards the benefits of formation of *Pani Panchayat*
- To create a feeling of unity and brotherhood among fellow farmers
- To create a feeling among the farmers to visuals the created irrigated potentials as their own rather than that of Government
- To build confidence amongst farmers regarding better returns once equitable, timely irrigation supplies are assured
- To convince farmers for going for cash crops under crop diversification programme to get better returns on their investments
- To arrange training and workshops at State, District, Block and Panchayat levels with the help of experienced resource persons on PIM

Advantages envisaged are:

- Guarantee of getting full share of water through "Quota of water"
- Right for suggesting (Apex Committee) improvements in the Main System Management, water delivery schedule etc. at the project level

- Participation in operation, maintenance and management of the system
- Freedom of deciding own cropping pattern within the allocated water
- Through and timely maintenance for guarantee of drawing full allocated water
- Concession in water fees for collective bulk water supply
- Better service and amicable settlement of disputes in the use of water
- Better assistance from Department of Agriculture in all aspects of crop husbandry
- Own bank account for carrying out need-based maintenance

Formulation and working procedure:

(a) *Pani Panchayat*s are formed on a three-tier system with two informal associations and one formal association on minor/sub minor basis comprising an ayacut ranging between 300 to 600 ha.

(b) Chak committee is formed taking farmers one each from high land, middle land and low land areas of an outlet. A representative from the chak committee is a member of the executive body of the *Pani Panchayat*

(c) Each beneficiary within the concerned minor/sub minor qualifies to be member of the concerned *Pani Panchayat*

(d) For registration of *Pani Panchayat*, a minimum of 51% of the beneficiaries or beneficiaries possessing 60% of command is required to be members. To be eligible as a member in *Pani Panchayat*, a token money of Rs. 10 or as is decided by, is collected as membership fee. Registration of the *Pani Panchayat* is done along with necessary document like bye-law, general body resolution etc. by depositing necessary among with the registering authorities.

(e) A fund is created in the form of share capital from the members of *Pani Panchayat* in order to take up maintenance work of canals or to attend any work of emergent nature. The authorized office bearers of the *Pani Panchayat* used to spend this.

Prescribed functions and responsibilities of *Pani Panchayat*:

a) The *Pani Panchayat* will assume full responsibility for operation and maintenance of the minor/sub-minor and all structures turned over to it. It will also ensure construction/maintenance and repair of all the watercourses, field channels, field drainage in the said area as covered under the agreement jurisdiction of it. For this purpose, the *Pani Panchayat* will establish its own operation and maintenance fund (O&M fund) to meet the operation and maintenance expenditure. The following items of work are included in repair and maintenance work, namely:

i) Removal of silt from minor/sub-minor/water courses/field channels and field drains and proper upkeep of the same

ii) Repair and maintenance of inspection path and service road to keep them in good condition

iii) Removal of grass, shrubs and bushes from the canal embankments and beds

iv) Repairs and maintenance of all structures in the distribution system so handed over for operation and maintenance to keep them in good working condition

v) Earth work to restore banks to proper shape and profile

vi) Repairs to lining, painting, plastering, replacing damage portion, repairs to masonry and other structures, etc.

b) The *Pani Panchayat* will ensure construction, maintenance and repair of all the watercourses, field channels, field drains and other drains structure within the jurisdiction of the Water User's Association.

c) The *Pani Panchayat* will protect the entire system covered under the said area within its jurisdiction from any damage whatsoever.

d) The *Pani Panchayat* will undertake/suggest measures for improved water management at the level of minor/sub-minor.

e) The *Pani Panchayat* will receive water from the Government and shall distribute it amongst the water users, whether members or non-members according to the requirement of their area under crop. It will observe economy and equitability in this regard. Wherever possible water shall be supplied for Water User's Association on volumetric basis. It will organize better and improved water management methods at the farm level. It will decide for internal distribution of water.

f) The *Pani Panchayat* will have the right to decide its own cropping pattern within the allocated water.

g) The *Pani Panchayat* may ask for and obtain from the Department of Water Resources information on planned operation and maintenance activities in the entire system. It may also request and obtain assistance from the concerned Assistant Engineers of Department of Water Resources and the plant for operation and maintenance in the concerned distributories/minors/sub-minors for proper asset management.

h) The *Pani Panchayat* may obtain permission from Government in Water Resources Department through the concerned Executive Engineer to utilize any unutilized land acquired by the Government in Department of Water Resources. The *Pani*

Panchayat will notify to the project authorities promptly if there is any damage due to unforeseen natural calamities like earthquake, heavy rains etc.

i) The *Pani Panchayat* will facilitate collection of water rates from the members/ non-members of the Association and establish its own fund in bank account.

2.2 Conceptual Model of the Study

Based on the review of literature and objectives of the study a conceptual model was developed. The conceptual model (Fig. 1) shows interrelationship between dependent variable, i.e. group dynamics effectiveness of WUA and independent variables like nature and functioning of WUA, socio-personal, socio-economic, psychological/ attitudinal and communicational variables of the group members. The "Group Dynamics Effectiveness" (GDE) has been operationally defined as the sum total of forces among the members of group based on certain sub-dimensions. WUA / *Pani Panchayat* under PIM programme has been considered for present study. It could be assessed with respect to it's different parameters *viz.* Participation, Decision making procedures, Operation, Maintenance & Management functions, Interpersonal trust, Fund generation, Social support, Group atmosphere, Membership Feelings, Group norms and Empathy.

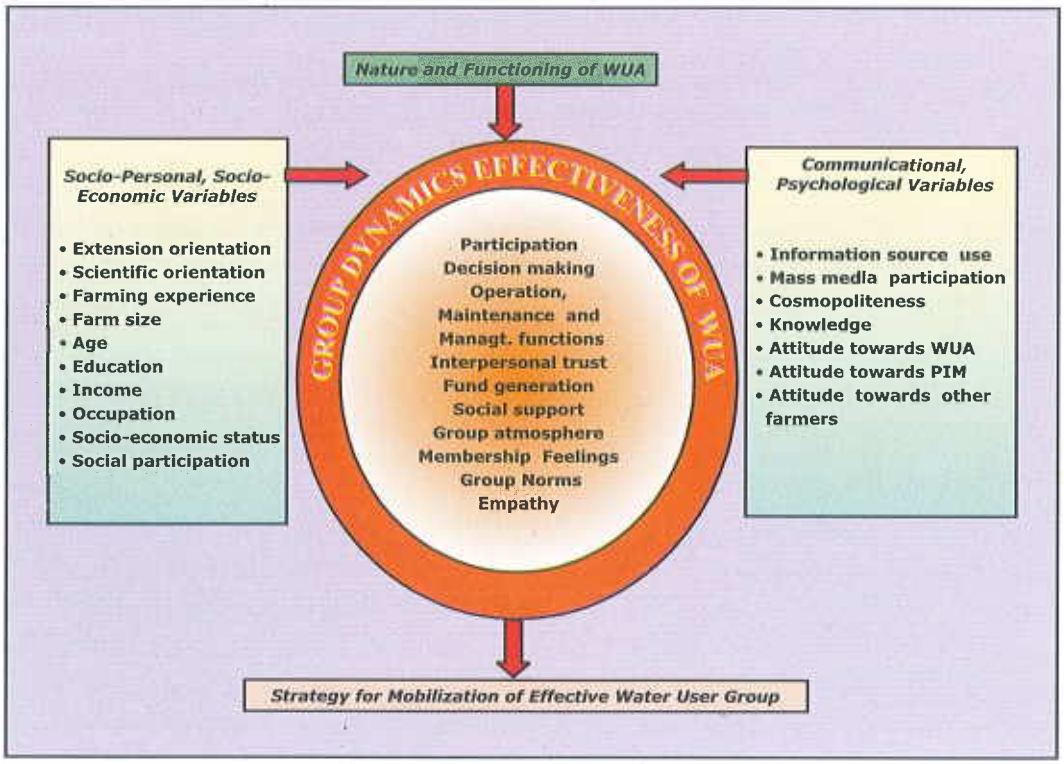


Fig.1 Conceptual model of the study

2.3 Group Dynamics Effectiveness Index (GDEI)

Group Dynamics Effectiveness Index (GDEI) was formulated through following steps:

- An universe of items/parameters (25 for present study) was selected to include in a questionnaire to be judged by a sample of experts with respect to relevancy of each parameter in group dynamics
- Questionnaire survey of 40 experts (associated directly or indirectly with PIM programme) was carried out to assess content validity of each item and importance with respect to group dynamics effectiveness
- Screening of items to include in GDEI was done on the basis of statistical analyses as per Likert's method of Summated Rating Technique of Scale Construction
- Weightage to each of the 10-12 screened items in GDEI was put following Scale-Product Methodology

The development of GDEI initiated with selection of 25 items, which may influence group dynamics effectiveness followed by item analyses following Likert's summated ratings method and indexing the items with respect to respective weightage delineated through scale product method. For selection of items to be included in GDEI according to Likert's methodology, the respondents were divided into two groups *viz.* group of twenty respondents with higher scores referred as high group and group of rest twenty respondents with lower scores referred as low group. The 't' value for each selected item was calculated using following formula and items were screened by arranging in rank order according to 't' values in decreasing order.

$$t = (\overline{X}_H - \overline{X}_L) / (S_H^2 / n_H + S_L^2 / n_L)^{1/2}$$

Where,

$\overline{X}_H$ = the mean score on a given item for the high group

$\overline{X}_L$ = the mean score on same item for the low group

S_H^2 = the variance of the responses of high group

S_L^2 = the variance of the responses of low group

n_H = the no. of respondents of high group = 20

n_L = the no. of respondents of low group = 20

The GDEI included ten items, which were Participation, Decision making procedures, Operation, Maintenance & Management functions, Interpersonal trust, Fund generation, Social support, Group atmosphere, Membership Feelings, Group norms and Empathy. The 't' value, mean evaluatory score of each selected item and respective standard deviation value are presented in Table 1.

Table 1: Item analyses to develop Group Dynamics Effectiveness Index (GDEI)

Sl. No.	Items of GDEI	Mean evaluatory score (n=40)	Standard deviation (n=40)	't' value
1.	Participation	4.83	0.38	7.13
2.	Decision making	4.26	0.72	6.64
3.	Operation, maintenance and management functions	4.18	0.84	6.56
4.	Interpersonal trust	4.15	0.71	6.22
5.	Fund generation	4.13	0.83	5.43
6.	Social support	4.03	0.83	5.24
7.	Group atmosphere	4.00	0.92	4.33
8.	Membership feeling	3.97	0.87	4.32
9.	Group norms	3.66	1.15	3.58
10.	Empathy	3.62	0.83	2.70

Thereafter, to identify cruciality of ten items of GDEI, respondents were asked to assign weightage for each item in the range of 0 to 100, based on the importance it attached to measuring GDE in such a manner as to get a total of 100 for all the identified relevant items. The cruciality of each item referred to its importance in measuring GDE of WUA. The final framing of GDEI along with the selected items and respective weightage is depicted in Fig. 2. It is evident that the weightage of the items varied from 5 to 20 percent. Participation was perceived as most crucial item in GDEI with 20 per cent weightage followed by Decision-making (15%), Operation, maintenance and management functions (12%) and rest of the items.

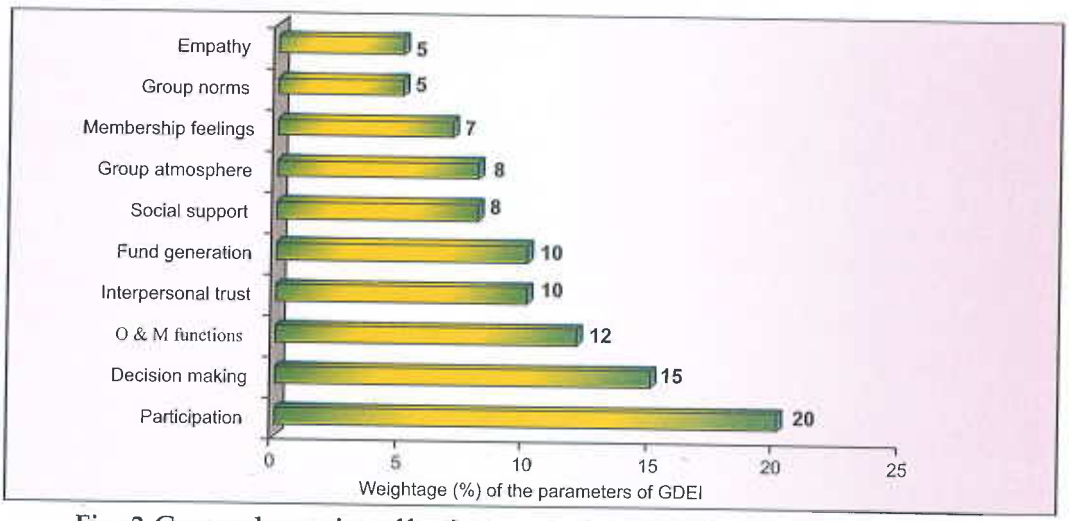


Fig. 2 Group dynamics effectiveness index (GDEI) with its parameters

2.4 Sampling Plan

Sampling plan for selection of groups *viz. Pani Panchayat* / WUA and respondents followed stratified random sampling method as indicated below:

- 2 *Pani Panchayats* under major irrigation projects were selected:
  - Distributary no. 1 of *Taladanda* canal: *Dharina* minor at Biribati in Cuttack district (a sample 30 farmers were chosen as respondents)
  - Delang distributary of *Sakhi Gopal* branch canal: *Pipili-Sasan* minor in Puri district (a sample of 20 farmers were chosen as respondents)
- 2 WUAs under minor irrigation projects (MIP) were selected:
  - Koska (MIP) in Nayagarh district (a sample of 20 farmers were selected as respondents)
  - Devijhar (MIP) in Ganjam district (a sample of 19 farmers were selected as respondents)
- 4 *Pani Panchayats* under lift irrigation (LI) projects were selected:
  - Bahalpada II and III LI projects in Cuttack district (a sample of 30 farmers were taken as respondents)
  - Asalpur LI project in Jajpur district (a sample of 20 farmers were taken as respondents)
  - Badadhuleswar LI project in Cuttack district (a sample of 20 farmers were taken as respondents)
- 9 small Water user groups (WUGs) formed at Ersama (3 pump user groups and 3 tank user groups) and Astarang (3 pump user groups) in Jagatsinghpur and Puri district, respectively, under NATP-Coastal (a sample of 59 farmers as respondents) project were selected

Thus a total of 17 different groups were selected and 218 farmers were chosen as the respondents.

2.5 Data Collection and Analyses

The study is accomplished following interview schedule survey of selected farmers. Interview schedule (see Annexure) included socio-personal, socio-economic, attitudinal variables and the GDEI as an instrument developed during study. Group dynamics effectiveness (GDE) was studied on the basis of ten different parameters in GDEI, which received different weights in calculation of overall group effectiveness. Individual farmer's responses were recorded on various statements under each parameter of GDEI. Linguistic expression of the farmers was quantified on 3-point continuum (2-agree, 1-undecided and 0-disagree for favourable statement and reverse score for unfavourable statement). An analysis of the attitude of the farmers towards PIM is made on the basis of their agreement or disagreement on various statements.

The aggregate of farmers' responses was derived through calculation of mean value and variations in their opinions were realized through standard deviation values. A correlation analysis was done to understand association of characteristics of group members with group dynamics effectiveness.

On the basis of lessons drawn from present findings, drawing experiences from selected different types of groups and focus group discussion with farmers and officials a strategy was formulated to mobilize effective group for PIM.

3. FINDINGS AND DISCUSSION

3.1 Gap between Prescribed and Performed Functions of Selected Groups

3.1.1 Pani Panchayat (PP) / Water User Association (WUA)

The selected *Pani Panchayats* / WUAs differ in their performed functions with each other. However, most commonly performed functions are as follows:

- Preparing and maintaining an inventory of the irrigation system, member-farmers, natural resources (common land, water bodies, etc) within the WUA's area of operation
- Operation and maintenance of irrigation system in its jurisdiction
- Ensuring construction, maintenance and repair of all the watercourses, field channels, field drainage in the said area
- Preparing cropping programme in its area
- Collection of water rates
- Establishing its own operation and maintenance fund (O & M fund) to meet the operation and maintenance expenditure
- Accounting and record keeping

It is evident that there is a gap between the prescribed and performed functions of *Pani Panchayats* / WUAs. The gap is wider in case of the *Pani Panchayats* under major irrigation projects. The efforts under PIM are mainly based on the assumption that problem related to irrigation system at lower level of distribution could be set right by organization of farmers/irrigators at the local level. During present study it is felt that without changes in management of higher levels it is unlikely that local level farmers' organizations will be successful over time. Farmers can effectively manage the relatively smaller system like minor irrigation and lift irrigation where the system is fully turned over to the group following the concept of irrigation management transfer or participatory irrigation governance rather than the participatory irrigation management. In this context there is a need for policy intervention, which will give the farmers' association real decision-making power in managing the irrigation system as a whole system. There are successful evidences in case of minor and lift irrigation systems those are mostly farmer managed systems; however, unreliable water supply

from the main system to the lower levels is a major problem that influences the functioning of *Pani Panchayats* under major and medium irrigation projects. Several socio-economic and political factors out side the water sector influence the irrigation management. The issues of rights are beginning to enter the debate on Indian irrigation, but it needs a lot of attention (Mollinga, 2005).

3.1.2 Small Water User Group

The super cyclone of October 1999 severely damaged basic natural resources, land and water of fragile agro-ecosystem of coastal Orissa, which is characterized with traditional rice cultivation practices with low and unstable yield and resource poor farmers engaging in complex and risk prone agriculture. In this context, during post cyclone period Water Technology Centre for Eastern Region (WTCER) has taken a leading role on participatory development and management of water resources in cyclone-affected area (Astarang and Ersama blocks of Puri and Jagatsinghpur district, respectively, were selected for present study) under National Agricultural Technology Project.

Lack of power/energy for lifting the water was major constraint in utilization of the water resources. It was planned to have strategies to provide power/energy for lifting the water from existing water resources following participatory approaches. Accordingly, in view of small and fragmented holdings pump user groups (8 in Astarang and 12 in Ersama) were formed and one pump was given to each group. Each group has decided to collect a nominal rent as a part of group's fund generation process. The decision on quantum of rate was left to the user group and it varied from Rs. 10/- to Rs. 25/- per hour. The money so collected is being deposited in group's account and the amount so deposited totally belongs to the group to meet operation and maintenance expenditure as well as to make group's savings for purchase of new pump in future. However, the groups are varied in their functioning and effectiveness that is reflected in differential fund collection amount. Any group is yet to be in the position to purchase a new pump through group saving and return the old pump, which can be given to another group of farmers.

To combat water shortage during *rabi* season in Erasama, small subsurface water harvesting tank was the best option available for poor farmers. In the first year, 7 such subsurface water harvesting tanks were constructed on participatory basis by forming water user groups, where 40 per cent of the cost of construction/renovation was borne by the farmers' group either by self-labour or by payment and 60 per cent of the cost was met from the project. In the second year another 15 farmers' groups came forward to participate in such intervention by paying 67% of the total cost and only one third of the cost was borne by the project. There is no structured utilisation mechanism of tank water by the group-members as the utilisation and maintenance procedure is decided by group, which differs from one group to another.

3.2 Group Dynamics Effectiveness of Selected Groups

3.2.1 Pani Panchayats under major irrigation project

Maintenance of irrigation system by member-farmers of *Pani Panchayat*

Pani Panchayat building

Group effectiveness of two *Pani Panchayats* under Dharina minor of Distributary 1 of Taldanda canal at Biribati in Cuttack district and under Pipili sasan minor of Delang distributary of Sakhi Gopal branch canal in Puri district was studied. The levels of various parameters of GDEI as perceived by the member-farmers of both *Pani Panchayats* are presented in Table 2. The perceptions of the farmers is found to be contrasting as participation, decision-making, group atmosphere and empathy were perceived as below average in case of *Pani Panchayat* at Biribati while those were at relatively higher level in case of *Pani Panchayat* at Pipili sasan. Similarly, norms is found as poor in *Pani Panchayat* at Pipili sasan while it was perceived most favourably in *Pani Panchayat* at Biribati. However, social support and interpersonal trust were below average in case of both *Pani Panchayats*.

Table 2. GDEI of *Pani Panchayats* under major irrigation projects

Parameters of GDEI	*Maa Tarini Pani Panchayat* Biribati, Cuttack(n=30)		*Sri Jagannath Pani Panchayat* Pipili sasan, Puri(n=20)	
	Mean	SD	Mean	SD
Participation	4.37	0.93	7.95	1.43
Decision making	4.47	1.11	7.55	0.60
O &M functions	7.40	0.56	6.45	0.60
Fund generation	8.23	0.82	5.05	1.00
Group atmosphere	4.97	0.76	7.25	1.59
Membership feeling	6.73	1.11	7.80	1.06
Norms	8.43	1.41	2.40	1.31
Empathy	4.40	1.16	6.20	0.62
Interpersonal trust	5.13	1.07	4.90	1.41
Social support	3.53	0.93	4.15	1.39
Overall GDE	5.71	0.47	6.43	0.69

SD stands for standard deviation; maximum and minimum possible mean score is 10 and 0, respectively

Overall group effectiveness of both *Pani Panchayats* were found at medium level; however, *Pani Panchayat* at Pipili sasan (GDE value of 6.43) was marginally more effective than *Pani Panchayat* at Biribati (GDE values of 5.71). As evident from the standard deviation values, the member-farmers have varied in their opinions more in case of *Pani Panchayat* at Pipili sasan as compared to *Pani Panchayat* at Biribati.

3.2.2 WUAs under minor irrigation project

To address the problem of derelict irrigation systems in Orissa, Project Management Unit (PMU) Government of Orissa, with support from European Commission (EC) through Union Ministry of Water Resources, has implemented "Minor Irrigation in Orissa" project since 1996 for rehabilitation of 49 selected derelict minor irrigation (MI) schemes in 7 districts. With the objective of irrigation management transfer (IMT), the rehabilitated MI schemes were turned over to the developed farmer-based Water Users Associations (WUAs), who will self-finance, manage and operate their own system including collection of water taxes to fund the maintenance work and managing water distribution. The group dynamic effectiveness of such 2 WUAs located at Koska and Devijhar MI projects in Nayagarh and Ganjam districts, respectively, was studied.

The nature and functioning of the WUAs under Koska and Devijhar minor irrigation projects (MIPs) was found to be contrasting. The selected WUA (*Maa Pitabali* WUA) was one out of total five WUAs, those have been functioning with an APEX under Koska MIP. It covers a command area of 137 ha and comprises of 170 members. In contrast, only one WUA (*Baba Sidheswar* WUA) with 934 members has been functioning at Devijhar covering 10 villages with a command area of about 499 ha. The village committee or village water user groups function at Devijhar and one member of each village committee represents in WUA management committee.

The level of different parameters of GDE of the WUAs is presented in Table 3. Parameters like participation, group atmosphere and membership feeling were perceived relatively high by the member-farmers of both WUAs. Lower value for the parameter empathy indicates the lack of understanding of each others situation among

Selected minor irrigation systems

Minor irrigation system's reservoir

Discussion with the WUA members

the members of the WUAs at both places. At Koska, farmers perceived fund generation activities, decision-making and O&M functions at a lower level along with the empathy as compared to other parameters. Member-farmers of WUA at Devijhar perceived most of the parameters relatively high barring empathy and decision-making. Social support and interpersonal trust were perceived relatively better at Koska as compared to Devijhar. Overall GDE of WUA was calculated on the basis of ten different parameters in GDEI, which received different weights in calculation of overall group effectiveness. It is evident that overall GDE of both WUAs fall under high category.

It is interesting to note that inspite of largeness of the WUA at Devijhar member-farmers perceived most of the parameters favourably. Prevalence of village water

Table 3. GDEI of selected WUAs under minor irrigation projects

Parameters of GDEI	*Maa Pitabalai* WUA, Koska, Nayagarh (n=20)		*Baba Sidheswar* WUA, Devijhar, Ganjam (n=19)	
	Mean	SD	Mean	SD
Participation	7.26	1.52	8.00	0.00
Decision making	5.89	2.26	5.05	0.23
O &M functions	5.89	2.20	7.00	0.00
Fund generation	4.95	0.85	6.95	0.52
Group atmosphere	8.53	1.39	9.74	1.15
Membership feeling	8.84	1.34	7.89	0.46
Norms	6.95	1.22	6.74	0.99
Empathy	5.32	1.20	3.00	0.00
Interpersonal trust	7.84	0.50	6.00	0.00
Social support	7.53	0.70	6.00	0.00
Overall GDE	6.80	0.74	6.85	0.16

SD stands for standard deviation; maximum and minimum possible mean score is 10 and 0, respectively

user groups at each village and their representation in the management committee of WUA may have cater the need of the farmers better thereby influenced the perceptions of the respondent-farmers at Devijhar. It is also evident from the standard deviation values that the variation in the responses of farmers were less in case of Devijhar as compared to Koska.

3.2.3 Pani Panchayats under lift irrigation project

Group dynamic effectiveness (GDE) of selected 4 *Pani Panchayats* under ground water lift irrigation projects in Cuttack district and river lift irrigation project in Jajpur district was studied. The group effectiveness was analysed on the basis on 10 parameters, level of which are varied in different groups as evident from the Table 4. It is noticed that all the parameters of group dynamics effectiveness index (GDEI) were

Pipeline to take water from lift point to outlet near the crop field

Table 4. GDEI of selected *Pani Panchayats* under lift irrigation projects

Parameters of GDEI	*Maa Durga Pani Panchayat* Cuttack(n=15)		*Gopinath Pani Panchayat* Bahalpada III, Cuttack(n=15)		*Sathi Bhauni Pani Panchayat* Badadhuleswar, Cuttack(n=20)		*Maa Tarini Pani Panchayat* Asalpur, Jajpur(n=20)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Participation	8.53	0.92	8.53	1.19	8.45	1.32	8.70	0.73
Decision making	8.40	0.83	7.87	0.92	7.45	1.10	7.50	1.15
O & M functions	8.13	1.19	7.93	0.96	7.45	0.51	7.45	0.76
Fund generation	9.33	0.98	8.80	1.82	6.55	1.00	6.35	1.14
Group atmosphere	9.60	0.83	9.73	0.70	6.15	1.14	6.85	1.09
Member feeling	9.60	1.12	9.47	1.19	5.65	0.93	5.80	0.77
Norms	8.87	1.51	8.80	1.78	4.30	1.08	5.00	0.92
Empathy	7.73	0.70	7.93	0.26	7.15	0.67	6.55	0.83
Interpersonal trust	7.87	0.52	8.00	0.00	6.15	0.99	6.15	0.37
Social support	6.87	0.52	6.83	0.45	4.40	1.60	3.55	1.19

SD stands for standard deviation; maximum and minimum possible mean score is 10 and 0, respectively

perceived highly by the respondents barring group norms and social support in case of two groups. It is interesting to note that differences of farmers' opinions was also found to be higher for these two parameters as observed from relatively higher standard deviation values. In case of two *Pani Panchayats*, group atmosphere was perceived highly leading to better membership feeling, norms and participation of members in different activities. In contrast, members of other two groups opined that there used to be some conflict among few members affecting the group atmosphere, norms and membership feeling although most of the members participate in group activities.

Interviewing the member-farmers of lift irrigation *Pani Panchayat*

Overall GDE is depicted in Fig. 3. It is ranged from 6.80 to 8.59 that means the overall group effectiveness of all the selected lift irrigation *Pani Panchayats* fall under high category. It seems that the groups under ground water lift irrigation are marginally better as compare to that of river lift irrigation as far as their dynamism and effectiveness are concerned.

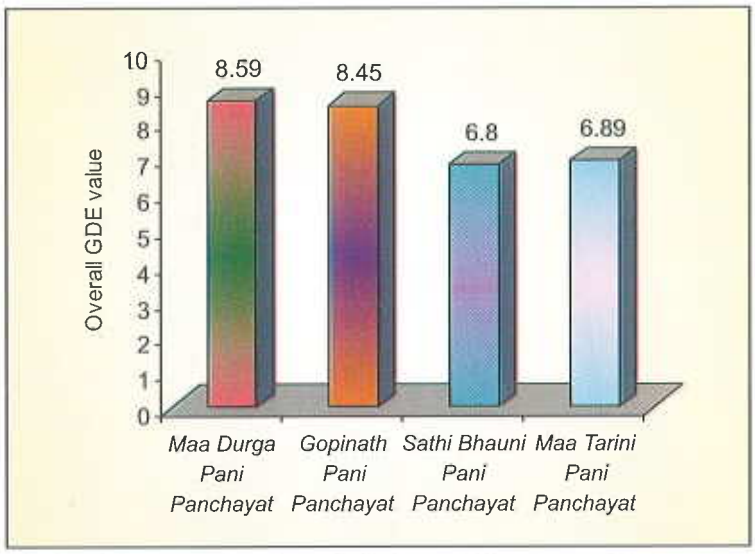


Fig. 3 Overall GDE of selected lift irrigation *Pani Panchayats*

3.2.4 Small Water User Groups

Group effectiveness of 9 small water user groups were studied, which included 3 pump user groups each at Astarang and Ersama and 3 water harvesting tank user groups at Ersama. The groups are varied in their functioning with differential levels of the parameters of GDEI as evident from the Table 5 and 6, respectively.

Table 5. Group dynamics effectiveness index (GDEI) of selected small WUGs (pump user groups)

Parameters of GDEI	WUG I, Badabellary, Giraelo, Ersama (N=6)		WUG II, Patna, Ambiki, Ersama (N=7)		WUG III, Chaulia, Ambiki, Ersama (N=7)		WUG IV, Baridhi, Astarang (N=7)		WUG V, Patalda, Astarang (N=8)		WUG VI, Sundar, Astarang (N=10)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Participation	7.50	0.84	7.14	0.90	6.86	0.90	8.14	1.86	8.00	1.41	8.30	0.82
Decision-making	4.67	0.52	5.86	1.07	4.86	1.07	6.29	0.76	6.25	1.28	6.20	0.92
O & M functions	6.67	1.37	6.86	1.57	8.29	0.76	6.14	1.68	9.00	1.41	7.60	1.07
Fund generation	4.67	1.03	5.00	2.31	3.14	0.90	5.29	0.95	5.88	1.64	6.90	0.74
Group atmosphere	7.00	2.53	6.00	1.53	4.00	1.63	7.14	2.27	6.88	1.36	6.50	0.71
Membership feeling	8.00	1.00	8.43	1.62	8.00	2.00	6.43	0.98	5.38	0.74	5.00	1.15
Norms	7.50	1.38	7.86	1.77	8.86	1.35	7.71	1.25	8.63	1.51	7.30	0.82
Empathy	4.17	1.33	5.86	1.35	5.57	0.53	6.57	0.79	7.63	0.52	7.50	0.53
Interpersonal trust	6.50	1.38	7.00	1.73	6.71	0.76	4.57	0.79	5.75	1.28	6.30	1.06
Social support	5.67	0.52	7.29	1.19	5.71	1.29	4.57	1.72	5.25	1.10	6.30	0.92
Overall GDE	6.31	0.42	6.66	0.46	6.17	0.20	6.60	0.81	7.10	0.68	6.98	0.39

SD stands for standard deviation; maximum and minimum possible mean score is 10 and 0, respectively

Table 6. GDEI of selected small WUGs (tank user groups)

Parameters of GDEI	WUG VII, Ersama (N=4)		WUG VIII, Ersama(N=6)		WUG XI, Ersama(N=4)	
	Mean	SD	Mean	SD	Mean	SD
Participation	7.25	0.96	7.50	0.55	6.75	0.50
Decision making	4.75	0.96	5.50	0.84	4.50	0.58
O & M functions	8.00	1.41	8.33	1.03	7.50	1.00
Fund generation	3.50	0.58	4.67	2.07	6.00	0.82
Group atmosphere	7.50	1.00	5.67	2.58	5.00	3.56
Membership feeling	8.00	4.00	7.67	3.20	7.50	3.11
Norms	9.25	0.96	8.83	0.75	7.75	1.26
Empathy	3.00	0.82	5.17	0.75	4.00	0.82
Interpersonal trust	6.00	2.31	6.50	2.35	4.75	0.50
Social support	9.00	2.45	9.33	1.37	9.75	0.50
Overall GDE	6.66	0.62	6.83	0.71	6.35	0.73

SD stands for standard deviation; maximum and minimum possible mean score is 10 and 0, respectively

Utilisation and maintenance of pump and water harvesting tank by the users groups

It is revealing that the majority of GDE parameters were perceived more favourably in pump user groups at Astarang as compared to those at Ersama. Decision-making and fund generation were below average in case of 2 groups at Ersama while interpersonal trust and social support were below average in case of 1 group at Astarang. The members of most of the groups perceived fund generation lowly; however, most of them opined higher level of participation of the members in group activities. The levels of GDE parameters of 3 tank WUGs at Ersama show the similar kind of trend as observed in case of pump user groups. The parameters like decision-making, fund generation and empathy were perceived as below average by the members of 2 groups. Most of the group members mentioned about high level of participation, O & M functions, membership feeling and norms.

The overall GDE of all selected 9 small WUGs is depicted in Fig. 4. It is noted that the overall GDE value ranged from 6.17 to 6.98 representing the medium to high level of group effectiveness. Three groups (2 pump user and 1 tank user group) have received overall GDE values of 7.1, 6.98 and 6.83 therefore fall in the high category of group effectiveness while 2 groups (1 pump user and 1 tank user group) were found at border of high and medium category of group effectiveness with GDE value of 6.66. Rest of the 4 groups (3 pump user and 1 tank user group) belonged to the medium level of group effectiveness.

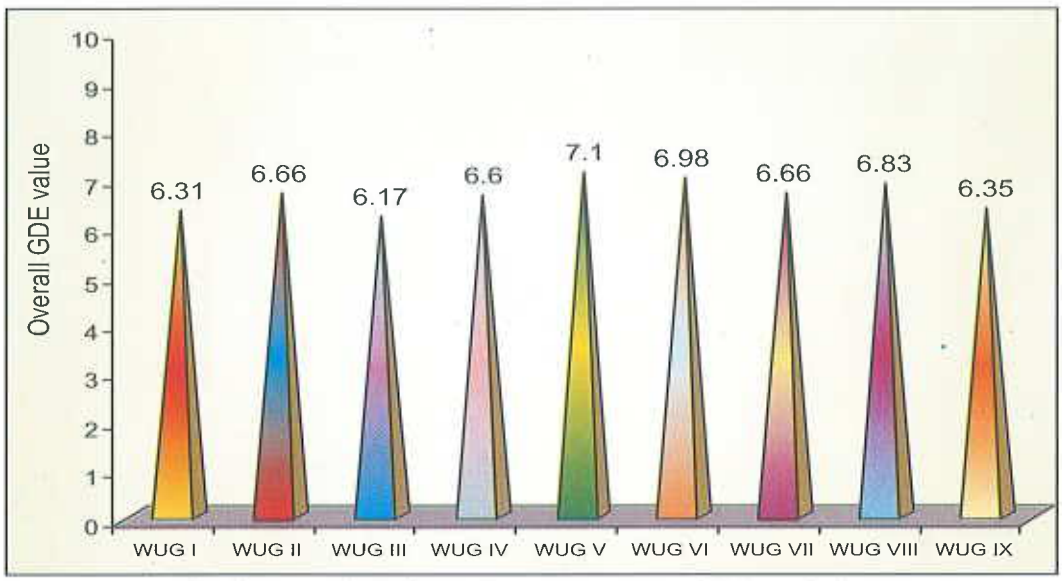


Fig. 4 Overall GDE of selected 9 small water user groups

3.2.5 Comparative group dynamics effectiveness of different types of groups

The level of parameters of group dynamics effectiveness is varied in different groups, therefore, a comparison is made among LI *Pani Panchayats*, minor irrigation WUAs, major irrigation *Pani Panchayats* and small WUGs taking mean scores of selected groups under above-mentioned four broad categories (Table 7 and Fig. 5).

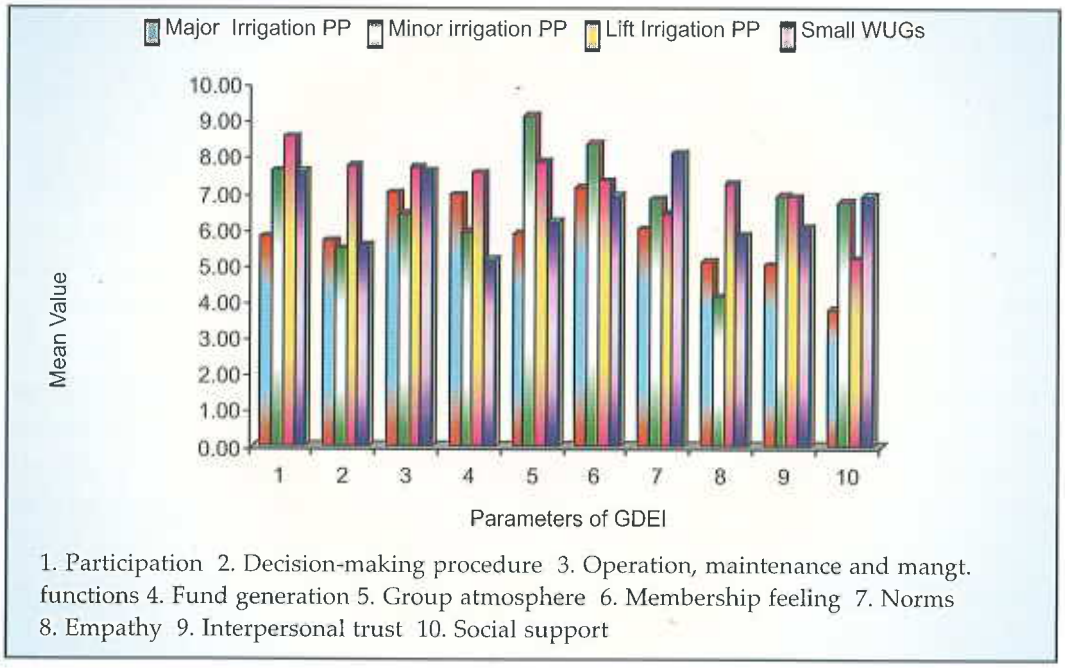
It is evident that that most of the parameters of the index were perceived highly by the farmers of lift irrigation *Pani Panchayats* followed by minor irrigation WUAs while it was quiet low for many of the parameters in case of major irrigation *Pani Panchayats*; most of the parameters were found to be at medium level in case of small water user groups.

It is noted that all ten parameters were perceived highly by the respondents in case of LI *Pani Panchayat* barring the social support. The most of the parameters of group effectiveness were also high in case of minor irrigation WUAs; however, empathy was found to be below average and decision making as well as fund generation were

Table 7. Group dynamics effectiveness index (GDEI) of different types of groups

Parameters of GDEI	*Pani Panchayats* under lift irrigation (N=70)		WUAs under minor irrigation (N=39)		*Pani Panchayats* under major irrigation (N=50)		Small water user groups (N=59)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Participation	8.56	1.04	7.63	1.13	5.80	2.11	7.59	1.15
Decision making	7.76	1.07	5.47	1.64	5.70	1.79	5.58	1.12
O & M function	7.70	0.89	6.45	1.67	7.02	0.74	7.61	1.50
Fund generation	7.57	1.80	5.95	1.23	6.96	1.81	5.15	1.74
Group atmosphere	7.86	1.87	9.13	1.40	5.88	1.61	6.20	2.07
Membership feeling	7.36	2.13	8.37	1.10	7.16	1.20	6.93	2.25
Norms	6.44	2.47	6.84	1.10	6.02	3.28	8.12	1.35
Empathy	7.27	0.85	4.16	1.44	5.12	1.32	5.86	1.66
Interpersonal trust	6.91	1.07	6.92	1.00	5.04	1.21	6.07	1.53
Social support	5.21	1.83	6.76	0.91	3.78	1.16	6.93	2.50
Overall GDE	7.56	0.95	6.82	0.53	6.00	0.66	6.67	0.61

SD stands for standard deviation; maximum and minimum possible mean score is 10 and 0, respectively



1. Participation 2. Decision-making procedure 3. Operation, maintenance and mangt. functions 4. Fund generation 5. Group atmosphere 6. Membership feeling 7. Norms 8. Empathy 9. Interpersonal trust 10. Social support

Fig. 5 Level of GDE parameters in different water users groups

perceived relatively low. Farmers have perceived many of the parameters (participation, decision-making procedure, group atmosphere, empathy, interpersonal trust and social support) lowly in case of major irrigation *Pani Panchayat*. Fund generation, decision-making and empathy were also the concerns in case of small water user groups.

It can be generalized that decision-making, fund generation, empathy and social support are the parameters those need attention to improve the overall group dynamics effectiveness of selected water user groups in present study. It is the fact that the small and marginal farmers are unaware of the WUAs in many cases and there is considerable gap in awareness between small and large farmers within the same WUA. Small farmers use more water because they cultivate paddy more often than the large farmers. They face more problems in accessing water as their lands are concentrated in the tail ends unlike those of large farmers. It leads to the dissatisfaction of the small and marginal farmers towards decision-making process. The gap in the need and awareness of the farmers depending on their socio-economic condition also results into poor empathy despite being the members of same group (WUA). Admittedly, the government water rates are abysmally low; therefore, collection of water rates by the WUA generally suffer from the earlier mindset of farmers in many cases. Water entitlements in canal irrigation are singular, that is only refer to agricultural production and they are exclusive, that is only landholders in the command area can enjoy them (Mollinga, 2005). However, water as a common resource has other functions like domestic and industrial use. The concept of WUA does not consider the needs of the landless that may hamper the issue of social support.

The overall group dynamics effectiveness of different groups presented through radar diagram (Fig. 6) on a scale ranging from 0.00 to 10.00 which is categorized as low (0.00-3.33), medium (3.34-6.66) and high (6.67-10.00). Therefore, overall group dynamics effectiveness of different groups in a decreasing order was *Pani Panchayats* under lift irrigation command, WUAs under minor irrigation command, small water user groups and *Pani Panchayats* under major irrigation command.

It is interesting to note that the farmers' groups (*Pani Panchayats* / WUAs) under lift and minor irrigation projects are more effective as compared to the major irrigation projects. The reasons of this kind of differential group performances may be attributed to the fact that in case of both lift and minor irrigation, irrigation management transfer (IMT) to the farmers' group / organization has inculcated a sense of ownership, access and control of the system to manage water distribution as well as financial independency of the group through collection of water rates to fund the maintenance work thereby taking up the responsibility of operation and management of the irrigation system. In contrast, in case of major irrigation projects the efforts are undertaken based on the assumption that things could be set right by organization of

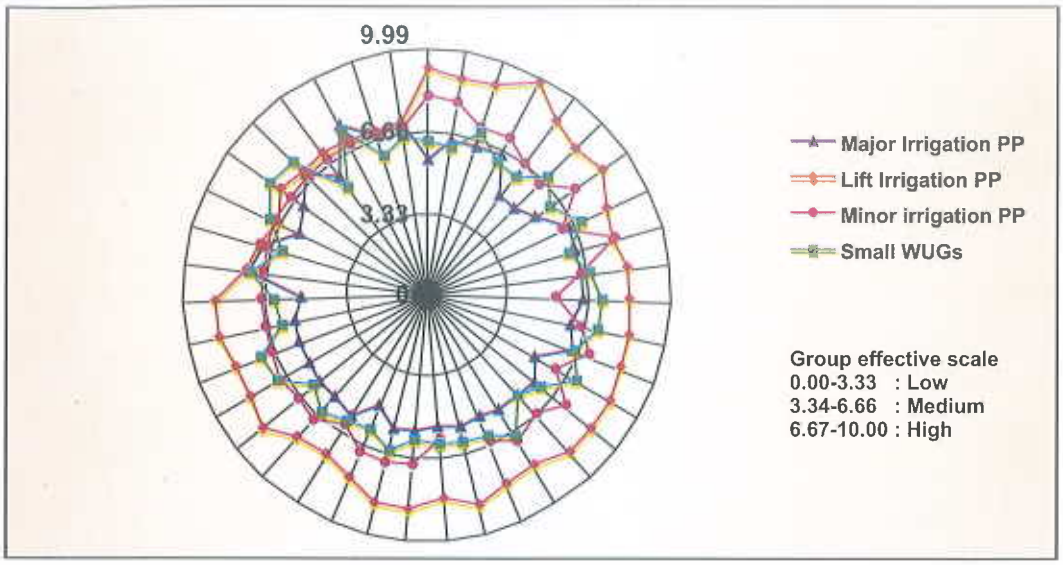


Fig. 6 Extent of overall group effectiveness of different types of water users groups

the irrigators at the local level despite the availability of insight that without changes in management at higher levels it is very unlikely that these local organizations will be successful over time (Mollinga, 2005). Wade and Chambers (1980) mentioned that to be able to get good water management at farm and outlet level, one needs to address the problems in the management of the main system. The unpredictability and unreliability of water supply from the main system to the local units is a major cause of the problems at local level. Transfer of irrigation management responsibility from the government irrigation authority to local management demands both allocative and investment decisions by the farmers' group / organization (Parthasarathy, 2000). It needs to understand that the problem at main system level is mainly a problem of allocation, of rights and entitlements and therefore of governance. There has to be a paradigm shift from participatory irrigation management to participatory irrigation governance giving the irrigators (farmers) real decision-making power in managing the irrigation system as a whole system.

3.3 Factors Influencing Group Effectiveness

Correlation analyses carried out to find out association of socio-personal, economical, communicational and psychological characteristics of group members with group dynamics effectiveness. The results are given in Table 8. Correlation analyses indicated association of socio-personal, economical, communicational and psychological characteristics of group members with group dynamics effectiveness. Evidently education, caste, farm size, income, social participation, scientific orientation and attitude of group members are significantly related with group dynamics effectiveness.

Table 8. Correlation of characteristics of group members with GDE

Sl. No.	Characteristics of group members	*Pani Panchayats* under lift irrigation (N=70)	WUAs under minor irrigation (N=39)	*Pani Panchayats* under major irrigation (N=50)	Small water user groups (N=59)	Overall (N=218)
		Correlation coefficient	Correlation coefficient	Correlation coefficient	Correlation coefficient	Correlation coefficient
1.	Age	-0.150	0.033	0.326*	-0.136	-0.043
2.	Education	0.686**	0.321*	0.279*	0.258*	0.138*
3.	Caste	0.192	0.055	0.124	0.173	0.080
4.	Household	0.659**	0.352*	0.308*	0.122	0.315**
5.	Farm size	0.112	0.125	0.381**	0.302*	0.143*
6.	Income	0.753**	0.332*	0.172	0.128	0.265**
7.	Social participation	0.094	0.052	0.392**	0.461**	0.051
8.	Scientific orientation	0.282*	0.285	0.481**	0.214*	0.151*
9.	Mass media participation	0.506**	0.298	0.393**	0.052	0.156*
10.	Attitude toward group and group members	0.387**	0.396*	0.302*	0.252*	0.157*

* Significant at the 0.05 level ** Significant at the 0.01 level

3.4 Strategy to Mobilize Effective User Group for PIM

Based on the theoretical orientation, experiences drawn from the studies of selected groups and focus group discussions with farmers and officials, various steps to mobilization of users group for PIM has been conceptualized. Strategy for mobilization of effective user group for PIM was formulated for 3 distinct phases viz. group formation (0-4 months), group stabilization (4-15 months) and group independency phase (15-36 months).

I. Group formation phase (0-4 months)

To facilitate an organization among farmers is in reality a task of great challenge. It is even more so to organize a sustainable functional organisation like water users group (WUG) / water users association (WUA). In view of that a group promoter (also know as facilitator, community organizer, extension personnel, catalyst or development worker) should prepare himself and community before actually helping in WUG/

WUA building. Three major steps and 18 different sub-steps have been identified under group initiation / formation stage.

A. *Learning about the village / community / project area*

1. Acquiring initial information of the project area
2. Entering the area, discussing with key persons/influential people and introducing self
3. Holding a public meeting for awareness creation about the programme/ project
4. Gathering more information
5. Building people's confidence and community's trust

The most important message for fulfilling this step is 'equipping oneself with as much local knowledge as possible on various aspects, such as political, social, cultural, traditional, religious, ecological, economical and traditional village organizations'. Support of local leaders is to be achieved first. So, discussion is mandatory with the influential people in the community. The local leaders may assist and facilitate to organize a meeting to introduce oneself and the project to all the villagers/farmers. Comments and suggestions from them should be invited in meeting. Some people, especially women, may be shy or afraid of discussing at the meeting. If one finds that women are too reluctant to participate in discussion, a separate meeting for them should be held to facilitate their confidence and convenience. A single meeting is never enough to gather sufficient and reliable information on the community; several meetings, informal as well as formal, need to be organized. Gaining the trust and confidence of farmers is a hard and time-consuming task. But, it plays a pivotal role in building users group. Generally, most farmers are from poor families and always face some troubles and problems. If one pays attention to them, listen to their complaints about hardship and problems with sympathy and try to help them whenever possible, their confidence and trust will grow.

B. *Development of local understanding*

1. Participatory awareness building of issues related to land and water resources
2. Conceptualization of local geographical features
3. Participatory need assessment with respect to water management for cultivation and prioritization of common needs
4. Analysis of causative problems and generating ideas of developing and managing water resources on a self-help basis
5. Highlighting advantages of working together in groups and encouraging for formation of WUG / WUA

6. Motivating the farmers by explaining that in a participatory water management, all members of group benefit from their combined skill and resources.
7. Arranging observation tour to witness success stories of other places

The purpose of this step is to make awareness among farmers of their own community issues related to land and water resources through participatory discussion. From such discussions and debates, they can be benefited by learning about their community's water resources, utilisation problems and needs; their misconceptions can also be eliminated. Farmers will notice how good or bad land and water resources are being utilized and be able to envision appropriate land and water use for areas of various condition based on their own local knowledge. The idea is to how to develop and manage their water resources on a self-help basis can evolve. Farmers are to be encouraged to tell most important needs with respect to water management for their cultivation. Although individual needs may differ, some needs may be common. If the listed common needs are numerous, one cannot deal with all at one time. So, prioritization of common needs will identify the need that requires top most priority. After getting the priority list, one has to start analyzing from the topmost need together with the farmers. It is imperative that the majority reaches a consensus on the selection of the problems that are to be solved urgently so that a commitment is made to remove their problems by them only. Hence, they have to bear in mind that the strengthening or formation of farmers' / users group can tackle their own problems by themselves as per their own interests as in a participatory water management, all members of users group benefit from their combined skill and resources. Success-stories of other places in this regard will also motivate them.

C. *Formation of WUG / WUA*

After the completion of aforementioned steps, farmers can be reckoned to have been furnished with preparatory measures for formation of their WUG / WUA. The following is a process for group formation:

1. Holding formal meetings to establish group
2. Setting specific objectives of group
3. Determining group's size involving all water users in the area
4. Structuring group through selection/election of office bearers of the group
5. Establishing group norms/rules
6. Determining functions and work plans though participatory discussion amongst group members

This step completes the process of group formation that starts with a formal plenary meeting of the farmers / irrigators in presence of village level government personnel. After the vision and mission of users group are well defined and understood, the group members describe in a clear way specific objectives and expectations in the context of participatory water management. There is no hard and fast rule defining the best size of a group since it varies from case to case. It is hard to say how many members should be included in a group. In practice the group size would depend on degree of participation and population of the community. Group structuring with facilitation of the group promoter elect the office bearers as desired by all members. It is also imperative for the group to lay down rules and regulations. The work plan should be prepared though participatory discussion amongst group members. What to do, when to do and who is responsible to do need be stipulated in the work plan so that group can monitor various activities, review progress and find ways and means to overcome problems and difficulties if encountered in the course of participatory water management.

II. Group stabilization phase (4-15 months)

Most of the cases project personnel are remained active up to the group formation (0-4 months) stage. However, to ensure the stability of the group, group promoter should become 'Enabler' in this stage. Three major steps and 15 sub-steps have been formulated for group stabilization phase.

A. Enabling WUG/WUA

1. Fulfilling legal aspects to establish the group as statutory body (Registration)
2. Developing habits of team-work and inculcate commitment among group members; expected outcomes should be
   - People willing to go along
   - Ready to share responsibility
   - Plan of action emerges
3. Inculcating a feel for the group dynamics i.e. remaining alert for the various indicators of avoidance is a must among the group members
4. Training in all technical and management aspects inclusive of creation / rehabilitation, operation, maintenance and utilization of water resources, group's fund generation, accounting and record keeping
5. Capacity building through awareness camps, exposure visits, participatory learning and action

B. Empowering WUG/WUA

1. Vesting all decision making power to the WUG
2. Giving responsibility of operation, maintenance and management of water resources to WUG in its jurisdiction
3. Maintaining group fund for financial independency / self sufficiency
4. Formulation and implementation of action plan taken up by the group
5. Encouraging monitoring and evaluation
   - Leader / office bearer of group monitor and evaluate
   - Members share assessment
   - Success satisfies and failures yield lessons

C. Developing self-reliance

1. Establishing effective link with services for access
2. Acquiring necessary skills and expertise for efficient operation, maintenance and management of resources
3. Solving problems of own
4. Being keen on next venture
5. Playing proactive role - greater the initiative taken by member-farmer(s) better it is

III. Group independency phase (15-36 months)

Group promoting personnel gradually reduce their presence during this stage, as group of farmers can stand up on its own, without the help from outside. Two major steps and 12 sub-steps have been conceptualized for this stage.

A. Ensuring independent group / organisation

1. Developing action programme for performance enhancement of water resources / irrigation system and farming system of entire area
2. Selection of master farmers in respect of irrigation management, technical, production, marketing and credit aspects to establish separate unit under each- master farmer's committee
3. Skill development of selected master farmers through training in respective areas
4. Imparting intensive technical knowledge to master farmers to carry out activities of each unit and equipping them to give training to improve knowledge, attitude and skill of other farmers
5. Planning and execution of programmes of action plan as per schedule of different units

6. Organising periodical meetings of group members for farmer to farmer technology transfer – farmer led extension
7. Reducing and facilitating role of group promoters/project personnel for the refinement, improvement and problem solving with respect to various activities through master farmers
8. Development of new set of master farmers after one to one and half year paving the way for leadership development among the group members in due course

B. Sustainability of group

1. Asssuring active participation of members in every activity of group
2. Follow-up actions in post operational/post-project stage
3. Setting appropriate mechanisms to resolve conflicts / problems within the group
4. Establishing networking of farmers' organizations/groups

Most of the cases project personnel are concerned on the first two stages viz. group formation (0-4 months), group stabilization (4-15 months) and the last stage i.e. group-independency phase (15-36 months) remains largely unaddressed leading to the unsustainability of the group. While helping to build the farmers' groups their prolonged integrity and functionality should be always kept in mind. All the efforts and resources invested in forming groups will be meaningless if they do not sustain themselves for long. Therefore, it is of paramount importance to keep it functional and effective for a long time. In fact it should become a part of the tradition of the village over time, as is the case with the already existing traditional village organizations. Passive participation (for gaining subsidy or other monetary inputs or food for work or due to project pressure etc. only) will not keep it sustainable and functional for long. Soon after a project, such groups or organizations become defunct and get dismantled. In other words, only active participation for self-development of farmers and for their own motivation can help to create an effective and sustainable organization. There must be some higher motive for the farmers to participate in a program. *Pani Panchayats* / WUAs should act as a Farmer Field School and facilitate training on a range of topics based on the local demands.

During the discussion with officials, members of WUA and farmers it was agreed by the majority that success and achievement of WUA depend on the extent to which nature and functioning of the programme/project address the problems and needs of the farmers in irrigation management, the extent to which the farmers have been

organized in group with participation and empowerment culture for group action and the extent to which the improvements can be made in the strategies for effective group mobilization and sustainability.

The present study has developed a tool to measure group dynamics effectiveness of different groups for PIM identifying different dimensions and their relative importance in it. It delineates socio-personal, economic, communicational and psychological traits of the group members, which have significant relationship with group effectiveness. A strategy to mobilize effective group for PIM is formulated on the basis of lessons drawn from present findings and drawing more experiences from different types of groups.

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ANNEXURE

Interview Schedule

Name of project :

Name of WUA :

Name of the respondent :

Village, Block, District :

Age of the respondent :

Education : No schooling / Functionally literate / Primary school/ High school / College

Caste : SC / ST OBC General

Main occupation : Agriculture / Dairy / Fishery / Service / Business / Other (specify)-

Annual Income : Rs.

Farm Size (acres) :

Household : Small (1-3 members) / Medium (4-6 members) / Large (7-9 members) / Very large (>9 members)

Socio-political participation :

Without any official position in socio-political organization

Official position in one or more social and political organisations / committees

Financial contribution or raising funds for common work

Active office bearer

Involvement in community work

Organization	Member	Office bearer	Participation		
			Always	Sometimes	Never
1 Panchayat 2 Co-operative society 3 Youth club 4 Labour organization 5 Other organization					

Extension orientation :

a. *Extension contact: Frequency of meeting VLW / Agril. Officer*

1. Once a week
2. Once a fortnight
3. Once a month
4. Never

b. *Extension participation*

Activities	Attended whenever conducted / Occasionally attended / Never attended
1. Study tours 2. Seminars/meetings 3. Farm days/ farm fair 4. Demonstrations 5. Other (specify)	

c. *Mass media participation*

	Media	Twice or more / week	Once a week	Once a fortnight	Once a month	Never
1	Newspaper					
2	Radio (general)					
3	Radio (rural programme)					
4	Magazines & other literature on agriculture					
5	Television					

Scientific orientation:

Agree / Disagree

1. New methods of farming give better results than old methods
2. Farming practices followed by our forefathers are the best ways to farm today
3. Even a farmer with lot of experience should use new methods of farming
4. Though it takes time for a farmer to learn new methods in farming it is profitable in future
5. Traditional methods of farming have to be changed in order to raise the farm productivity and income

Motivation/Attitude of member-farmers toward *Pani Panchayat* / WUA:

(Give opinion: Agree / Undecided / Disagree to following statements)

Attitude towards WUA / Pani Panchayat

1. WUA has made significant improvement in the farming condition of farmers
2. WUA promotes mutual co-operation among farmers
3. WUA does solve water related problems of farmers
4. WUA helps to maintain economy and equitability in distribution of water among the farmers
5. WUA performs excellently since the responsibility of operation and maintenance shifted to farmers

6. WUA also ensures construction / maintenance and repair of all the watercourses, field channels, field drainage in its jurisdiction
7. WUA establishes its own operation and maintenance fund (O & M fund) to meet the operation and maintenance expenditure
8. WUA members have the right to decide its own cropping pattern within the allocated water
9. WUA creates a profound impact in optimizing and stabilizing the income of member farmers
10. WUA pretends as a leap towards self-sufficiency and judicious Management of water and in reality nothing is done so far

Attitude towards other member farmers in the WUA / Pani Panchayat

1. It is always good to keep good relationship with other farmers of the WUA
2. Discussing the matters of irrigation operations and WUA activities with other farmers is merely a waste of time
3. To bring about substantial improvement in farmers' production, it is a necessity to maintain frequent interpersonal contact with other farmers
4. Since the other farmers are not much bothered about improving the water management practices, you do not convey the information you received to them
5. You are proud of the fact that mutual help and co-operation from other farmers are possible in your WUA

Group dynamics effectiveness as perceived by the member of WUA / *Pani Panchayat*:

(Give opinion: Always / Sometimes / Never of following statements)

Participation

1. Do you participate in all meetings and activities of your WUA?
2. When discussions are going on do you participate in it actively?
3. Do you become silent when discussion is going on?
4. Do you treat all the members alike in your all WUA activities?
5. Do you think other members of the WUA are actively participating in all activities?

Decision making procedures

1. Do you try to make a decision and carry it out without checking with other WUA members?
2. Do you support other member's suggestions and decisions resulting in consensus for the WUA as a whole?
3. Do you feel that majority's decision will be valid by voting inspite of wishes of other WUA members?
4. Is there any attempt to get all members participating in WUA's decision?
5. Do you feel the contributions made by you do not receive any kind of response or recognition in WUA?

Operation, Maintenance and Management Functions

1. Do all farmers of WUA involve in deciding internal water distributions to their fields?
2. Do the farmers follow water-sharing process for irrigating crops when required?
3. Do the group of farmers select specific crop pattern to be adopted by all member farmers of WUA?
4. Do the farmers of WUA involve in construction/maintenance and repair of all the watercourses, field channels, and field drainage in its jurisdiction?
5. Do the farmers of water users group take care of maintenance of water resources through own operation and maintenance fund?

Fund Generation

1. Do you contribute any money in construction of water resources?
2. Do you contribute labour towards construction of water resources?
3. Do the farmers participate in the collection of water rates / revenues?
4. Does the WUA maintain the collected fund for future use or meeting the necessary expenditure?
5. Is there any financial support to manage and maintain the water resources by the farmers' group?

Group Atmosphere

1. Do you prefer a friendly congenial atmosphere in your WUA?
2. Do you attempt to suppress or avoid conflict or unpleasant feelings?
3. Do you feel that some members of your WUA try to create an atmosphere of conflict?
4. Do the members of your WUA involved and interested in different activities?
5. Is the atmosphere of work in your WUA satisfactory?

Membership Feelings

1. Do you feel any sub-grouping in your WUA?
2. Do you feel that there are members, who consistently agree and support each other in WUA?
3. Do you feel to be inside and attached with the WUA?
4. Do you feel some members prefer to be outside the WUA?
5. Do some members move in and out of the WUA?

Norms

1. Do the members follow certain rules in WUA?
2. Do all members of WUA co-operate and help each other?
3. Is there any rule/norm for participation in WUA?
4. Are there rules and regulations that control the behaviour of WUA members?
5. Do members act in the WUA as per the rules/norms for any activity?

Empathy

1. When you interact with others in your WUA, do you imagine that "you were in his position"?
2. When you interact with another member of your WUA, if he mentions his problems that are coming in the way of adopting the WUA decisions:
   a) You get angry and irritated
   b) You consider it an escapism and leave him
   c) You try to understand his problems and make necessary alternative solutions

Interpersonal Trust

1. When you interact and give suggestions to other members of your WUA, do you think that they believe you completely?
2. In your perception, do the other farmers have good opinion about your capability to work for your WUA?
3. When another farmer member interacts and gives suggestions/recommendations to you, do you think he may try to mislead you?
4. When another farmer explains or does something for the WUA, do you think that he does not posses the qualifications to do it?

Social support

1. WUA identifies various problems relating to water management and communicates to officials/development personnel and receives various technical messages from them
2. All member farmers grow crops as per crop planning of WUA
3. WUA members attend training sessions by resource persons
4. Project implementing institute/department officials act as a facilitator and supportive to WUA in performing its activities
5. The WUA obtain information on planned operation and maintenance activities from the Department of Irrigation/Water Resources