



Final Report

on

**Institution and Socio-economic Assessment
of Water Users Association under WBADMIP**



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Abbreviations

ADMI	Accelerated Developed of Minor Irrigation Project
AGM	Annual General Meeting
ATMA	Agriculture Technology Management Agency
CD	Constructed Dams
CW	Constructed Wetlands
DK	Don't Know
DPTL	Deep Tube well
DPTW(Solar)	Deep Tube well Solar
FGDs	Focused Group Discussions
FIG	Farmer Interest Groups
GTA	Gorkhaland Territorial Administration
H.I	Herfindahl Index
ICE	Information, Education and Communication
IRMA	Institute of Rural Management Anand
IWMI	International Water Management Institute
KBs	Krishi Bandhus
KVK	Krishi Vigyan Kendra
LDTW	Light Duty Tube well
MC members	Managing Committee Members
MDTW	Medium Duty Tube well
MI	Minor Irrigation
MoM	Minutes of Meeting
OBC	Other Backward Class
PDW	Pump Dug Well
RLI	River Lift Irrigation
SC	Scheduled Caste
SC level meetings	Sub-committees Level Meetings
SFMIS	Surface Flow Minor Irrigation Scheme
SHG	Self Help Groups
SO	Support Organization
SRG Consultancy	Sun Rise Group Consultancy

SRI	System of Rice Intensification
ST	Scheduled Tribe
STDW	Shallow Tube well
STW	Shallow Tube Well
TW	Tube well
WBADMIP	West Bengal Accelerated Development of Minor Irrigation Project
WDS	Water Detention Structure
WUAs	Water Union Associations

Executive Summary

This study presents the institutional characteristics, functioning, and performance of water users associations (WUAs) promoted by West Bengal Accelerated Development of Minor Irrigation Project (WBADMIP). In this executive summary we have outlined only the major findings.

For this study, a sample of 63 WUAs was selected from across the state of West Bengal. To compare these WUAs with water user groups initiated through programmes other than WBADMIP, 12 non-WBADMIP groups were selected from across the state. For the WBADMIP promoted WUAs, we have conducted the survey both at the association and member level. In addition, in depth case studies of 10 WUAs were conducted.

At the time of study, 70 percent of the schemes were found to be functional. On an average the WUAs have 66 registered members, with only 15 percent female members. There is a managing committee in every WUA to take decisions on operational and management issues.

The study finds that the WUAs conduct general body meeting to discuss and reach to a consensus about policy issues. They discuss about crop planning, membership fee, income and expenditure of the association. It is found that the minutes of the meeting of last three general body meetings before the survey were maintained in 96 percent of functioning WUAs. Financial audits were conducted in approximately three-fourths of functioning WUAs. Six out of every 10 members among the functioning WUAs revealed during the survey that the management committees of WUAs had taken decisions on issues of the associations through general meeting involving the majority of the members.

The land for the schemes is mainly provided by either the chairperson or any other members or both. The WUAs have made contracts with the land providers. There are provisions in the contracts to supply them with water free of charge or at a reduced charge. In many schemes, land provider is appointed as operator as well. Approximately one-fifth of the functioning WUAs have cited non-availability of water as a problem. The study also finds that the WUAs need immediate technical support to avoid problems arising out of sudden breakdown of machinery during cultivation season.

The major sources of income of WUAs are periodic membership fees and water charges. Additional income generating activities such as fishery, horticulture and vermin composting

are conducted by approximately half of the functioning WUAs. It is found that higher the number of members having large land holdings, higher is the collection of membership charges and lower is the number of members delaying payment of water charges. However, it is also observed that larger the proportion of small farmers, lesser is the delay in payment of water charges. Moreover, in case of defaults, it is found that no action has been taken for more than 50 percent of such cases.

Approximately, one-third of the WUA members surveyed have indicated that there is no conflict in the association. The awareness about transparency is confirmed by only 44 percent of the respondents. A significant majority of the members has expressed their ignorance about the rules and procedures of functioning of the WUAs such as election process of the management committee members, decision making process, conflict resolution mechanism, and physical and financial accounting details of the schemes. Also, the institutional support in terms of providing training and capacity building fail to cover large majority of the WUA members.

The case studies of better performing WUAs in different regions show that these WUAs practice different water management practices according to the local context. Unlike many WUAs, these WUAs are high on transparency and fairness in the functioning of WUAs and the same is ensured through monthly general body meetings. Also, interactions with the members of these WUAs reveal that the members have been greatly benefited through the exploratory visits and training. Adoption of crop diversification among the members of these WUAs has increased income of farmers as well as increased the labour workdays.

This study has outlined a set of recommendations. It suggests that WUAs to be more financially sustainable, it should have more large farmers as their members. To reduce the transaction cost, the command area should be large but spread across lesser number of villages. Also, lesser heterogeneity amongst the members would build more trust among the members. To make the WUAs more participatory, more and more members should be encouraged to provide land or share some resource in formation of WUAs.

The study also recommends that the composition of managing committee should be changed from time to time. Penalty should be imposed for defaulting fee payments so as to incentivise the non-defaulters to continue to pay the charges in time. For better functioning of WUAs, more awareness should be generated amongst the members regarding the institutional

processes. Conducting regular meetings of general body can improve the awareness of the members about the functioning and governance of WUAs.

Another important suggestion of the study for smooth functioning of the WUAs is to have an operator outside the members of WUA. Currently, the responsibility is with typically the land-owner. Also, the study recommends better maintenance-free machinery, a solar backup to take care during load shedding, and a system of immediate technical assistance through a network to deal with sudden breakdown of machinery.

CHAPTER 1
INTRODUCTION

1.1 Purpose of the Study

West Bengal Accelerated Development of Minor Irrigation Project (WBADMIP) was launched by Water Resources Development & Investigation Department in collaboration with the World Bank on January 2012. The project reached its final stage in December 2019. The project aims to provide minor irrigation to small and marginal cultivators in monocrop areas of West Bengal. The distribution of the irrigation water is entrusted on Water Users Association (WUAs). The project has created 2500 minor irrigation (MI) schemes covering 75000 Ha of irrigated area. The total number of beneficiaries are around one lakh which included a substantial women participation in the WUAs. The other key components of the projects are strengthening community-based organization including WUAs, agricultural support system, and project management.

Water Resources Development & Investigation Department assigned Institute of Rural Management Anand (IRMA) the task of assessment of functioning of the WUAs as well as socio-economic changes of the members of WUAs.

1.2 Study Objective

The objectives of the study are to assess the following:

- i. Water management practices of WUAs
- ii. Governance of WUAs including effectively functioning WUAs
- iii. Economic issues of WUAs including leveraging benefits
- iv. Transparency and fairness in functioning of WUAs
- v. Training and capacity building of WUA members
- vi. Changes in crop diversification, income, expenditure (food and non-food) access to education, access to health condition (malnutrition, if any).
- vii. Changes in migration for work
- viii. Women empowerment and involvement of youth
- ix. Development of entrepreneurial agency
- x. Reason for performing and non-performing WUA
- xi. Coverage of small & marginal farmers, tribal and women
- xii. Future plan of action/vision of WUAs (maintenance, management & growth)
- xiii. Different types of reporting according to Project needs

- xiv. Minimum 10 Case studies will be developed to document innovative practices and achievements.

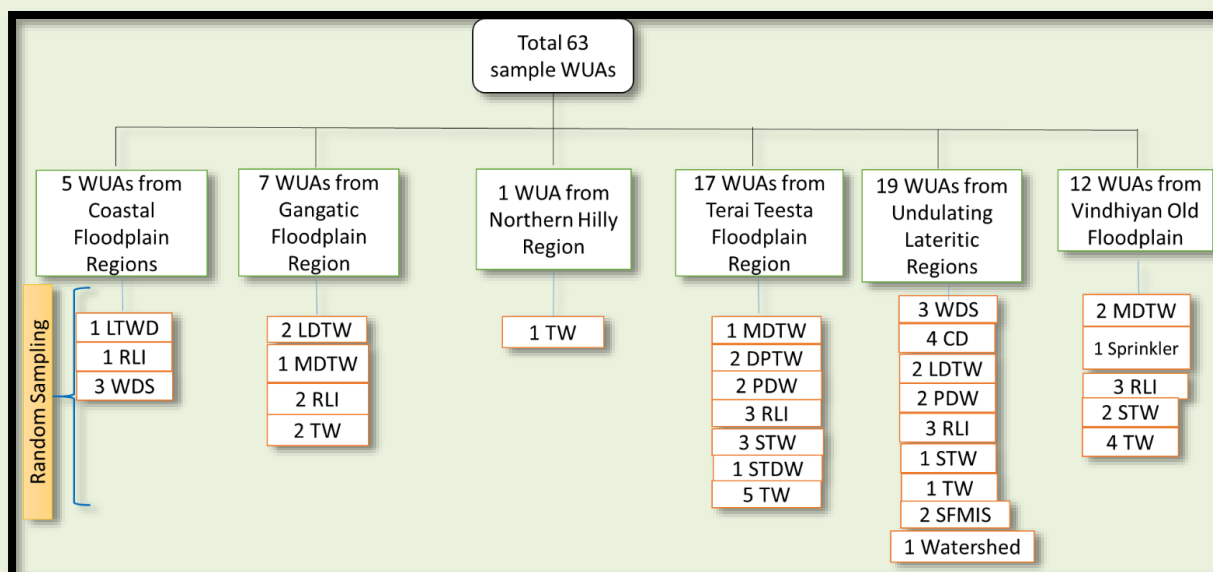
1.3 Methodology

The WUAs that were more than one year old by June 2019, were considered for sample selection. Five percent of the WUAs were considered for survey work. There were 1247 such WUAs in six agro-climatic regions taken together. The survey was conducted on 63 WUAs.



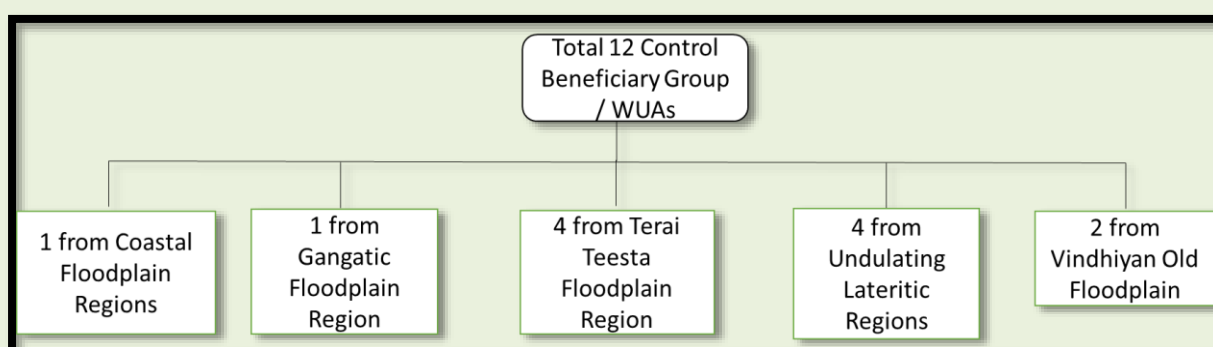
The samples of WUAs were selected through multistage stratified random sampling. First, the WUAs were stratified according to the agro-climatic regions. WUAs from each agro-climatic stratum were further stratified by type of scheme. Approximately 5 percent WUAs were randomly selected from each type of scheme within an agro-climatic region. The number of WUAs selected by type of scheme was proportional to the actual number of WUAs by type of schemes. (Figure 1.1). The number of sample WUAs is adjusted in a few cases to cover all types of WUAs in each agro-climatic region. The schemes selected were Tube well (TW), Tube well {TW (Solar)}, Shallow Tube Deepwell (STDW), Shallow Tube well (STW), Deep Tube well (DPTW), Deep Tube well Solar {DPTW (Solar)}, Light Duty Tube well (LDTW), Medium Duty Tube well (MDTW) and Pump Dug Well (PDW).

Figure 1.1: Selection of Sample WUAs



We have also selected sample water user groups that are not part of WBADMIP for the purpose of comparison with the WUAs promoted by WBADMIP. The water user group developed by WBADMIP is called ‘treatment’ WUA, while the water user group developed by projects other than WBADMIP is called ‘control’ WUAs. The number of control samples considered was 12, which is around 1% of total WUAs under consideration (1247). This selection was done by agro-climatic region only. The control samples can be WUAs or beneficiary groups served by government irrigation schemes. They are a group located near to sample WUAs so that they belong to a very similar agro-climatic condition. The sampling plan for control sample is given in Figure 1.2 below.

Figure 1.2: Selection of Control Beneficiary Groups / WUAs

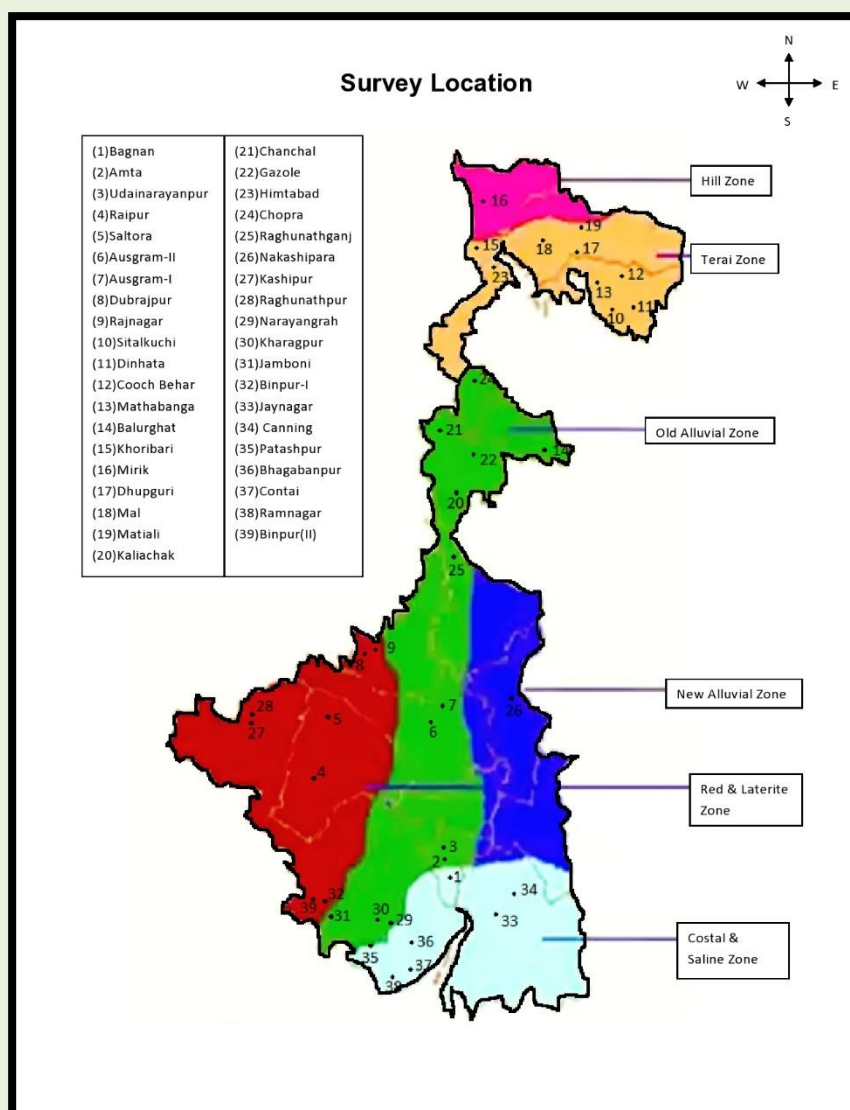


We have selected additional 10 WUAs for study as they are the better performers from their respective regions. The number of WUAs and members selected for the study from different agro-climatic regions is illustrated in Table 1.1.

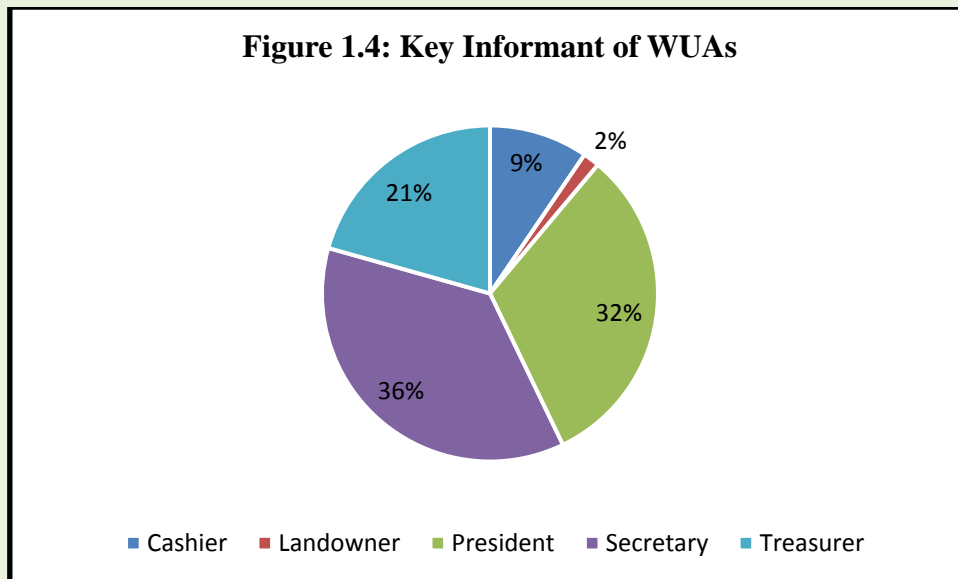
Table 1.1: Selection of Water Users Association (WUAs) for Survey and Case Study

Agro-Climate Region	Primary Survey (by canvassing designed formats)		WUAs under Other schemes	WUA for Case study
	WUAs	Beneficiaries		
Northern Hilly	1	8	0	1
Terai Teesta Floodplain	17	68	4	6
Vindhiyan Old Floodplain	12	86	2	1
Gangatic Floodplain	9	90	1	1
Undulating Lateritic	19	97	4	1
Coastal saline	5	58	1	0
Total	63	407	12	10

Figure 1.3: Survey Location



In this study, both quantitative and qualitative data analysis were done for meeting the project objectives. The WUA officials (key-informants) were surveyed to get information about functioning of WUAs (Figure 1.4). The key informants are secretary, treasurer, president, cashier, and landowner. Similarly, around 10% beneficiaries were surveyed for understanding the relation between WUAs and beneficiaries and the impact of WUAs on the wellbeing of beneficiaries. Focused group discussions (FGDs) were conducted in each and every WUAs selected for case studies.

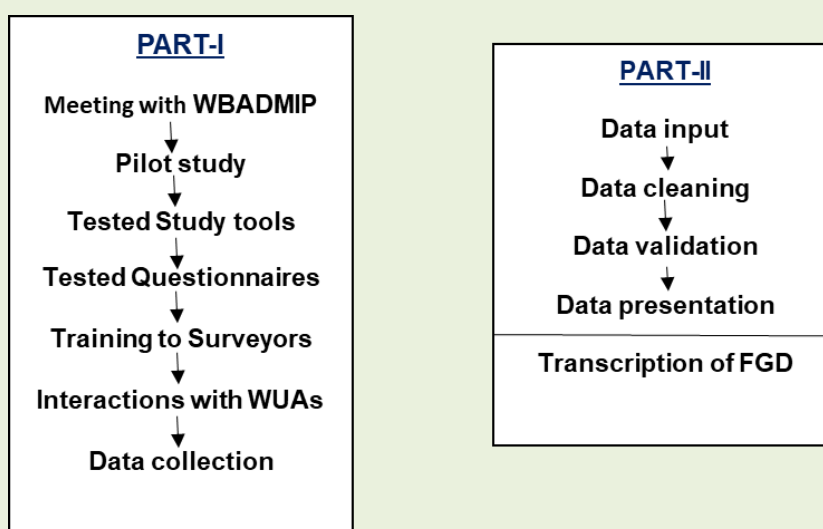


The data collection and survey were done at three levels. First, to understand the overall scenario of WUA, basic information was collected through pre-designed format questionnaire from the key informants of WUA. Secondly, information regarding functioning mechanisms of WUAs were collected through FGD with beneficiaries of WUA. This would help understand involvement of members, mutual interactions, and success and failures in their endeavour. Thirdly, the survey team interacted with smaller groups of beneficiaries in each of the WUAs for assessing their cost and benefit, grievance, income generation, and other important socio-economic issues. Data at this stage were collected through a structured questionnaire.

A key informant from each 12 control WUAs will be interviewed to understand the basic functioning, policy, practices, and constraints of the WUAs. Total 44 beneficiaries from the 12 control WUAs were interviewed with a structured questionnaire for assessing land holding, crops cultivated, cost and income.

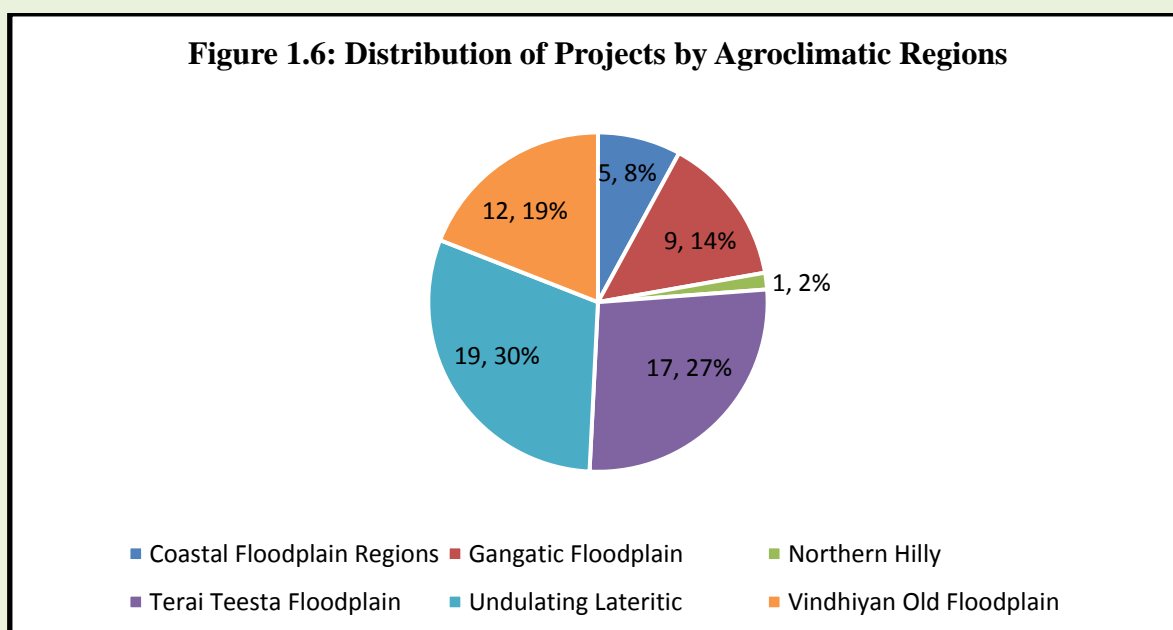
The survey team, SRG Consultancy, went through a structured process of data collection including pilot survey and questionnaire testing (Part I of Figure 1.5). They were also involved in data input, data cleaning, validation and presentation (Part II of Figure 1.5).

Figure 1.5: Process Flow for Data Collection



1.4 Description of Selected Sample

The 63 WUAs selected for study are spread across six agro-climatic regions of West Bengal. The highest percentage of the projects belonged to Undulating Lateritic at 30%, followed by Terai Teesta Floodplain at 27%. Amongst other WUAs, 19% belongs to Vindhyan Old Floodplain and 14 % belongs to Gangatic Floodplain (Figure 1.6).



The sample WUAs were selected from 17 districts of West Bengal. Highest proportion of WUAs are selected from Jalpaiguri district, followed by Coochbehar and Bardhaman (Table 1.2).

Table 1.2: Selection of WUAs by District

Districts	No of Projects	% of Projects
Bankura	2	3
Bardhaman	7	11
Birbhum	4	6
Coochbehar	7	11
Dakshin Dinajpur	2	3
Darjeeling	2	3
Howrah	4	6
Jalpaiguri	9	14
Jhargram	5	8
Maldah	4	6
Murshidabad	1	2
Nadia	2	3
Paschim Midnapur	2	3
Purba Midnapur	5	8
Purulia	3	5
South 24 parganas	2	3
Uttar Dinajpur	2	3
Total	63	100

The details of schemes selected in the process from different agro-climatic regions and districts are given in Appendix Table 1.1 and Appendix Table 1.2.

Around 56 percent of the schemes are different types of tube-wells. They are called Category-I schemes in the analysis. Approximately, one-fifth of the schemes selected are River Lift Irrigation (RLI). The RLI scheme comes under the surface water minor-irrigation (MI) projects, which accounts for approximately 30 percent of the WUAs. They are called Category II schemes in the analysis. The remaining 14 percent of the projects include Water Detention Structure (WDS), Watershed, and Sprinklers. They are called Category III schemes. The classification of MI schemes by category of schemes has been detailed in Table 1.3.

Table 1.3: Distribution of Treatment WUAs by Type of Schemes

Scheme Category	Type of Schemes	Water User Associations (WUAs)	
		Number	Percentage
Category I	Tubewell (TW)	12	19
	Tubewell {TW (Solar)}	1	2
	Shallow Tube well (STDW)	1	2
	Shallow Tube well (STW)	6	10
	Deep Tubewell (DPTW)	1	2
	Deep Tubewell {DPTW(Solar)}	1	2
	Light Duty Tubewell (LDTW)	5	8
	Medium Duty Tubewell (MDTW)	4	6
	Pump Dug Well (PDW)	4	6
	Subtotal	35	56
Category II	River Lift Irrigation (RLI)	13	21
	Surface Flow Minor Irrigation Scheme (SFMIS)	2	3
	Check Dam (CD)	4	6
	Subtotal	19	30
Category III	Water Detention Structure (WDS)	7	11
	Watershed	1	2
	Sprinkler	1	2
	Subtotal	9	14
Grand Total		63	100

The schemes comprising of different types of tube-wells (Category I) are mostly located in Terai Teesta Floodplain, followed by Vindhyan Old Floodplain (Table 1.4). The schemes developed using surface water (Category II) and other types of schemes (Category III) are mostly located in Undulating Lateritic region. Around 33 percent of the Category III schemes were developed in Coastal Floodplain Regions.

Table 1.4: Distribution of Treatment WUAs by Schemes and Agro-Climatic Region

Category	Type of Scheme	Coastal Floodplain Regions	Gangatic Floodplain	Northern Hilly	Terai Teesta Floodplain	Undulating Lateritic	Vindhiyan Old Floodplain	Total
Category I	DPTW	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	1 (100%)
	DPTW(Solar)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	1 (100%)
	LDTW	1 (20%)	2 (40%)	0 (0%)	0 (0%)	2 (40%)	0 (0%)	5 (100%)
	MDTW	0 (0%)	1 (25%)	0 (0%)	1 (25%)	0 (0%)	2 (50%)	4 (100%)
	PDW	0 (0%)	0 (0%)	0 (0%)	2 (50%)	2 (50%)	0 (0%)	4 (100%)
	STDW	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	1 (100%)
	STW	0 (0%)	0 (0%)	0 (0%)	3 (50%)	1 (17%)	2 (33%)	6 (100%)
	TW	0 (0%)	2 (17%)	1 (8%)	4 (33%)	1 (8%)	4 (33%)	12 (100%)
	TW(Solar)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	1 (100%)
	Subtotal	1 (3%)	5 (14%)	1 (3%)	14 (40%)	6 (17%)	8 (23%)	35 (100%)
Category II	CD	0 (0%)	0 (0%)	0 (0%)	0 (0%)	4 (100%)	0 (0%)	4 (100%)
	RLI	1 (8%)	3 (23%)	0 (0%)	3 (23%)	3 (23%)	3 (23%)	13 (100%)
	SFMIS	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (100%)	0 (0%)	2 (100%)
	Subtotal	1 (5%)	3 (16%)	0 (0%)	3 (16%)	9 (47%)	3 (16%)	19 (100%)
Category III	Sprinkler	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	1 (100%)
	Water Shed	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1 (100%)
	WDS	3 (43%)	1 (14%)	0 (0%)	0 (0%)	3 (43%)	0 (0%)	7 (100%)
	Subtotal	3 (33%)	1 (11%)	0 (0%)	0 (0%)	4 (44%)	1 (11%)	9 (100%)
Grand Total		5 (8%)	9 (14%)	1 (2%)	17 (27%)	19 (30%)	12 (19%)	63 (100%)

To analyses the information from the perspectives of geographic location we have further classified the WUAs in different zones. The distribution of WUAs by zones are given in Table 1.5.

Table 1.5: Distribution of WUAs by Zones (Nos)

Districts	Zones					Total
	Central	Coastal	Hilli	Northern Plateau	Western	
Bankura	0	0	0	0	2	2
Bardhaman	0	0	0	0	7	7
Birbhum	0	0	0	0	4	4
Coochbehar	0	0	0	7	0	7
Dakshin Dinajpur	0	0	0	2	0	2
Darjeeling	0	0	2	0	0	2
Howrah	4	0	0	0	0	4
Jalpaiguri	0	0	0	9	0	9
Jhargram	0	0	0	0	5	5
Maldah	4	0	0	0	0	4
Murshidabad	1	0	0	0	0	1
Nadia	2	0	0	0	0	2
Paschim Midnapur	0	0	0	0	2	2
Purba Midnapur	0	5	0	0	0	5
Purulia	0	0	0	0	3	3
South 24 parganas	0	2	0	0	0	2
Uttar Dinajpur	0	0	0	2	0	2
Total	11	7	2	20	23	63

The irrigation schemes have also been classified according to type of schemes to get a comparative perspective of groundwater and surface water schemes. In this exercise the sprinkler and watershed schemes have been dropped. The distribution of reclassified schemes is given in Table 1.6.

Table 1.6: Distribution of WUAs by Groundwater and Surface Water Schemes (No.)

Type of Scheme	Reclassified Schemes								All
	Groundwater (GW)			Surface water (SW)					
	TW	PDW	Total	CD	RLI	WDS	Creek	Total	
CD	0	0	0	4	0	0	0	4	4
DPTW	1	0	1	0	0	0	0	0	1
DPTW(Solar)	1	0	1	0	0	0	0	0	1
LDTW	5	0	5	0	0	0	0	0	5
MDTW	4	0	4	0	0	0	0	0	4
PDW	0	4	4	0	0	0	0	0	4
RLI	0	0	0	0	13	0	0	13	13
SFMIS	0	0	0	0	0	2	0	2	2
STDW	1	0	1	0	0	0	0	0	1
STW	6	0	6	0	0	0	0	0	6
TW	12	0	12	0	0	0	0	0	12
TW(Solar)	1	0	1	0	0	0	0	0	1
WDS	0	0	0	0	0	6	1	7	7
Total	31	4	35	4	13	8	1	26	61

Most of the groundwater schemes are from Northern Plateau whereas most of the surface water schemes belong to Western zone (Table 1.7).

Table 1.7: Distribution of WUAs by Zones and Reclassified Types of Schemes (Nos)

Zones	Groundwater (GW)			Surface water (SW)					All
	TW	PDW	Total	CD	RLI	WDS	Creek	Total	
Central	6	0	6	0	4	0	0	4	10
Coastal	2	0	2	0	1	3	1	5	7
Hilli	2	0	2	0	0	0	0	0	2
Northern Plateau	15	2	17	0	3	0	0	3	20
Western	6	2	8	4	5	5	0	14	22
Total	31	4	35	4	13	8	1	26	61

The key informants in different zones and schemes varied. In the central zones, the Presidents were the key informants in a very few WUAs, despite being one of the important key informants overall (Figure 1.7). Presidents were also key informants in a very few groundwater schemes (Table 1.8).

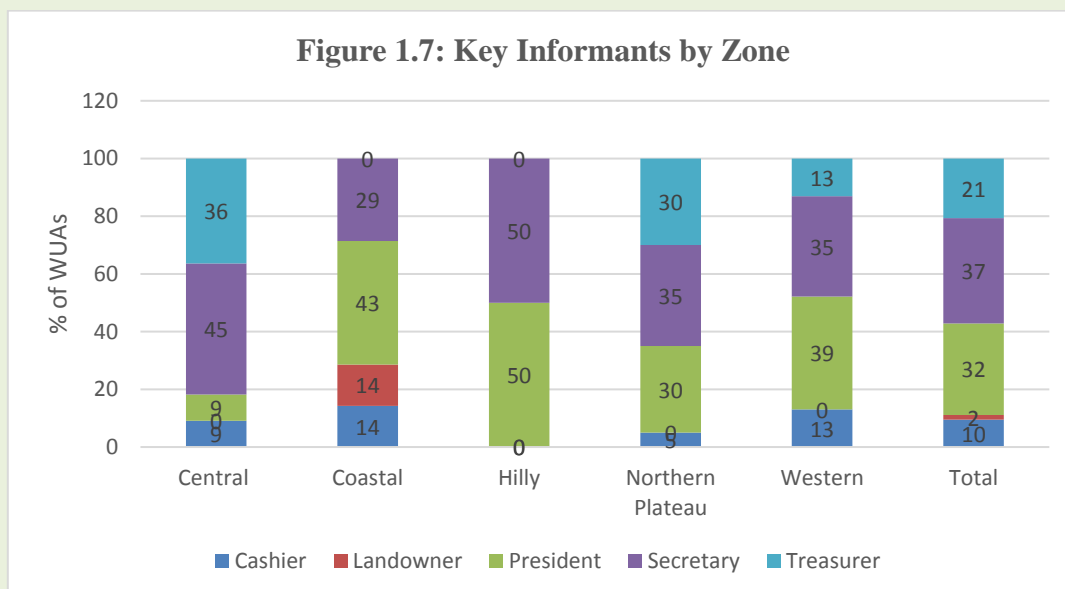
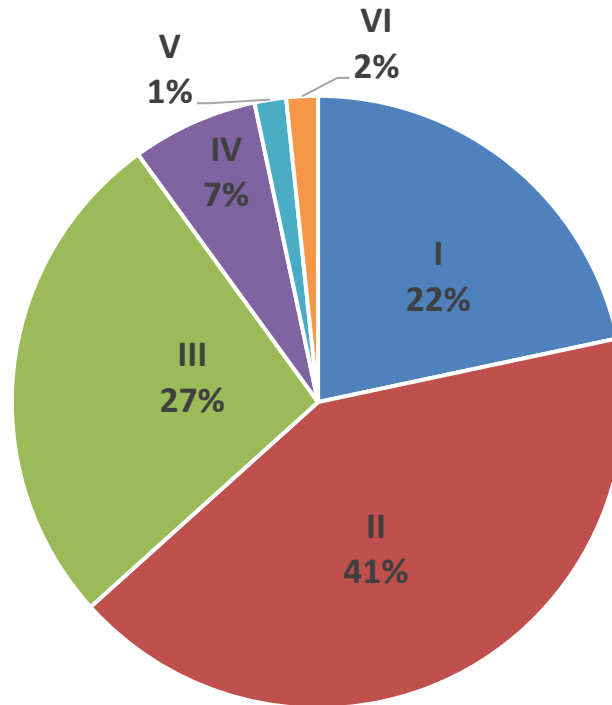


Table 1.8: Percentage Distribution of Key Informants by Systems

Key Informant	TW (GW)	PDW (GW)	GW	CD (SW)	RLI (SW)	WDS (SW)	SW	All
Cashier	15	25	17	0	0	17	5	12
President	31	0	27	50	30	50	40	32
Secretary	27	25	27	50	60	33	50	36
Treasurer	27	50	30	0	10	0	5	20
Total	100	100	100	100	100	100	100	100

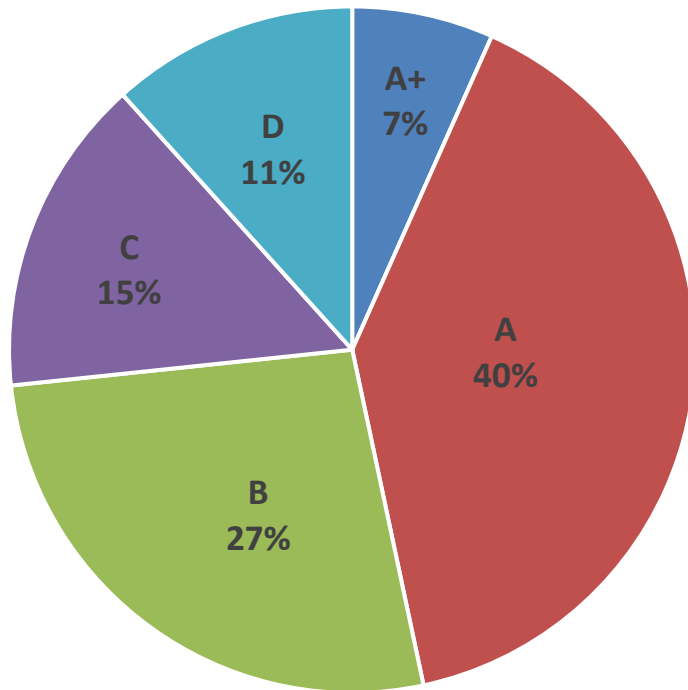
Almost 90 percent of the WUAs belong to the Batch I, II and III schemes. Only a tiny percentage of schemes are from Batch IV, V and VI in the sample (Figure 1.8).

Figure 1.8: Distribution of WUAs by Batch



WBADMIP has graded the schemes according to their performances. We have considered grades of 2019-20 for our analysis. The highest percentage of schemes belongs to A grade. Around half of the schemes are graded either A or A+ (Figure 1.9). Eleven percent of the schemes belongs to grade D.

Figure 1.9: Distribution of WUAs by Grade



1.5 Scheme of the Study

Chapter 2 deals with the functioning of WUAs and their challenges. The next chapter looks into the interaction between members and the WUAs. The benefits of the members from WUAs are illustrated in this chapter. Analysis in Chapter 4 exclusively looks into institutional issues regarding the relationship between members and WUAs. Chapter 5 illustrates the case studies of WUAs. The last chapter summarizes the major conclusions and provides recommendations.

Appendix Table 1.1: Schemes Selected by Agro-climatic

	CD	DPTW	DPTW (Solar)	LDTW	MDTW	PDW	RLI	SFMIS	Sprinkler	STDW	STW	TW	TW (Solar)	Watershed (Happa-6, Pond-4, Well-4,)	WDS	All
Coastal Floodplain Regions	0	0	0	1	0	0	1	0	0	0	0	0	0	0	3	5
Gangatic Floodplain	0	0	0	2	1	0	3	0	0	0	0	2	0	0	1	9
Northern Hilly	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Terai Teesta Floodplain	0	1	1	0	1	2	3	0	0	1	3	4	1	0	0	17
Undulating Lateritic	4	0	0	2	0	2	3	2	0	0	1	1	0	1	3	19
Vindhyan Floodplain	0	0	0	0	2	0	3	0	1	0	2	4	0	0	0	12
Total	4	1	1	5	4	4	13	2	1	1	6	12	1	1	7	63

Appendix Table 1.2: Schemes Selected by District

	CD	DPTW	DPTW (Solar)	LDTW	MDTW	PDW	RLI	SFMIS	Sprinkler	STDW	STW	TW	TW (Solar)	Watershed (Happa-6, Pond-4, Well-4,)	WDS	All
Bankura	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	2
Bardhaman	0	0	0	0	0	0	3	0	0	0	2	2	0	0	0	7
Birbhum	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	4
Coochbehar	0	0	0	0	1	0	2	0	0	0	3	1	0	0	0	7
Dakshin Dinajpur	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
Darjeeling	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	2
Howrah	0	0	0	0	1	0	2	0	1	0	0	0	0	0	0	4
Jalpaiguri	0	1	1	0	0	2	1	0	0	0	0	3	1	0	0	9
Jhargram	1	0	0	0	0	0	1	0	0	0	0	0	0	1	2	5
Maldah	0	0	0	0	0	0	1	0	0	0	1	2	0	0	0	4
Murshidabad	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Nadia	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2
Paschim Midnapur	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2
Purba Midnapur	0	0	0	1	1	0	0	0	0	0	0	0	0	0	3	5
Purulia	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	3
South 24 parganas	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	2
Uttar Dinajpur	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2
Total	4	1	1	5	4	4	13	2	1	1	6	12	1	1	7	63

CHAPTER 2: FUNCTIONING OF WUAs: INSTITUTIONAL ISSUES AND CHALLENGES

2.1 Introduction

The West Bengal Accelerated Development of Minor Irrigation Project (WBADMIP) was launched in 2012 with the principal aim of enhancing agricultural production of small and marginal farmers through accelerated development of minor irrigation services in the state. The project employs multipronged strategies including strengthening of community-based irrigation management and operation and maintenance, supporting of agricultural development, provisioning of agricultural services for encouraging crop diversification, use of improved technologies and creating income generation activities to fulfil the principal aim. As part of the Component A - Strengthening Community-based Institutions, Water User Associations (WUAs) have been created to look after the operation and management of each of the minor irrigation schemes and to provide agricultural support services for realising the full potential of additional irrigation capacity created through the scheme. All the landholders in the command area of the scheme as well as users of the scheme can be members of WUA. Support Organization (SO) facilitates the process for formation of WUAs.

As per the latest World Bank Report (December 2019), the project has formed 2,044 WUAs constituting 107,000 small and marginal farmers. About 67 percent of the WUAs have taken charge of schemes and 50 percent of them have been operating for more than three years and thereby, exhibiting good performance in irrigation water management and delivery to their members. The beneficiaries are adequately represented by the marginalized groups in the state. In particular, the WUA members have been trained to plan, supervise, manage, operate and maintain schemes.

The Report documents impressive benefits in terms of increase in agricultural production value of all major crops. More than 72% of WUAs are currently generating at least 80% of resources required to manage, operate and maintain the developed schemes. This has been attributed to community mobilization and engagement during the very first stages of scheme implementation. This, in turn, has created a sense of ownership among the members who have become interested to contribute financially for operation and maintenance of the schemes. The agricultural support activities combined with capacity building for non-agricultural activities have increased the scope for economic diversification. These WUAs are likely to be sustainable

as those benefits have further strengthened members' commitment to pursue productive activities.

Review of empirical evidence reveals that users participation in irrigation management to an appropriate degree and at all levels is the defining feature of the successful and strong WUAs (Howarth *et al.*, 2005). The new institutional economics and the theories of collective action provide strong theoretical support to the need and usefulness of WUA. In particular the theory of collective action argues that when individuals fail to fulfil their needs through individual actions, then they choose a collective mode of action where each of its individual members finds it profitable to act collectively rather than individually. Given the rational self-seeking individuals' aim of maximizing their gains and non-excludability of public common pool resources, there is always risk for overutilization of such resources (Ostrom and Gardner, 1993). Minimization of such risks calls for the establishment of an institution and attendant rules for resource management and appropriation (Ostrom 1990, 1992). In this context, this chapter looks into functioning of WUAs as collective institution and its challenges.

2.2 Registration of WUAs

The WUAs under study were registered during 2012 to 2018. 58 out of 63 WUAs were found registered under the West Bengal Societies Registration Act, 1961. The number of schemes registered is highest in 2015, followed by 2017. Around 63 percent of the WUAs in category III were registered in 2017 (Table 2.1).

Table 2.1: Distribution of Treatment WUAs by Year of Registration

Category of Schemes	Type of Scheme	2012	2013	2014	2015	2016	2017	2018	Total
Category I	DPTW	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)
	DPTW(Solar)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	1 (100%)
	LDTW	0 (0%)	0 (0%)	0 (0%)	3 (60%)	2 (40%)	0 (0%)	0 (0%)	5 (100%)
	MDTW	2 (50%)	0 (0%)	2 (50%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	4 (100%)
	PDW	0 (0%)	0 (0%)	0 (0%)	3 (100%)	0 (0%)	0 (0%)	0 (0%)	3 (100%)
	STW	0 (0%)	1 (20%)	0 (0%)	1 (20%)	2 (40%)	1 (20%)	0 (0%)	5 (100%)
	TW	2 (18%)	1 (9%)	0 (0%)	1 (9%)	2 (18%)	4 (36%)	1 (9%)	11 (100%)
	TW(Solar)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	1 (100%)
	Total	4 (13%)	2 (6%)	3 (10%)	8 (26%)	6 (19%)	5 (16%)	3 (10%)	31 (100%)
Category II	CD	0 (0%)	0 (0%)	0 (0%)	2 (50%)	2 (50%)	0 (0%)	0 (0%)	4 (100%)
	RLI	1 (8%)	3 (23%)	4 (31%)	1 (8%)	0 (0%)	2 (15%)	2 (15%)	13 (100%)
	SFMIS	0 (0%)	0 (0%)	1 (50%)	1 (50%)	0 (0%)	0 (0%)	0 (0%)	2 (100%)
	Total	1 (5%)	3 (16%)	5 (26%)	4 (21%)	2 (11%)	2 (11%)	2 (11%)	19 (100%)
Category III	Sprinkler	(0%)	(0%)	(0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	1 (100%)
	Watershed	(0%)	(0%)	(0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	1 (100%)
	WDS	(0%)	(0%)	(0%)	1 (17%)	0 (0%)	5 (83%)	0 (0%)	6 (100%)
	Total	(0%)	(0%)	(0%)	1 (13%)	1 (13%)	5 (63%)	1 (13%)	8 (100%)
Grand Total		0 (9%)	0 (9%)	0 (14%)	2 (22%)	2 (16%)	0 (21%)	0 (10%)	4 (100%)

There are many schemes which have been registered after being handed over. The delay in registration of the schemes ranges from one month to more than one year. The delay in registration is maximum for category I schemes. 67 percent of the PDW schemes, half of the MDTW schemes and 45 percent of the TW schemes have been registered more than a year after handing over. On the other hand, a lesser proportion of category III schemes have been registered after a delay. 63 percent were registered without any delay. The sprinkler schemes and 25 percent WDS schemes were registered more than year after handover (Table 2.2).

Table 2.2: Percentage Distribution of Schemes by Delay in Registration after Handing Over

Scheme Category	Type of Scheme	No Delay	1-6 months	7-12 months	> 12 months	Total
Category I	DPTW	0	0	0	100	100
	DPTW(Solar)	100	0	0	0	100
	LDTW	40	40	0	20	100
	MDTW	25	25	0	50	100
	PDW	0	0	33	67	100
	STW	60	0	20	20	100
	TW	18	18	18	45	100
	TW(Solar)	100	0	0	0	100
	Total	32	16	13	39	100
Category II	CD	0	75	0	25	100
	RLI	54	8	8	31	100
	SFMIS	50	0	0	50	100
	Total	42	21	5	32	100
Category III	Sprinkler	0	0	0	100	100
	Watershed (Happa-6, Pond-4, Well-4,)	100	0	0	0	100
	WDS	67	17	0	17	100
	Total	63	13	0	25	100
Grand Total		40	17	9	34	100

2.2.1 Provision of Agro-Equipment

The WUAs were provided agro-equipment along with machinery for minor irrigation (MI). Agro-equipment was provided to 62 percent WUAs. The equipment was provided to highest proportion of WUAs located mostly in Undulating Lateritic region (Table 2.3). WUAs located in coastal floodplain were not being provided with any agri-equipment.

Table 2.3: Percentage Distribution WUAs Received Agri-equipment

Region	% WUAs
Coastal Floodplain	0
Gangatic Floodplain	25
Northern Hilly	4
Terai Teesta Floodplain	13
Undulating Lateritic	46
Vindhiyan Old Floodplain	13
Total	100

Power Tillers (one or two) were provided to 24 percent WUAs, threshers were provided to 7 percent WUAs, sprayers (one or two) were provided to 3 percent WUAs and harvesting machines were provided to 9 percent WUAs.

2.3 Functioning of WUAs

At the time of survey, 11 out of 63 schemes (17 percent) were not functioning, 13 percent were partially functioning, and 70 percent were fully functioning. Around one third of the schemes under Category III were not functioning. On the other hand, around 84 percent of the Category II schemes were fully functioning. 66 percent of category I schemes were fully functioning at the time of survey. The percentage of fully functional schemes was lowest for category III schemes (Table2.4).

Table 2.4: Distribution of Schemes by Status of Functioning

		Status of Functioning			
		Fully	Partially	Abandoned	Total
Category I	DPTW	0(0%)	1(100%)	0(0%)	1(100%)
	DPTW(Solar)	1(100%)	0(0%)	0(0%)	1(100%)
	LDTW	3(60%)	2(40%)	0(0%)	5(100%)
	MDTW	4(100%)	0(0%)	0(0%)	4(100%)
	PDW	4(100%)	0(0%)	0(0%)	4(100%)
	STDW	0(0%)	0(0%)	1(100%)	1(100%)
	STW	2(33%)	2(33%)	2(33%)	6(100%)
	TW	9(75%)	1(8%)	2(17%)	12(100%)
	TW(Solar)	0(0%)	1(100%)	0(0%)	1(100%)

		Status of Functioning			
		Fully	Partially	Abandoned	Total
	Total	23(66%)	7(20%)	5(14%)	35(100%)
Category II	CD	4(100%)	(0%)	0(0%)	4(100%)
	RLI	10(77%)	(0%)	3(23%)	13(100%)
	SFMIS	2(100%)	(0%)	0(0%)	2(100%)
	Total	16(84%)	(0%)	3(16%)	19(100%)
Category III	Sprinkler	0(0%)	1(100%)	0(0%)	1(100%)
	Watershed	1(100%)	0(0%)	0(0%)	1(100%)
	WDS	4(57%)	0(0%)	3(43%)	7(100%)
	Total	5(56%)	1(11%)	3(33%)	9(100%)
Grand Total		44(70%)	8(13%)	11(17%)	63(100%)

In partially functioning schemes, some of the water outlets are functioning and others are not. The average number of outlets malfunctioning is highest for category I schemes. On average, 20 percent of the outlets were malfunctioning at the time of survey. The percentage of sources malfunctioning is highest for category I schemes (Table 2.5). 43 percent of the sources created under STW schemes were found to be malfunctioning. However, only 6 percent of the sources created by LDTW schemes were malfunctioning.

Table 2.5: Outlets Functioning by Types of Schemes

		Average Number of Outlets		% Malfunctioning
		Functioning	Malfunctioning	
Category I	DPTW	4	1	20
	DPTW(Solar)	5	0	0
	LDTW	6	0	6
	MDTW	1	0	0
	PDW	5	0	0
	STDW	0	6	100
	STW	4	3	43
	TW	4	1	21
	TW(Solar)	3	1	25
	Total	4	1	23
Category II	CD	1	0	0
	RLI	1	0	23
	SFMIS	2	0	0
	Total	1	0	15
Category III	Sprinkler	4	1	20
	Watershed	14	0	0
	WDS	2	0	21
	Total	3	0	12
Grand Total		3	1	20

Zone-wise functioning status of the schemes vary widely. A substantial proportion of the schemes are abandoned in Coastal zone and partially working in Northern Plateau (Table 2.6)

Table 2.6: Percentage Distribution of Status of Functioning of Schemes by Zones

Functional Status	Central	Coastal	Hilly	Northern Plateau	Western	All
Fully Functional	64	43	50	65	87	70
Partially Functional	9	14	0	20	9	13
Abandoned	27	43	50	15	4	17
Total	100	100	100	100	100	100

Schemes that are abandoned have been dropped from the analysis with respect to zones. Only those which are functioning (fully functioning and partially functioning) have been considered in the zone-wise analysis.

In the irrigation system wise (reclassified schemes as in Chapter 1) analysis the abandoned schemes have been dropped and we have only dealt with schemes that are functioning (fully functioning and partially functioning). Moreover, we have dropped the sprinklers and watershed in the irrigation system wise (reclassified) analysis.

A substantial proportion of schemes of older batches are abandoned, while newer schemes are functioning. Around one-third of the Batch I schemes are abandoned. All schemes of Batch V and VI are fully functional (Table 2.7)

Table 2.7: Percentage Distribution of Status of Functioning of Schemes by Batch

Functional Status	Batch (%)						All
	I	II	III	IV	V	VI	
Fully Functional	69	76	63	75	100	100	72
Partially Functional	0	16	19	25	0	0	13
Abandoned	31	8	19	0	0	0	15
Total	100	100	100	100	100	100	100

Schemes with grade of A and A+ are all functioning. However, around one-third to one fourth schemes graded as B, C and D are abandoned (Table 2.8).

Table 2.8: Percentage Distribution of Status of Functioning of Schemes by Grade

Functional Status	Grades (%)					All
	A+	A	B	C	D	
Fully Functional	50	92	63	56	57	72
Partially Functional	50	8	13	11	14	13
Abandoned	0	0	25	33	29	15
Total	100	100	100	100	100	100

All the schemes that are abandoned (11 out of 63) and the scheme where information about grade is not available (one such scheme) have been dropped from the analysis of WUAs with respect to grade and batch of the schemes.

2.4 Members of WUAs

The average number of registered members, number of beneficiaries and number of managing committee members are 66, 63 and eight respectively. The number of members under the WUAs varies according to category of the schemes (Table 2.9). The average number of members registered and benefitted is highest for category I schemes, followed by category II and category III schemes. The average number of members in managing committee is almost equal in category I and category II schemes and is lesser in category III schemes.

The average numbers of female registered members and beneficiaries are 10 each. The average number of female managing committee members is two. The representation of female members as registered members, beneficiary and member of managing committee is highest in category III (Table 2.9). There is almost equal representation of male and female members in managing committees in category II schemes.

The male members are in either having land title or work as sharecropper. The female members are selected from the same households as the male members, unless they are household head.

The managing committee of the WUAs comprise of on average 8 members, with 6 males and 2 females. The size of the managing committee is smaller for category III schemes as compared to the other WUAs.

Table 2.9: Average Number of Members Registered, Benefited and in Managing Committee

	Members	Scheme Category			
		Category I	Category II	Category III	Total
Members Registered	Male	64	53	31	56
	Female	11	9	8	10
	Total	75	62	38	66
Members Benefited	Male	63	47	31	53
	Female	11	8	8	10
	Total	74	55	38	63
Members in Managing Committee	Male	6	7	3	6
	Female	2	2	3	2
	Total	9	9	6	8

Average number of members registered and benefitted in functioning (fully and partially) WUAs are higher in coastal region. However, average number of member in the managing committee is almost same in all the regions (Table 2.10).

Table 2.10: Average Number of Members in Functioning WUAs by Zones

		Zones					Total
		Central	Coastal	Hilly	Northern Plateau	Western	
Members Registered	Male	64	132	32	47	47	56
	Female	25	19	47	5	7	11
	Total	89	151	79	51	54	66
Members Benefitted	Male	64	132	32	47	46	55
	Female	25	19	47	5	7	11
	Total	89	151	79	51	53	66
Members in Managing Committee	Male	7	6	3	6	6	6
	Female	3	3	4	2	3	3
	Total	10	9	7	8	9	9

The average number of members registered and benefitted are much higher in groundwater schemes, especially tube well (Table 2.11). One LDTW has 420 members. However, within the surface water schemes, one RLI has 130 members.

Table 2.11: Average Number of Members in Functioning WUAs by Type of Irrigation System (Reclassified Schemes)

		TW (GW)	PDW (GW)	GW	CD (SW)	RLI (SW)	WDS (SW)	SW	All
		Members Registered	Male	73	29	67	37	54	22
Female	13		3	12	7	10	10	9	11
Total	86		33	79	45	63	31	50	67
Members Benefitted	Male	73	29	67	37	52	22	40	56
	Female	13	3	12	7	10	10	9	11
	Total	86	33	79	45	62	31	49	67
Members in Managing Committee	Male	7	6	6	6	7	5	6	6
	Female	2	2	2	3	3	3	3	2
	Total	9	8	9	9	10	7	9	9

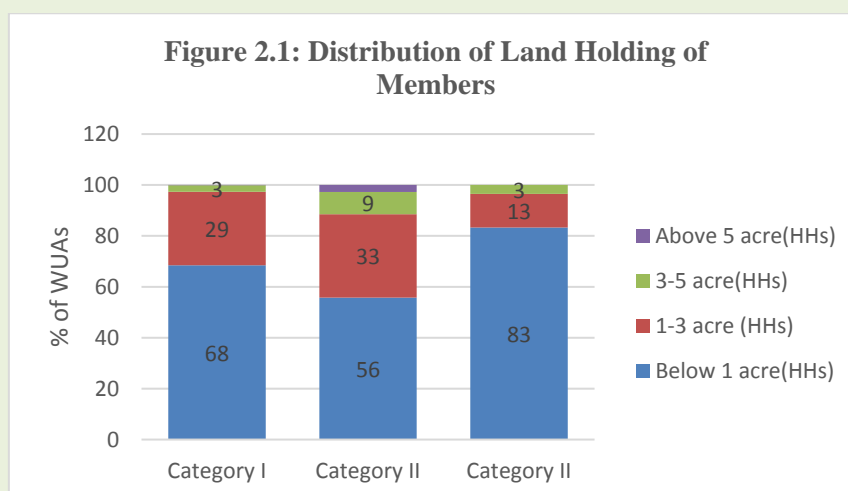
2.5 Land Holding by Beneficiaries

In general, the beneficiaries of the WUAs own land in the command area. While there are on average 66 registered, 45 of them are marginal farmers owning less than 1 acre of land and 20 of them own land between 1-3 acres in the command area. There are on average 14 sharecroppers per WUA who are not registered members and are dependent on water provided by WUAs (Table 2.12).

Table 2.12: Land Holding by the WUA Members

	Scheme Category	Category I	Category II	Category III	Total
Average number of members	Below 1 acre (HHs)	53	36	30	45
	1-3 acre (HHs)	22	21	5	20
	3-5 acre (HHs)	2	6	1	3
	Above 5 acre (HHs)	0	2	0	1
	Sharecropper	18	11	1	14
% of Members	Below 1 acre (HHs)	68	56	83	66
	1-3 acre (HHs)	29	33	13	29
	3-5 acre (HHs)	3	9	3	4
	Above 5 acre (HHs)	0	3	0	1
	Total	100	100	100	100

66 percent the beneficiaries who own land of less than one acre and only one percent have more than five acres in the command area. In category III schemes, 83 percent beneficiate own land of less than one acre in the command area (Table 2.13 and Figure 2.1). Hence, the WBADMIP programme is well targeted towards the marginal and small farmers.



Land holding of 5 acres or more is observed more in Coastal zones. Land holding size of below 1 acre is least in Northern Plateau followed by the Coastal zones (Table 2.13).

Table 2.13: Distribution of Landholding of Members of Functioning WUAs by Zones (in %)

Zones	Central	Coastal	Hilly	Northern Plateau	Western	Total
Below 1 acre (HHs)	78	74	100	54	66	68
1-3 acre (HHs)	19	19	0	42	27	27
3-5 acre (HHs)	2	3	0	3	6	4
Above 5 acre (HHs)	1	4	0	0	0	1
Total	100	100	100	100	100	100

Land holding of 5 acres or more is observed more for RLI schemes. Land holding size of below 1 acre is least for WDS schemes. A higher proportion of farmers have land holding between three to five acres in WDS as compared to other schemes (Table 2.14).

Table 2.14: Distribution of Landholding of Members of Functioning WUAs by Type of Irrigation System (Reclassified Schemes) (in %)

Land holding	TW (GW)	PDW (GW)	GW	CD (SW)	RLI (SW)	WDS (SW)	SW	All
Below 1 acre (HHs)	71	67	71	70	61	54	61	68
1-3 acre (HHs)	26	33	27	25	28	35	29	27
3-5 acre (HHs)	3	0	2	4	7	11	7	4
Above 5 acre (HHs)	0	0	0	0	4	0	3	1
Total	100	100	100	100	100	100	100	100

The average number of sharecroppers is higher in the coastal regions. The number of sharecroppers is highest for the tube well irrigation schemes. It is also high for the RLI schemes (Table 2.15)

Table 2.15: Average number of Sharecroppers in Functioning WUAs

Type of Irrigation Schemes							
TW (GW)	PDW (GW)	GW	CD (SW)	RLI (SW)	WDS (SW)	SW	All
23	1	24	4	15	2	20	15
Zones						All	
Central	Coastal	Hilly	Northern Plateau	Western			
18	52	0	10	12	15		

2.6 Functioning of WUA

In general, the WUAs do not have any separate establishment. Only one surveyed WUA has a separate establishment. This WUA is formed for CD scheme more than three years back. In case of all other WUAs, one of the member's residences is considered as establishment to conduct association related activities.

The key WUA informants expressed their understanding of the fact that the WUAs were constructed to build a group of beneficiary farmers to undertake activities for enhancing income of the members. Only one of the WUAs expressed that the objective of building the WUA was getting knowledge on improved practice and technologies and receiving support on agriculture, horticulture, fisheries like seed, equipment, feed, fertilizer, etc.

The managing committee of all the WUAs was formed through a process of selection. None of the WUAs expressed that it was done through election or through recommendation by anyone. The selection of managing committee members was done in a general meeting. Only a few of the WUAs (13 percent) mentioned about criteria of selection for WUA members. One third of them had education as criteria, half of them judged the candidates by their ability to discharge duties, and only one (11 percent) considered knowledge about agriculture as one of the criteria.

The members of the managing committee have remained same for 81 percent of the WUAs since managing committee was first constituted. In case of those WUAs where there has been a change in managing committee, 83 percent are more than three years old and 17 percent are

two to three years old. There has not been any change of members of managing committee in WUAs less than two years old.

2.6.1 Managing Committee Meetings

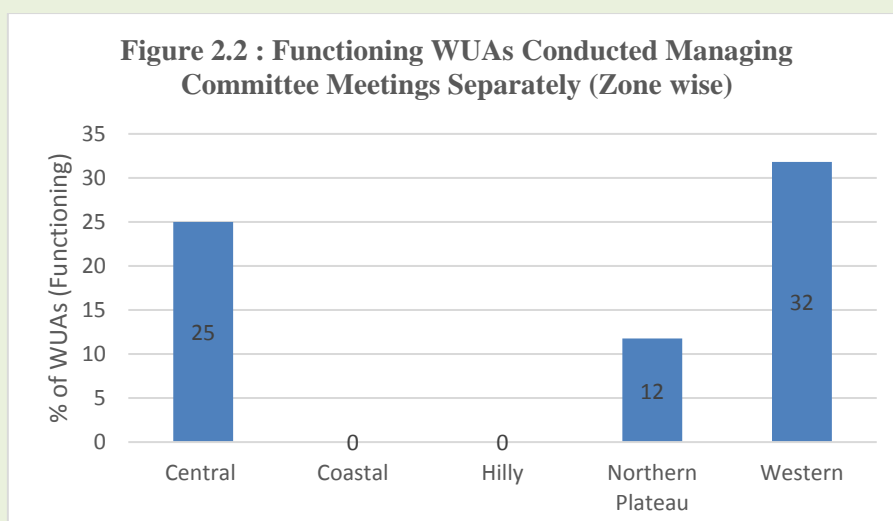
Most of the WUAs did not conduct managing committee meetings separately. In case of schemes under category I, separate managing committee meetings were conducted in 14 per cent WUAs. This is the lowest amongst all category of schemes. Separate managing committee meetings were highest for category III schemes at 33 percent (Table 2.16). In case of 10 percent WUAs, the managing committee meeting did not take place as the scheme had been abandoned.

Table 2.16: Percentage Distribution of WUAs Conducted Managing Committee Meetings Separately

Response	Scheme Category			Total
	I	II	III	
Yes	14	21	33	19
No	77	74	44	71
No, Scheme Abandoned	9	5	22	10
Total	100	100	100	100

75 percent of the managing committee meetings were conducted on monthly basis, which is sign of strength of the institution. Around 17 percent meeting were held on quarterly basis and 8 percent were held occasionally.

Amongst the functioning WUAs (fully and partially), only in 21 percent, managing committee meetings take place separately. It does not take place at all in coastal regions. However, in western and central zones, managing committee meetings take place in a substantial proportion of the WUAs (Figure 2.2).



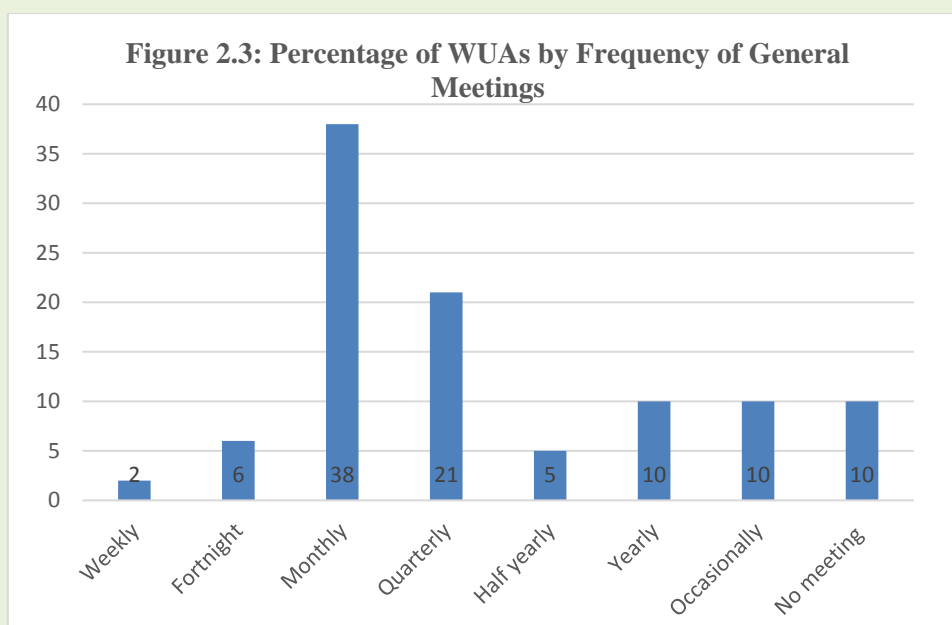
More than 80 percent of the WUAs based on tube well irrigation do not conduct managing committee meeting separately. However, separate meeting is conducted in half of the WUAs with check dam scheme (Table 2.17).

Table 2.17: Percentage Distribution of Functioning WUAs Conducted Managing Committee Meeting Separately by Type of Irrigation System (Reclassified Schemes)

Meeting Conducted	TW (GW)	PDW (GW)	GW	CD (SW)	RLI (SW)	WDS (SW)	SW	All
Yes	19	0	17	50	0	33	20	18
No	81	100	83	50	100	67	80	82
Total	100	100	100	100	100	100	100	100

2.6.2 General Meetings

The general meetings are held mostly either monthly or quarterly (Figure 2.3). In around 38 percent WUAs it has been conducted monthly. Monthly meeting is strength of institutional functioning. In 10 percent of WUAs, it is held yearly, and, in another ten percent, it is held occasionally. Infrequent general meetings are signs of institutional weakness of the WUAs. No meetings are held in 10 percent WUAs as they are defunct.



The zone-wise disaggregated results illustrate that the frequency of meetings is better in Central and Northern Plateau zones (Table 2.18).

Table 2.18: Frequency of General Meeting of Functioning WUAs by Zones

Frequency	Zones (%)					Total
	Central	Coastal	Hilly	Northern Plateau	Western	
Weekly	13	0	0	0	0	2
Fortnight	13	0	0	12	5	8
Monthly	38	25	100	53	36	42
Quarterly	0	50	0	6	36	21
Half yearly	13	0	0	6	0	4
Yearly	25	0	0	18	5	12
Occasionally	0	25	0	6	18	12
Total	100	100	100	100	100	100

The meetings are much more frequent for the groundwater schemes. In a higher percentage of WUAs with SW schemes meetings take place occasionally (Table 2.19).

Table 2.19: Frequency of General Meeting of Functioning WUAs by Scheme

Frequency	Scheme (%)							All
	TW (GW)	PDW (GW)	GW	CD (SW)	RLI (SW)	WDS (SW)	SW	
Weekly	0	0	0	0	10	0	5	2
Fortnight	8	25	10	0	10	0	5	8
Monthly	46	50	47	50	40	33	40	44
Quarterly	19	25	20	50	0	50	25	22
Half yearly	4	0	3	0	10	0	5	4
Yearly	15	0	13	0	0	17	5	10
Occasionally	8	0	7	0	30	0	15	10
Total	100	100	100	100	100	100	100	100

Around one-fourth of the WUAs of Batch IV conduct meetings occasionally. Weekly and fortnightly meetings are conducted more in Batch I, II and III WUAs (Table 2.20).

Table 2.20: Frequency of General Meeting of Functioning WUAs by Batches

Frequency	Batch (%)						Total
	I	II	III	IV	V	VI	
Weekly	11	0	0	0	0	0	2
Fortnight	11	9	8	0	0	0	8
Monthly	33	39	46	75	0	0	41
Quarterly	11	22	31	0	100	0	22
Half yearly	0	9	0	0	0	0	4
Yearly	22	4	15	0	0	100	12
Occasionally	11	17	0	25	0	0	12
Total	100	100	100	100	100	100	100

There is no systematic relation between grades and frequency of meetings. Occasional meetings are conducted more in A, C and D grade WUAs. On the other hand, weekly meetings are conducted only in grade D WUAs (Table 2.21).

Table 2.21: Frequency of General Meeting of Functioning WUAs by Grades

Frequency	Grades (%)					Total
	A+	A	B	C	D	
Weekly	0	0	0	0	20	2
Fortnight	25	0	25	0	0	8
Monthly	25	46	50	33	20	41
Quarterly	25	17	25	17	40	22
Half yearly	0	8	0	0	0	4
Yearly	25	13	0	33	0	12
Occasionally	0	17	0	17	20	12
Total	100	100	100	100	100	100

The WUAs, in general, maintain the minute's book for meeting. 81 percent WUAs have maintained minutes of last three meetings and 3 percent have maintained partially. The percentage of WUAs maintaining minute's book is substantially low for the category III schemes (Table 2.22 and Figure 2.4). It is interesting to note that all the WUAs aged within one year have maintained minutes of all the meetings. However, the percentage of WUAs maintaining minutes of the meeting (MoM) drops substantially once they go beyond one year of age (Table 2.23 and Figure 2.5). Incidence of improper maintenance of meetings minutes are found to be highest for WUAs formed more than 3 years back.

Table 2.22: Scheme Category Wise Percentage Distribution of WUAs Maintaining Minutes Book for Last Three General Body Meetings

Response	Scheme Category			Total
	I	II	III	
Yes, for all meeting	83	89	56	81
Yes, for partly	6	0	0	3
No	11	11	44	16
Total	100	100	100	100

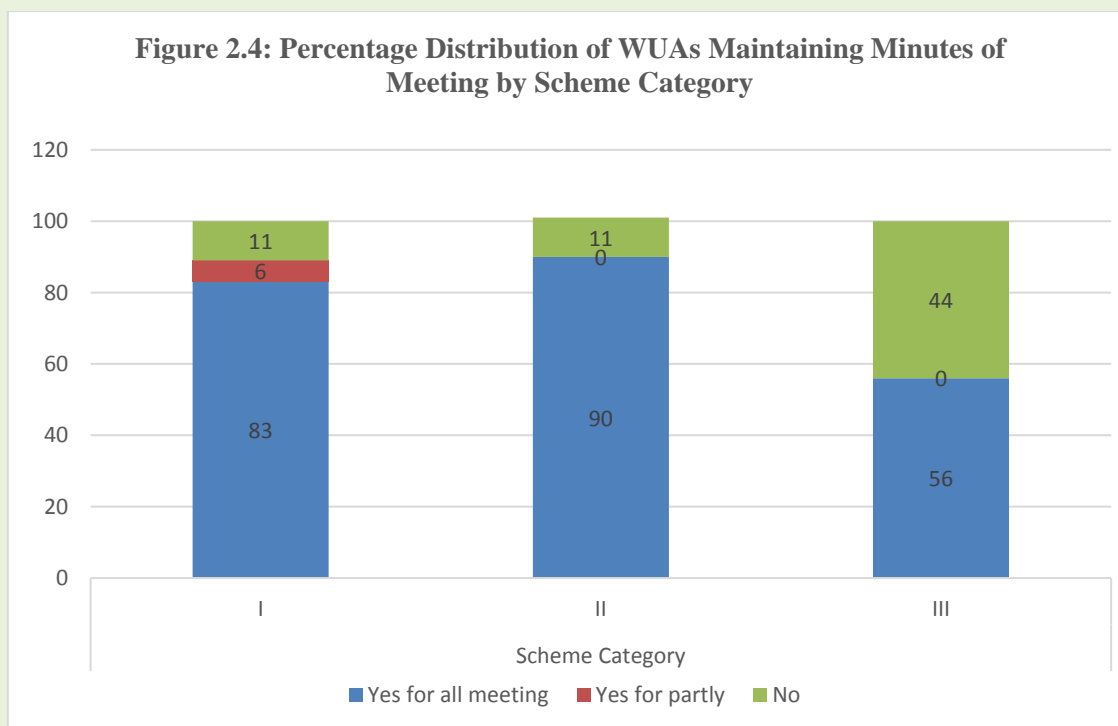
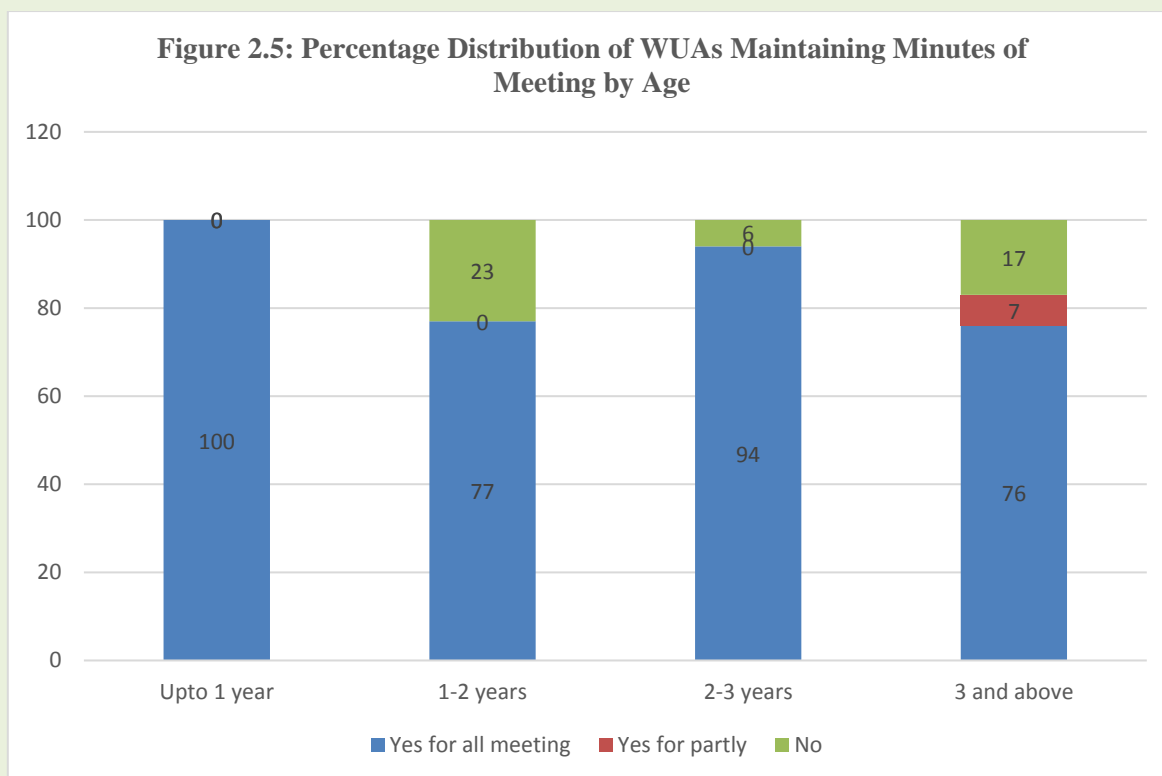
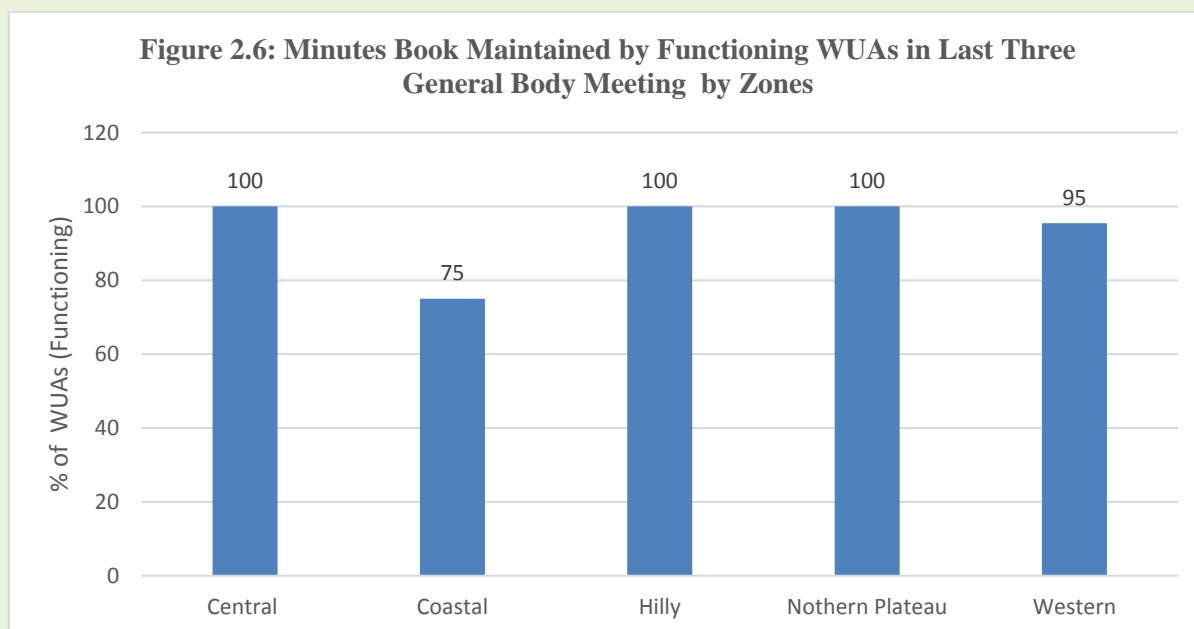


Table 2.23: Age Wise Percentage Distribution of WUAs Maintaining Minutes Book for Last Three General Body Meetings

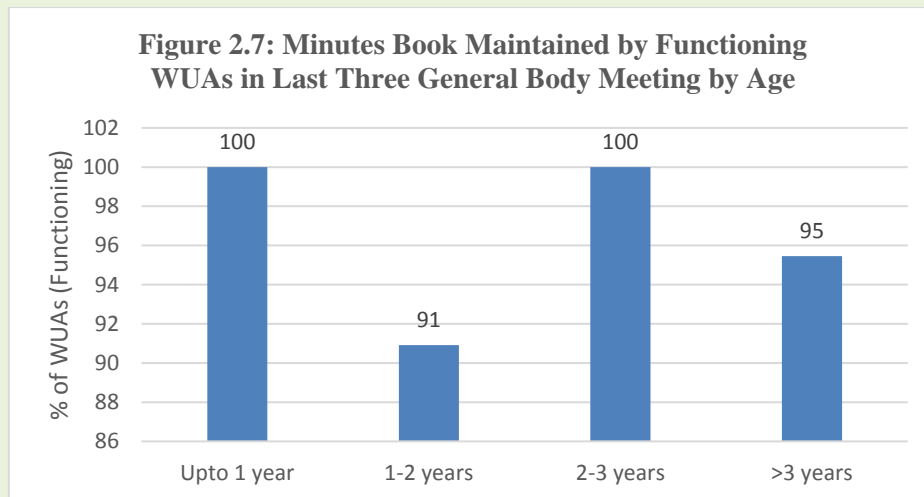
Response	Age of WUAs				Total
	Up to 1 year	1-2 years	2-3 years	3 years and above	
Yes, for all meeting	100	77	94	76	82
Yes, for partly	0	0	0	7	3
No	0	23	6	17	15
Total	100	100	100	100	100



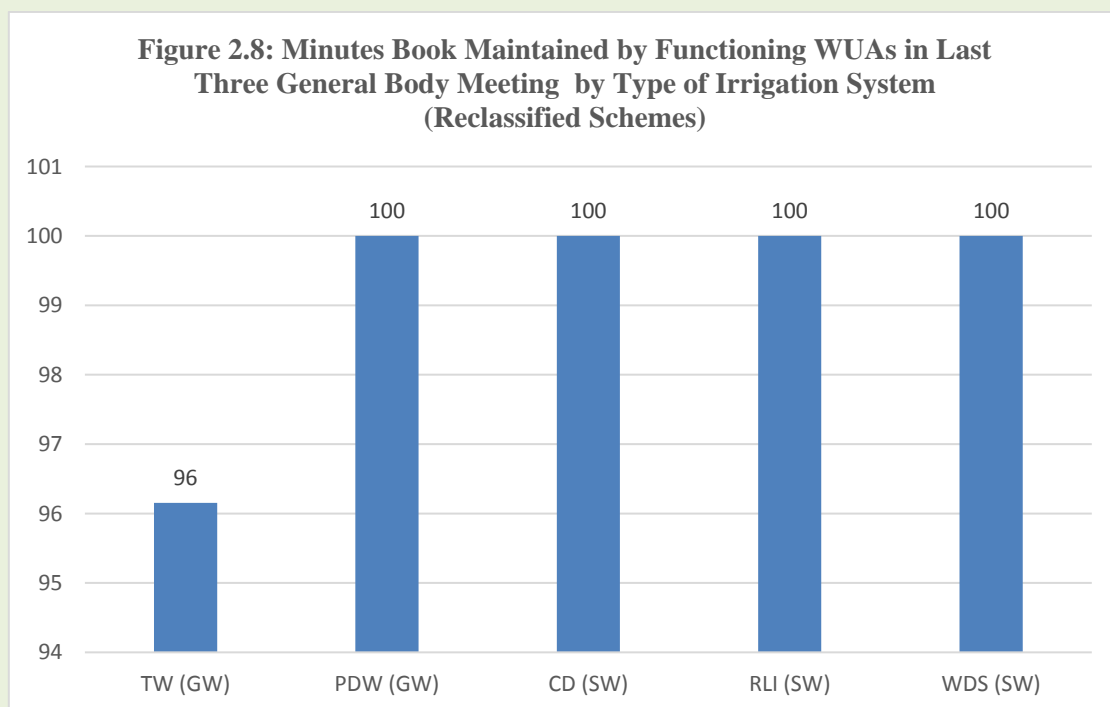
Out of the functioning WUAs, 96 percent have maintained the MoM of last three general body meeting. However, a much lesser percentage (only about three-fourth) of WUAs functioning in the coastal zones have maintained MoM (Figure 2.6).



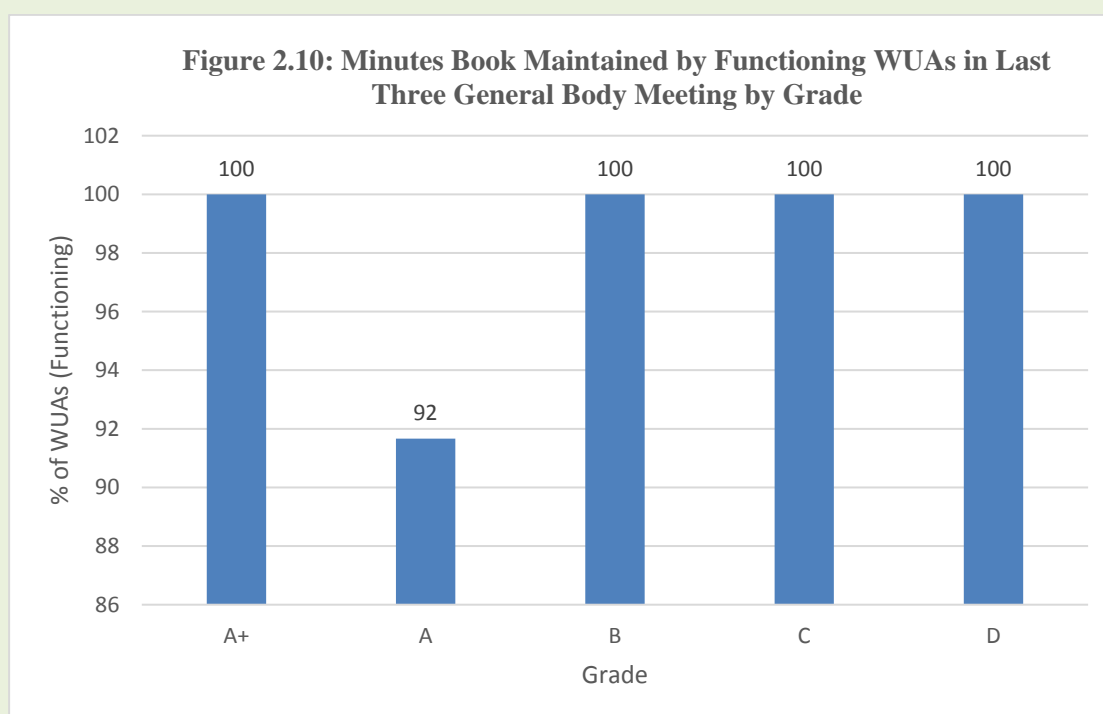
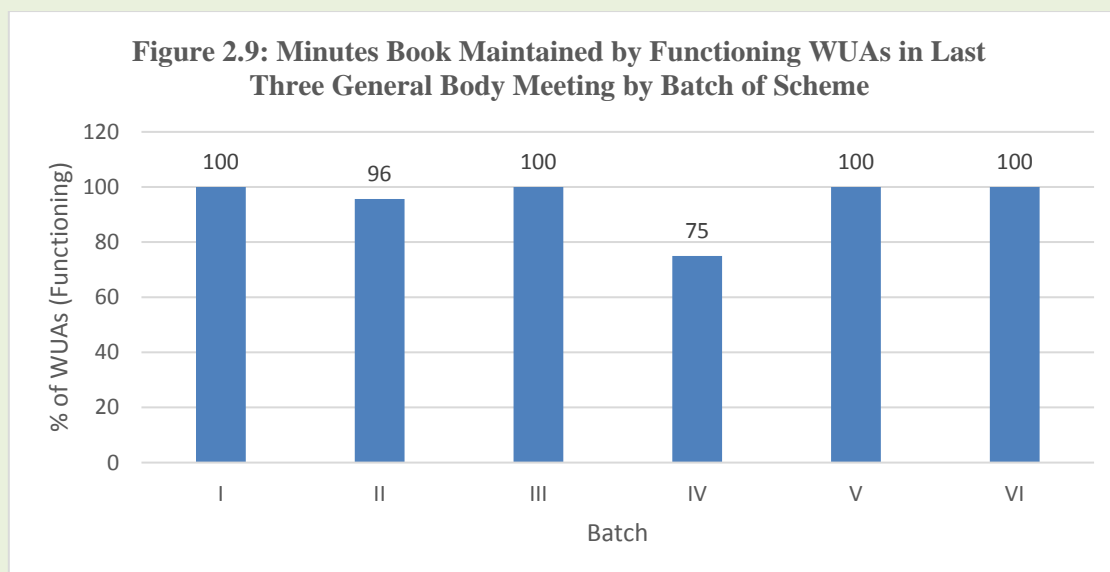
Amongst the functioning WUAs, relation between age of WUA and maintenance of MoM of last three general body meeting cannot be established (Figure 2.7).



MoM of last three general body meeting is maintained marginally lesser by tube well schemes (Figure 2.8)



No systematic relation is found between maintenance of MoM of last three general body meetings with batch and grade of the schemes (Figure 2.9 and Figure 2.10).



Around 81 percent WUAs provided the documents pertaining to attendance in the general meetings. The general meeting is held, on average, with 16-17 males and 2-3 female members (Table 2.24). The records illustrate that the average numbers of males and females attending the meetings are almost same in last three meetings.

Table 2.24: Members Present in Last Three General Meetings

Meetings	Member	Mean
Meeting 1	Male	16
	Female	03
Meeting 2	Male	16
	Female	02
Meeting 3	Male	17
	Female	02

29 different issues were discussed in the last three general meetings of the WUAs (Table 2.25). The most important issues discussed in the meetings include crop planning, membership fee and income and expenses of the WUA.

Table 2.25: Percentage Distribution of Issues Discussed in WUA General Body Meetings

Issue	Discussion (%)
Crop Planning	22
Membership fee	13
Income expenditure/Audit Report	10
Water Charges	7
Discussion on fishery	6
Distribution of seeds	6
Issues not clear	6
On Operational Issues	4
Vermicomposting	2
Repairing of accessories	2
On Operator Charge	2
Discussion on Bank account opening	2
On reformation of MC	2
Distribution of Orchard Plant	2
Electricity Bills	2
On distribution of Horticulture	2
Social activities	2

Issue	Discussion (%)
Discussion of Krishi Katha and collection of Mobile number	1
Pollyhouse	1
Major fault of Electric line	1
Discussion on Cluster level meeting	1
On Maintenance of supporting documents	1
Discussion on MC activity	1
Discussion on overhead expenses	1
Regarding Agri-equipment	1
On uses of Bio-fertilizer	1
On Banking issues	1
On Command area	1
Regarding Progressive Farmer	1
Total	100

Crop planning is one of the major issues discussed in Western zone and Northern Plateau. 27 percent of issues discussed in Western zone and 24 percent of issues discussed in Northern Plateau are related to crop planning. This may be due to higher crop diversification practiced in these zones. The Herfindahl Index of districts of western zone, Birbhum (0.28), Bankura (0.26) and Bardhaman (0.23), suggests high crop diversification during Rabi (details in Chapter 3). Also, under the northern plateau, Cooch Behar (0.22), Jalpaiguri (0.26) and South Dinajpur (0.25) experienced greater crop diversification during Rabi. Even during the pre-Kharif season, there is substantial crop diversification in Jalpaiguri (0.23), Birbhum (0.25) and Cooch Behar (0.28) districts.

Moreover, membership fee (yearly subscription) is one of the major issues discussed in Northern Plateau and Coastal zones (Table 2.26). A higher proportion of WUAs in Northern Plateau charge higher membership fees. On other hand, one-fourth of WUAs in Coastal zone does not charge membership fees. Furthermore, the average number of members in WUAs and average number of members delaying membership payment is highest in Coastal zone. Both high fee and lack of membership fee or delay in payment may make discussion about membership fee important in these zones. Larger the number of members more it is likely to be discussed as it concerns everyone.

Table 2.26: Major Issues Discussed in General Meetings of Functioning WUAs by Zones

Major Issues	Zones (%)					
	Central	Coastal	Hilly	Northern Plateau	Western	Total
Crop Planning	13	8	0	24	27	22
Income expenditure/ Audit Report	4	8	0	16	9	10
Water Charges	13	8	0	2	8	6
Discussion on fishery	0	0	33	4	11	6
Membership fee	8	17	0	20	8	12
On Operational Issues	0	0	0	4	6	4
Distribution of seeds	13	17	33	6	0	6
Issues not clear	13	8	0	0	9	6

Crop planning is one of the major issues discussed in WUAs with WDS. Again, this may be due to higher crop diversification in WDS schemes. Barring one WUA, all the other WDS of our survey from western zone experienced higher crop diversification.

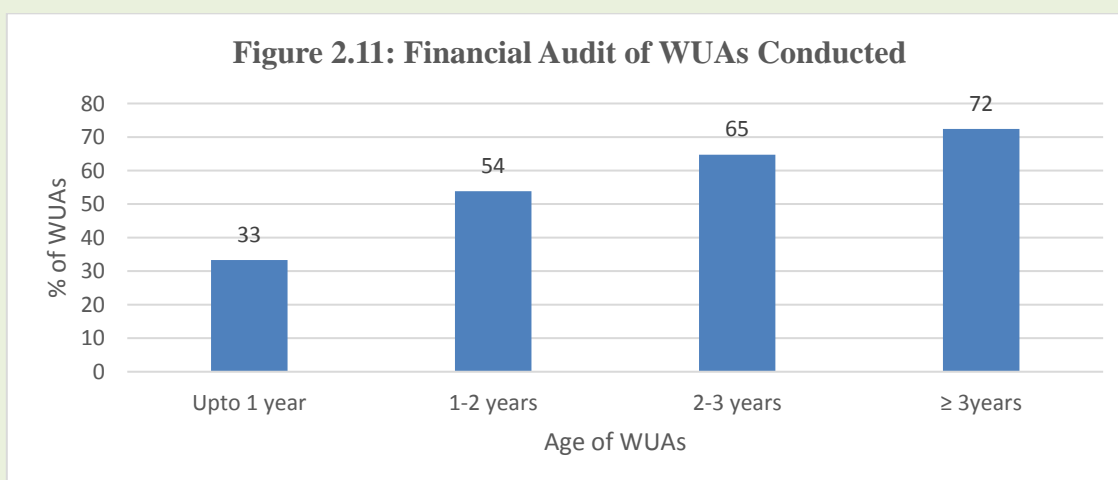
In PDW, RLI and TW schemes, membership fee turned out to be the major issue for discussion in the meeting (Table 2.27). This may be due to higher operating expenses for these schemes. The average number of members delaying membership payment is much higher in TW and RLI as compared to other systems. Furthermore, the average number of members in TW is much higher than other systems. These may be the reasons for more discussion on membership payment in these systems.

Table 2.27: Major Issues Discussed in General Meetings of Functioning WUAs by Type of Irrigation System (Reclassified Schemes)

Major Issues	Type of Irrigation Schemes (%)							Total
	TW (GW)	PDW (GW)	GW	CD (SW)	RLI (SW)	WDS (SW)	SW	
Crop Planning	19	25	20	25	13	39	23	21
Income expenditure/ Audit Report	13	0	11	17	10	0	8	10
Water Charges	9	8	9	8	3	0	3	7
Discussion on fishery	8	8	8	0	3	11	5	7
Membership fee	13	25	14	8	17	0	10	13
Distribution of seeds	6	8	7	0	7	6	5	6
Issues not clear	4	8	4	17	10	6	10	7

2.6.3 Financial Audit

Conducting financial audit of the WUAs is one of the important steps towards transparency of the association. It makes the institutional processes more resilient. It has been observed that only 65 percent WUAs have conducted financial audit. The percentage of WUAs that have conducted financial audit increases with the age of WUAs (Figure 2.11). 72 percent WUAs that are more than three years old have conducted financial audit in the past.



Financial audit has been conducted by the WUAs with greater average number of members and larger command area (Table 2.28). Financial audit is important measure for trust building within the members of WUAs, especially if they are large. However, number of small farmers (with less than one acre of land) has no association with conducting financial audit, indicating heterogeneity of WUA has no implication for conducting the financial audit.

Table 2.28: Number of Members and Command Area of WUAs where Financial Audit has been conducted and Not Conducted

	Number of Members (Nos)	Number of Small Farmers (< 1 acre)	Command Area (Bigha)
Financial Audit Done	81	20	178
Financial Audit Not Done	39	20	167

Around 73 percent of the functioning WUAs have done financial audit. Comparatively lesser number of the WUAs from the Northern and Western zones have done financial audit. But half of the WUAs from western zone aged up to 1 year have done financial audit (Table 2.29)

Table 2.29: Financial Audit of Functioning WUAs by Zones and Age

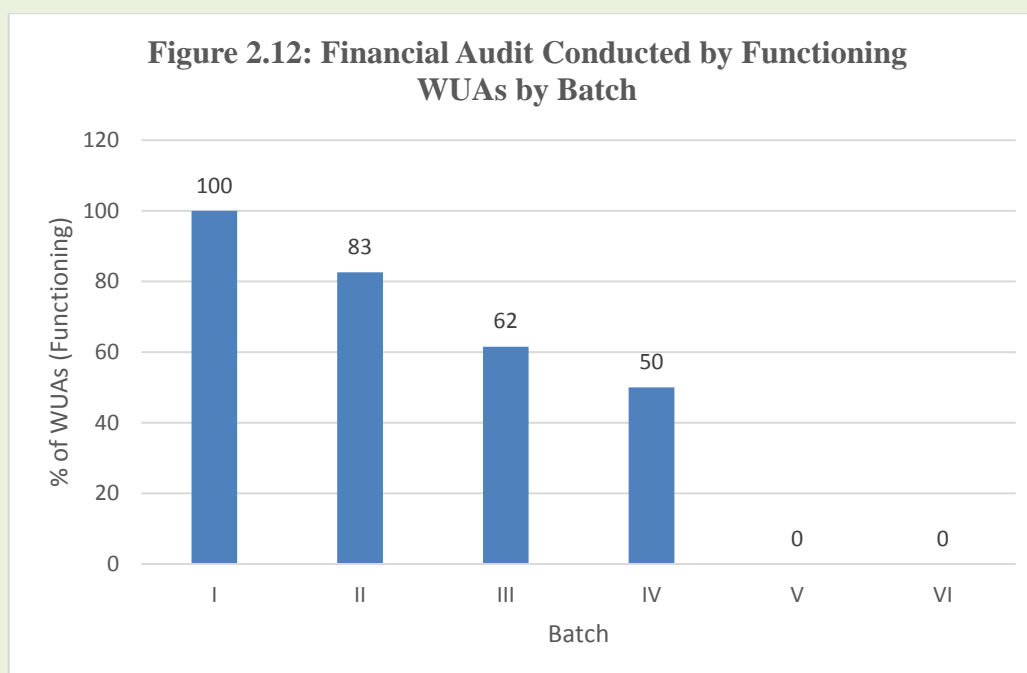
Zones	Age of WUAs (Functioning)				Total
	Up to 1 year	1-2 years	2-3 years	> 3 years	
Central		100	100	100	100
Coastal				75	75
Hilly		100			100
Northern Plateau	0	50	33	89	65
Western	50	50	75	75	68

A higher proportion of WUAs under groundwater schemes have conducted financial audit as compared to the WUAs under surface water schemes. Only one-third of the WUAs with WDS schemes have conducted financial audit (Table 2.30).

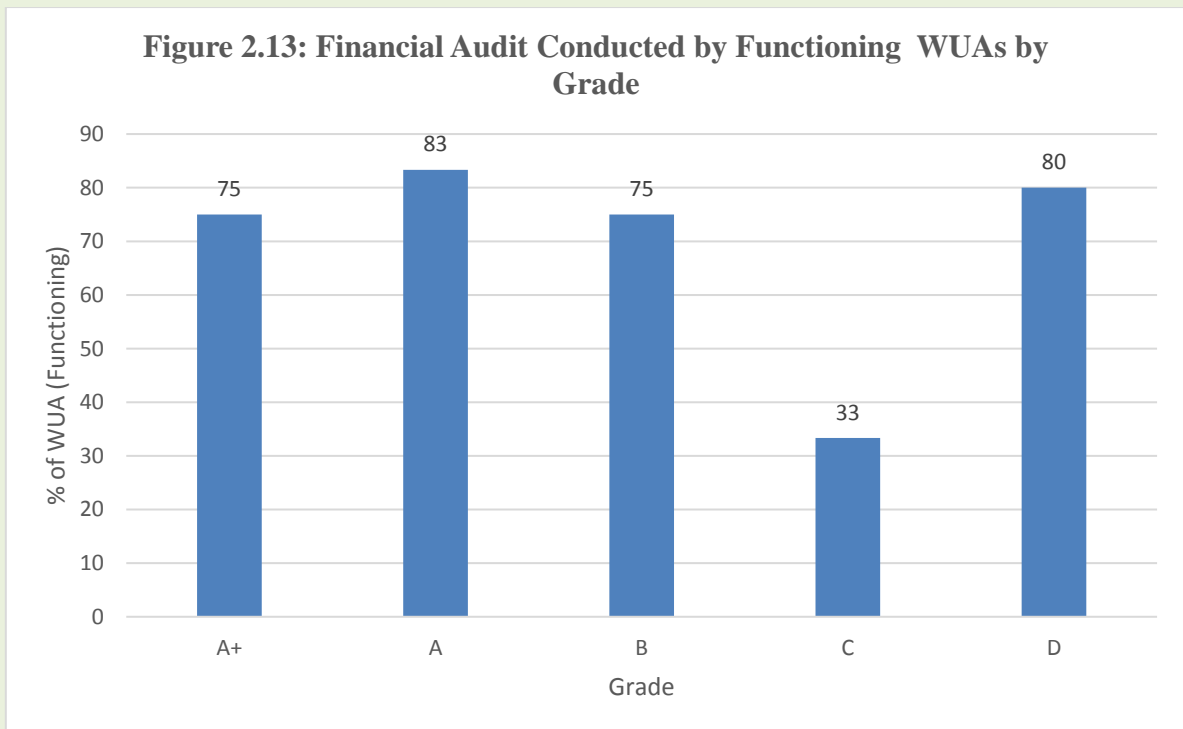
Table 2.30: Financial Audit of Functioning WUAs by Type of Irrigation System (Reclassified Schemes) and Age

Schemes	Age of WUAs (Functioning)				Total
	Up to 1 Year	1-2 Years	2-3 Years	> 3 Years	
TW (GW)	50	71	67	91	77
PDW (GW)		100	100	100	100
GW	50	75	75	92	80
CD (SW)			50	100	75
RLI (SW)		0	67	100	80
WDS (SW)	0		67	0	33
SW	0	0	63	80	65
All	33	67	69	86	74

The percentage of WUAs conducted financial audit decreases gradually with the successive batches. It corroborates the earlier finding that a higher proportion of older WUAs conduct financial audit than the newer ones (Figure 2.12).



There is no relation between WUAs conducted financial audit and grade of WUA (Figure 2.13)

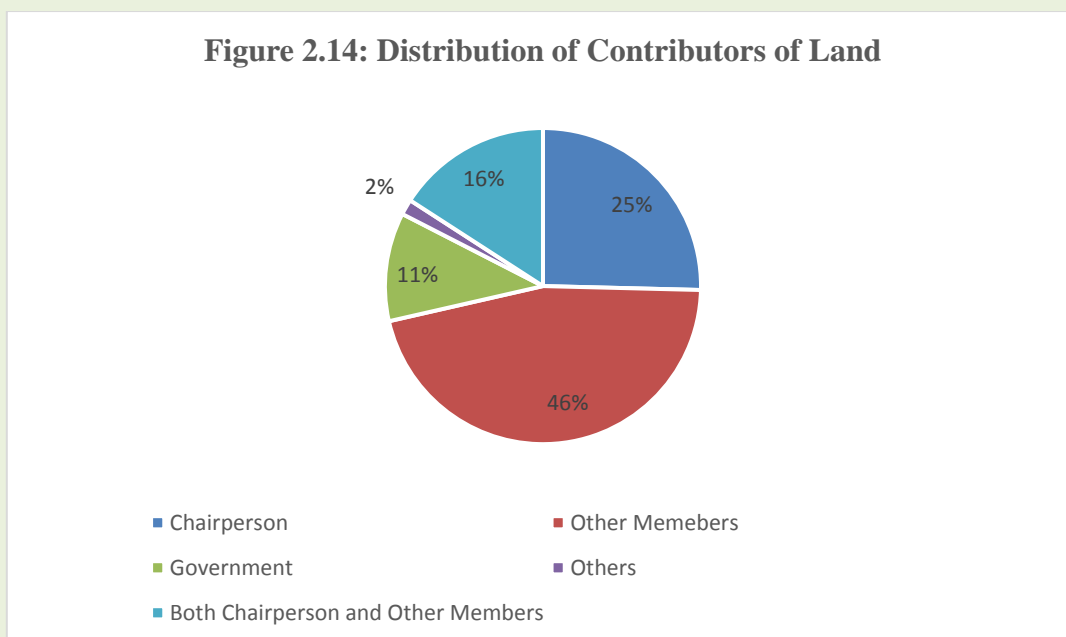


2.7 Functioning of MI Structures

The construction of the MI structures was possible due to contribution of both WBADMIP and beneficiaries. The capital investment for the MI structures was made by WBADMIP. Beneficiaries did not contribute any money for construction of the MI structures. However, the beneficiaries contributed land for all the schemes.

Land was contributed primarily by members, including chairperson. Both chairperson and other members contributed land in 25 percent WUAs (Figure 2.14). Only other members contributed land in 46 percent WUAs. Only chairperson contributed land in 16 percent WUAs. Only in one of 63 surveyed WUAs, government also provided some amount of land.

Figure 2.14: Distribution of Contributors of Land



The chairperson of the WUA contributed land (with or without other members) in 41 percent schemes and other members contributed in 46 percent schemes (Table 2.31). In case of schemes under category I and II, higher percentage of other members have contributed land. In contrast, for schemes under category III, chairpersons' land contributions have been higher compared to the other members.

Table 2.31: Percentage distribution of WUAs according to contribution of land

Land Contributor	Scheme Category			All
	I	II	III	
Chairperson (with or without other members)	40	26	78	41
Other members	57	42	11	46
Govt. Land	03	32	0.0	11
others	0.0	0.0	11	2
Total	100	100	100	100

In half of the functioning WUAs in coastal zone, chairperson is the sole contributor of land. In one-third of the WUAs in Northern Plateau, both chairperson and members are the contributor of land (Table 2.32).

Table 2.32: Land Contribution in Functioning WUAs by Zones

Land Contributor	Zones (%)					All
	Central	Coastal	Hilly	Northern Plateau	Western	
Chairperson	38	50	0	29	18	27
Other Members	50	25	100	29	55	44
Government	13	25	0	6	18	13
Both Chairperson and Other Members	0	0	0	35	9	15
Total	100	100	100	100	100	100

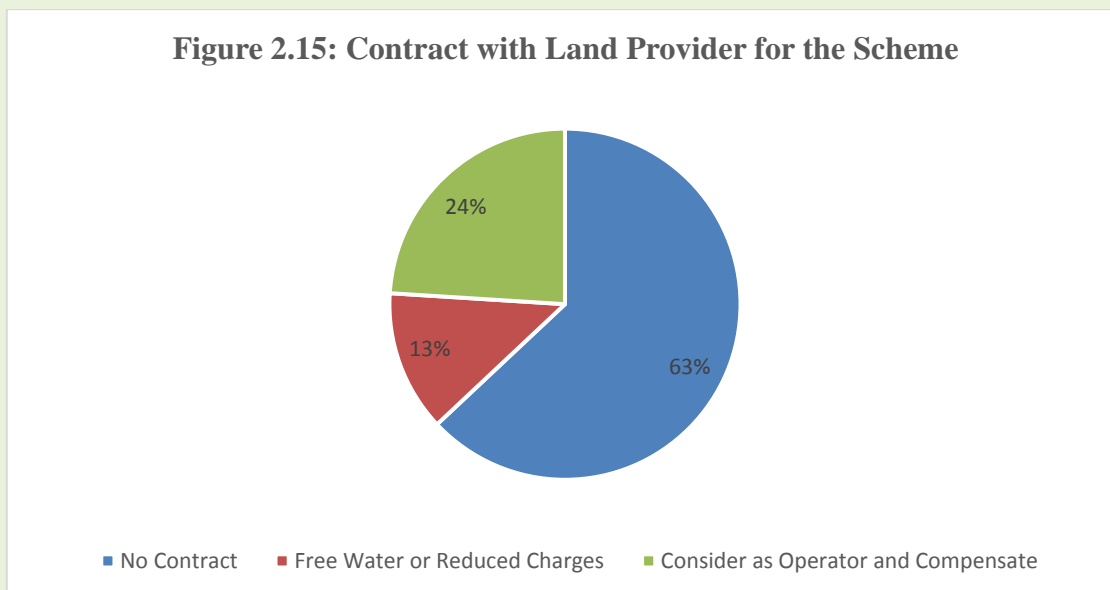
A substantially higher percentage of members other than the chairperson have contributed land to the WUAs under groundwater schemes than the WUAs under surface water schemes. Furthermore, a higher percentage of WUAs under surface water schemes have land contributed by government than the WUAs under groundwater schemes (Table 2.33).

Table 2.33: Land Contribution in Functioning WUAs by Type of Irrigation System (Reclassified Schemes)

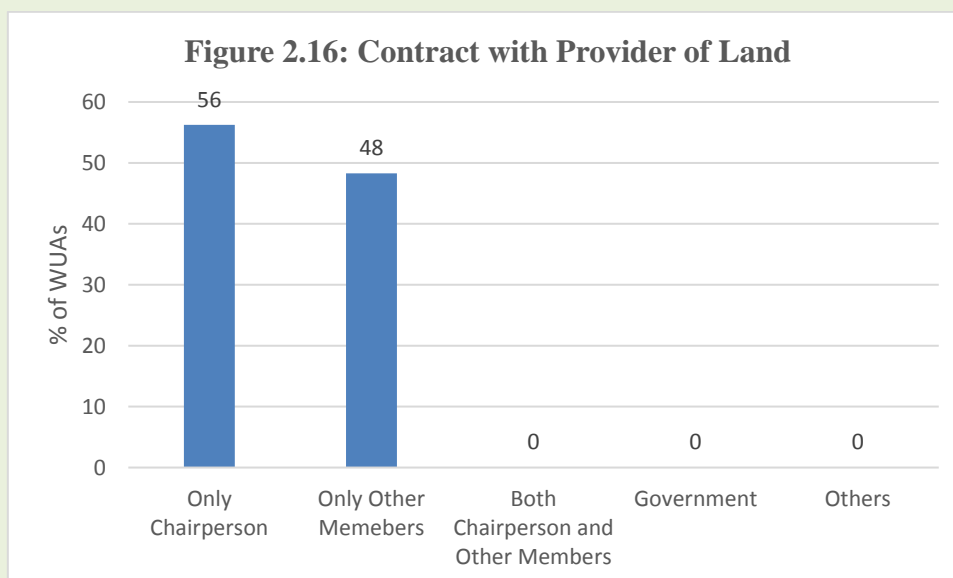
Land Contributor	Schemes (%)							All
	TW (GW)	PDW (GW)	GW	CD (SW)	RLI (SW)	WDS (SW)	SW	
Chairperson	27	0	23	0	20	67	30	26
Other Members	50	75	53	25	50	17	35	46
Government	4	0	3	75	20	17	30	14
Both Chairperson and Other Members	19	25	20	0	10	0	5	14
Total	100	100	100	100	100	100	100	100

While provisioning land for the schemes, around 37 percent WUAs made contract with land provider. Two types of contracts were made with land providers: one, provision of water free

of charge or at a reduced rate, and two, engagement as operator and compensate accordingly. The latter type of contract is more prevalent than the former (Figure 2.15).

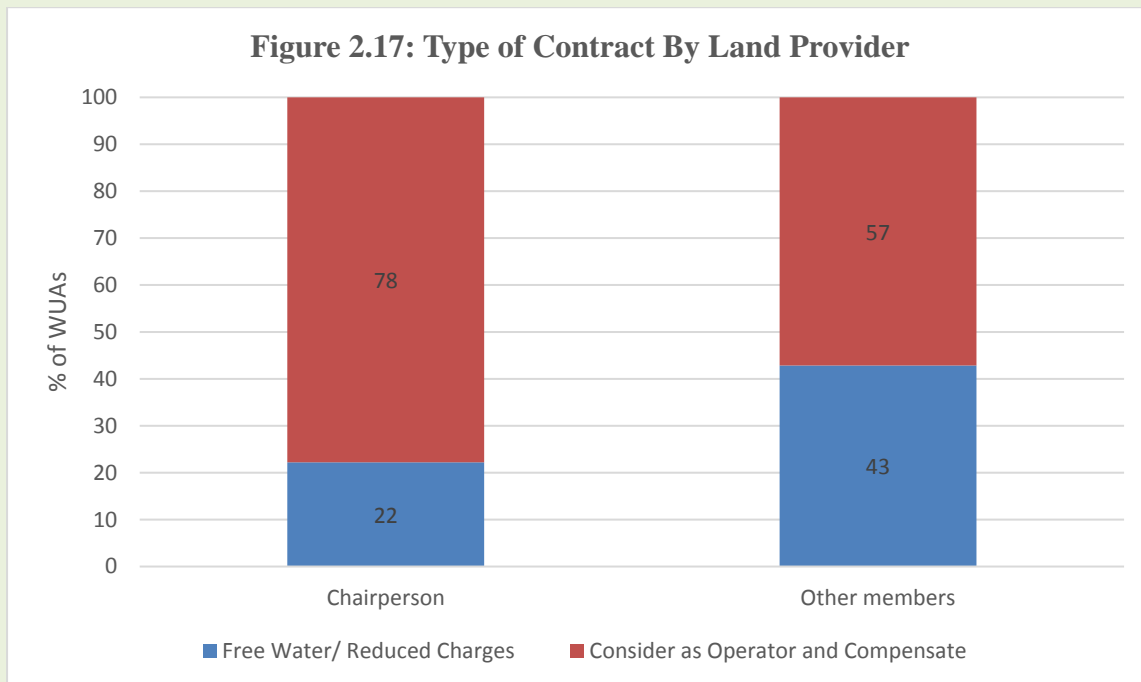


The contracts were made with the land provider when only the chairperson was the land provider and only members (other than the chairperson) were the land provider. In case both the chairperson and other members are provider of land, no contract was made (Figure 2.16).



The type of contract varied with the type of land provider. When only chairperson was the land provider, 78 percent contracts were made against either free water or reduced charges of water (Figure 2.17). When other members (but not the chairperson) were land provider, a much lower

percentage of them were provided free water or reduced charges of water and a much higher percentage of them were given the role of operator and compensated accordingly.



In a few of the WUAs (3 percent), additional structure or up gradation was introduced by association after the initial construction. New pump set was installed, and new channels were developed as a result of these initiatives.

When government or both the chairperson and other members are land contributor, no contract has been made with them by the WUAs that are functioning in all the regions. When contracted, in most of the cases land contributor has been engaged as operator. Contracting with chairperson is of higher proportion in Northern zone. In most of the cases land contributor has been engaged as operator in functioning WUAs. Free water or reduced water charges is sole type of contract with only Chairperson in Western zone (Table 2.34).

Table 2.34: Contract with Land Contributors in Functioning WUAs by Zones

Zones	Land Contributors	Contracted (%)	Type of Contract (%)		
			Free Water or Reduced Water Charges	Consider as Operator and Compensate	Total
Central	Chairperson	67	0	100	100
	Other Members	75	67	33	100
	Government	0			0
	Total	63	40	60	100
Coastal	Chairperson	50	0	100	100
	Other Members	100	0	100	100
	Government	0			
	Total	50	0	100	100
Hilly	Other Members	0			
	Total	0			
Northern Plateau	Chairperson	80	0	100	100
	Other Members	40	100	0	100
	Government	0			
	Both Chairperson and Other Members	0			
	Total	35	33	67	100
Western	Chairperson	25	100	0	100
	Other Members	58	14	86	100
	Government	0			
	Both Chairperson and Other Members	0			
	Total	36	25	75	100
Total	Chairperson	57	13	88	100
	Other Members	57	38	62	100
	Government	0			
	Both Chairperson and Other Members	0			
	Total	40	29	71	100

Contract with the land provider is more prevalent for groundwater schemes as compared to surface water schemes. Furthermore, when chairperson is the land provider a substantially higher proportion of contracting has taken place in groundwater schemes. In both groundwater and surface water schemes, chairperson is engaged mainly as operator (Table2.35)

Table 2.35: Contract with Land Contributors in Functioning WUAs by Type of Irrigation System (Reclassified Schemes)

Schemes	Land Contributor	Contracted (%)	Types of Contract (%)		
			Free Water /Reduced Charges	Operator and Compensated	Total
TW (GW)	Chairperson	86	17	83	100
	Other Members	69	44	56	100
	Government	0			
	Both Chairperson and Other Members	0			
	Total	58	33	67	100
PDW (GW)	Other Members	33	0	100	100
	Both Chairperson and Other Members	0			
	Total	25	0	100	100
GW	Chairperson	86	17	83	100
	Other Members	63	40	60	100
	Government	0			
	Both Chairperson and Other Members	0			
	Total	53	31	69	100
CD (SW)	Other Members	0			
	Government	0			
	Total	0			
RLI (SW)	Chairperson	100	0	100	100
	Other Members	60	33	67	100
	Government	0			
	Both Chairperson and Other Members	0			
	Total	50	20	80	100
WDS (SW)	Chairperson	0			
	Other Members	0			
	Government	0			
	Total	0			
SW	Chairperson	33	0	100	100
	Other Members	43	33	67	100
	Government	0			
	Both Chairperson and Other Members	0			
	Total	25	20	80	100
Total	Chairperson	62	13	88	100

Schemes	Land Contributor	Contracted (%)	Types of Contract (%)		
			Free Water /Reduced Charges	Operator and Compensated	Total
	Other Members	57	38	62	100
	Government	0			
	Both Chairperson and Other Members	0			
	Total	42	29	71	100

2.7.1 Maintenance of MI Structure

In general, the MI structures are not maintained through systematic maintenance procedure. Only 17 percent of the WUAs follow systematic maintenance procedure. 14 percent of the systems which function fully and 38 percent systems which function partially follow systematic maintenance procedure. Systematic maintenance is done before the cultivating season. Among the MI structures where scheduled maintenance is conducted, 56 percent are maintained quarterly and 22 percent half-yearly. In case of other MI structures, maintenance is not done systematically. It is done as and when required.

In case of category I and category III schemes, 79 percent and 67 percent of the MI structures are maintained by land provider (Table 2.36). However, in case of category II schemes, only 11 percent are maintained by the land provider. The association members maintain 74 percent MI structures for category III schemes. The category II schemes are of surface water irrigation, while the category I schemes are of groundwater irrigation. It may be inferred that collective action in maintenance is better in surface water irrigation. The MI structures of 16 percent of the WUAs are not maintained as they are not functioning properly.

Of the land providers who maintain the MI structures, 31 percent are paid separately for maintenance. When members of association are responsible for maintenance, 24 percent are paid separately for their work.

Table 2.36: Percentage Distribution of WUAs by Responsibility of Maintaining MI Structures

	Scheme Category			Total
	I	II	III	
Association	6	74	11	27
Land Provider	79	11	67	57
Nobody, as source malfunction	15	16	22	16
Total	100	100	100	100

The WUAs seek technical support or knowhow from pump motor mechanics. The members of association may discuss with the mechanics who provide their advice free of cost. They may also come and repair the machines, in which case, they charge the WUAs. More than half of the WUAs have sought help for maintenance from outside the WUA. The service providers are in general local mechanic. Only in one WUA the service provider is electrician from government department. External help for maintenance is sought for two reasons: lack of technical person in the association (65 percent) and need technical inputs to increase awareness regarding maintenance (35 percent).

We have categorised the frequency of seeking help from outside as frequent, if it is done very often. Most of the WUAs under category I scheme, have always taken outside help for maintenance (Table 2.37). But for category II and III schemes, most WUAs have never taken outside help for maintenance. The complications of maintenance of tube wells in category I schemes have necessitated help seeking from outside.

Table 2.37: Percentage Distribution of WUAs Sought Help from Outside Regarding Maintenance by Scheme Category

Response	Scheme Category			Total
	I	II	III	
Yes, always / Whenever maintenance is required	60	11	11	38
Yes, in special cases	20	0	11	13
Have a paid expert who from outside	3	5	0	3
Never	17	84	78	46
Total	100	100	100	100

The WUAs, that are newly formed (less than one year old), 67 percent of them have not sought any external help (Table 2.38). On the contrary, 62 per cent of 1-2 years old WUAs have always sought help from outside. Around 35 percent of the older WUAs (more than two years) have always sought help from outside for maintenance. 7 percent of WUAs that are more than three years old have made arrangement with an external expert against payment of required fees. Hence, the older WUAs have sought help from outside agency or expert for maintenance more than the newer ones.

Table 2.38: Percentage Distribution of WUAs Sought Help from Outside Regarding Maintenance (Age-wise)

Response	Age of WUAs				Total
	Up to 1 year	1-2 years	2-3 years	3 and above	
Yes, always / Whenever maintenance is required	0	62	35	34	39
Yes, in special cases	33	0	12	17	13
Have a paid expert who from outside	0	0	0	7	3
Never	67	38	53	41	45
Total	100	100	100	100	100

The complaint regarding maintenance has been received from the members in 81 percent WUAs. The WUAs reported that they had received complaints from a number of beneficiaries, ranging from 50 to 100. The members complained about non-availability of water supply. The WUAs have had capacity constraints regarding maintenance activities. 81 percent WUAs were not much aware of maintenance activities. Amongst those who were aware of maintenance activities, 50 percent were guided by the technical staff who installed the system, 28 percent developed their ability for maintenance activities through training and 22 percent developed capacity for maintenance through experience.

46 percent of the functioning WUAs have not sought outside help for maintenance. Relatively lesser percentage of functioning WUAs from the Coastal and Western zones sought external support for maintenance (Table 2.39).

Table 2.39: Percentage Distribution of WUAs (functioning) Sought Help from Outside Regarding Maintenance by Zones

Response	Zones (%)					Total
	Central	Coastal	Hilly	Northern Plateau	Western	
Yes, always/ whenever maintenance required	50	25	100	41	32	38
Yes, in special cases	13	0	0	29	5	13
Have a paid expert who from outside	0	0	0	6	0	2
Never	38	75	0	24	64	46
Total	100	100	100	100	100	100

More WUA functioning under surface water irrigation schemes have sought help from outside regarding maintenance. Both old and newer WUAs have sought outside help for maintenance of groundwater schemes. Only WUAs more than 3 years old have sought help for maintenance of surface water schemes (Table 2.40).

Table 2.40: Percentage Distribution of WUAs (functioning) Sought Help from Outside Regarding Maintenance by Type of Irrigation System (Reclassified Schemes)

Schemes	Response	Age of WUAs				All
		Up to 1 Year	1-2 Years	2-3 Years	> 3 Years	
TW (GW)	Yes, always/ whenever maintenance required	0	71	67	45	54
	Yes, in special cases	50	0	33	36	27
	Never	50	29	0	18	19
	Total	100	100	100	100	100
PDW (GW)	Yes, always/ whenever maintenance required		100	100	0	75

Schemes	Response	Age of WUAs				All
		Up to 1 Year	1-2 Years	2-3 Years	> 3 Years	
	Have a paid expert who from outside		0	0	100	25
	Total	0	100	100	100	100
GW	Yes, always/ whenever maintenance required	0	75	75	42	57
	Yes, in special cases	50	0	25	33	23
	Have a paid expert who from outside	0	0	0	8	3
	Never	50	25	0	17	17
	Total	100	100	100	100	100
CD (SW)	Yes, always/ whenever maintenance required			0	50	25
	Never			100	50	75
	Total	0	0	100	100	100
RLI (SW)	Yes, always/ whenever maintenance required		0	0	17	10
	Never		100	100	83	90
	Total		100	100	100	100
WDS (SW)	Never	100		100	100	100
	Total	100	0	100	100	100
SW	Yes, always/ whenever maintenance required	0	0	0	20	10
	Never	100	100	100	80	90
	Total	100	100	100	100	100
All	Yes, always/ whenever maintenance required	0	67	38	32	38
	Yes, in special cases	33	0	13	18	14
	Have a paid expert who from outside	0	0	0	5	2
	Never	67	33	50	45	46
	Total	100	100	100	100	100

2.7.2 Problems of Water Supply

The WUAs have faced water supply problem during cultivation season as water may not be available for cultivation.

Nearly 65 per cent WUAs never faced water supply problem during cultivation season last year. Non-availability of water supply was more frequent for category II schemes, which were related to surface water irrigation (Table 2.41). In 74 percent WUAs under category I schemes, water was always available. This implies higher reliability of groundwater irrigation through tube well. Better availability of water was also possible due to better maintenance of the systems as well.

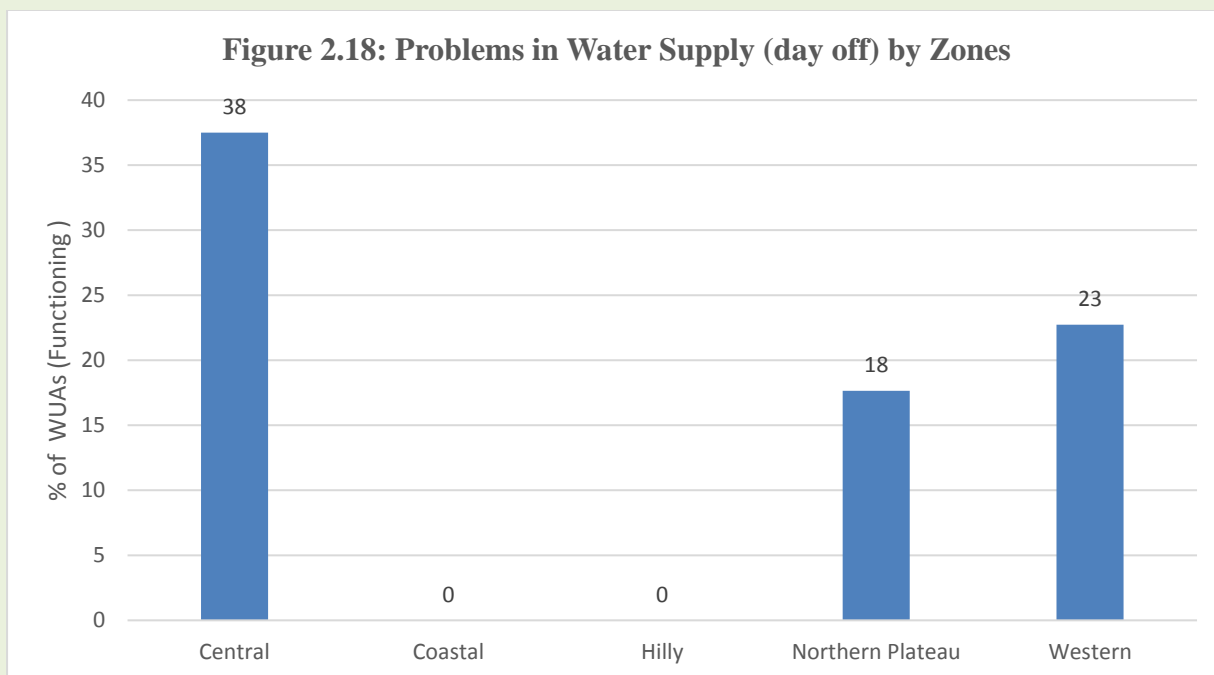
**Table 2.41: Percentage Distribution of Water Supply Problem (Non-availability)
During Cultivation**

Non-availability of Water Supply During Cultivation	Category			All
	I	II	III	
Yes	11	32	11	17
Never	74	53	56	65
For Long time since Source Malfunctioning	14	16	33	17
Total	100	100	100	100

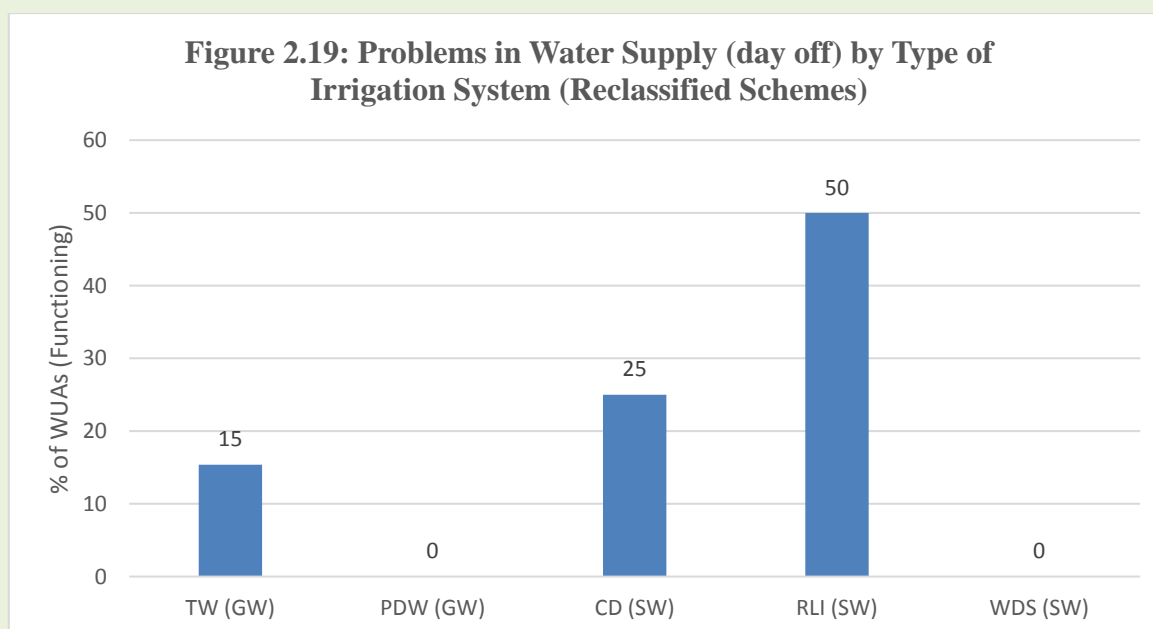
The duration of non-availability of water supply ranges from four to twenty days. During the year before the survey, in around 55 percent of cases of non-availability of water supply, the stalemate persisted for 10 to 20 days. The major reasons for the non-availability is water supply were power cut (59 percent) and sudden breakdown (39 percent).

As for majority, the reasons for non-availability of water supply were pertaining to power-cut, informing the electricity department was the prime redressal strategy adopted by the WUAs. Two of the surveyed WUAs switched over to diesel pump sets due to electricity problem. For other mechanical problems, mechanic was called for redressal of the problem.

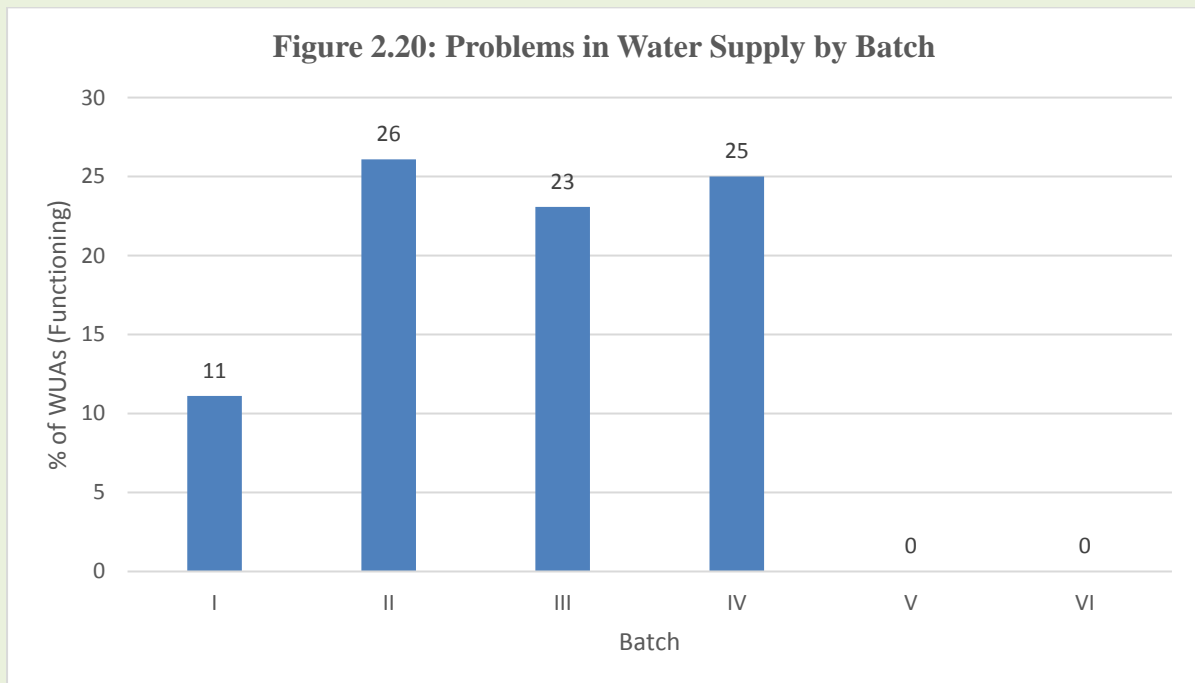
Within the functioning WUAs, problems of water supply are reported by 21 percent WUAs. Water is not available from the sources due to technical faults. The problems of maintenance are higher in the Central zone (Figure 2.18).



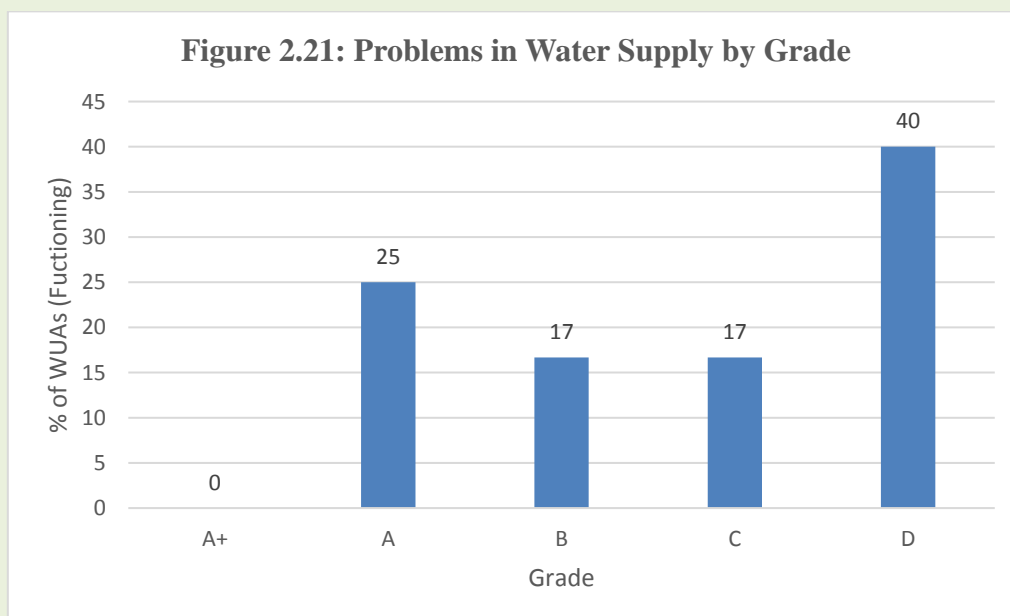
Problems of water supply is reported to be higher for surface water schemes than the groundwater schemes. While 30 percent surface water schemes have reported water supply problem, only 13 percent groundwater schemes have reported the same (Figure 2.19).



Problem of water supply has been reported less by batch I schemes as compared to batch II, III and IV schemes (Figure 2.20). The schemes of batch V and VI have not reported any problem of water supply.



None of the A+ graded WUAs have reported any water supply problem. The proportion of schemes reporting water supply problem is highest for D graded WUAs (Figure 2.21).

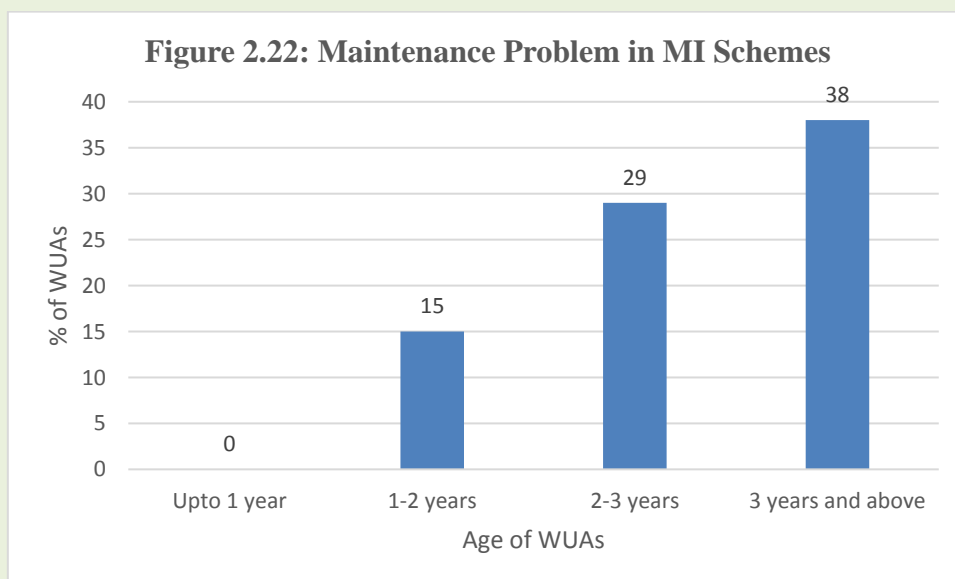


2.7.3 Problems of Maintenance

Problems of maintenance occur due to malfunctioning of sources, lack of technical persons and funds (due to delay in payment of water charges), lack of interest of beneficiaries in maintenance of system (due to low motor capacity) and frequent leakage or blockage.

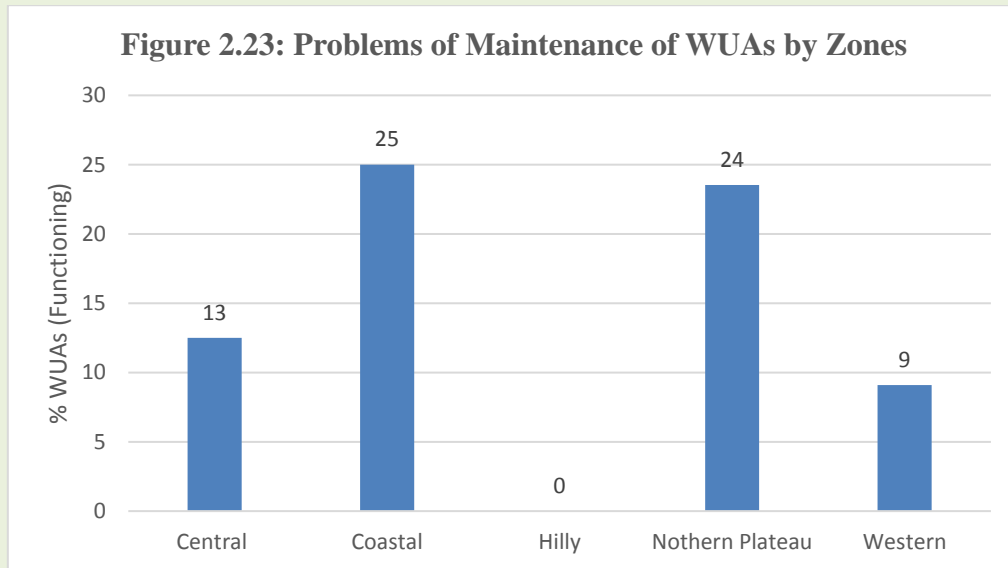
Problems regarding maintenance of MI systems were reported by 30 percent WUAs with little variation across the scheme categories. Amongst the problems of maintenance, 56 percent were regarding lack of capacity (lack of technical staff), 22 percent were regarding frequent leakage due to blockage in the pipeline and the rest 22 percent were related to lack of funds and lack of interest of members regarding maintenance.

The WUAs that are less than one year old has not reported any problem of maintenance. The percentage of WUAs facing maintenance problems increases with increase in the age of WUAs (Figure 2.22). 38 percent WUAs that are more than three years old have reported problem of maintenance of MI structure.

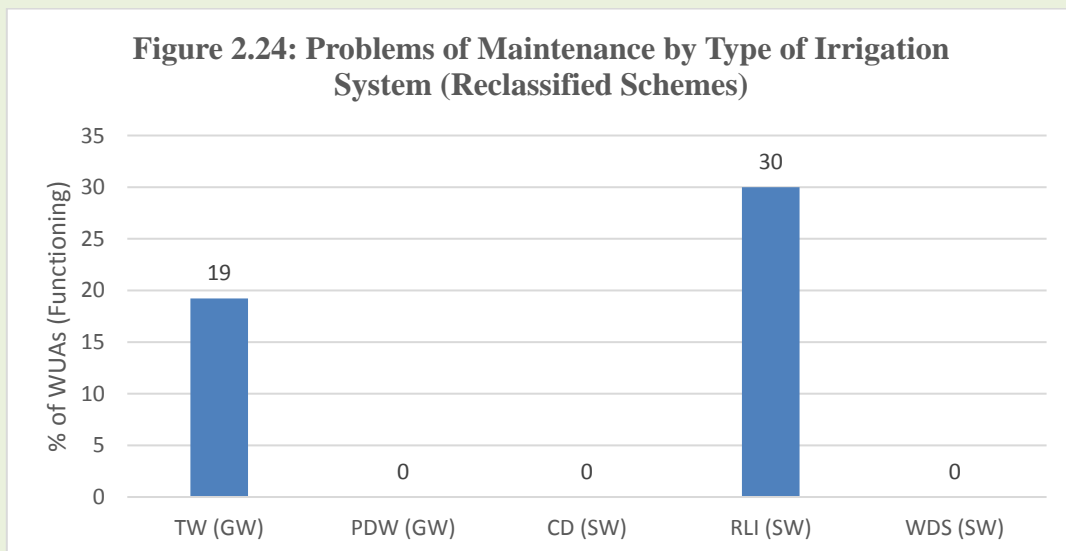


The WUAs were asked about their suggestions to make maintenance better. 81 percent WUAs had no suggestion regarding maintenance work. The suggestions provided by other WUAs were immediate technical support after breakdown, alternative distribution pipeline, timely payment of water charges by the beneficiaries, need of inverter, support through provision of pump motor until the recovery of breakdown and requirement of skill training for proper maintenance of structure.

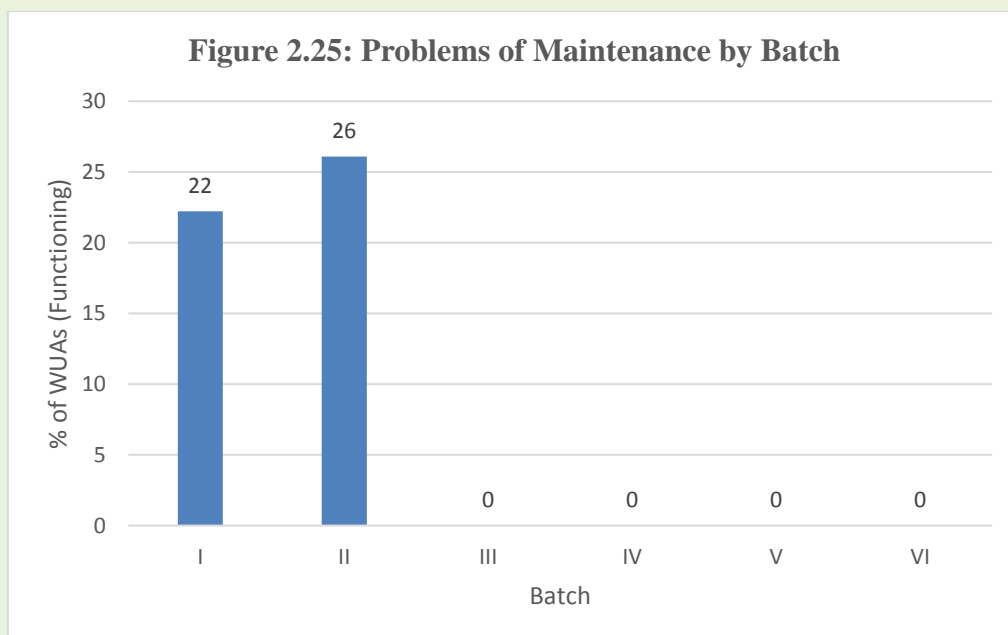
It has been observed that 15 percent functioning WUAs have problems of maintenance. The problem is higher in Coastal and Northern Plateau (Figure 2.23).



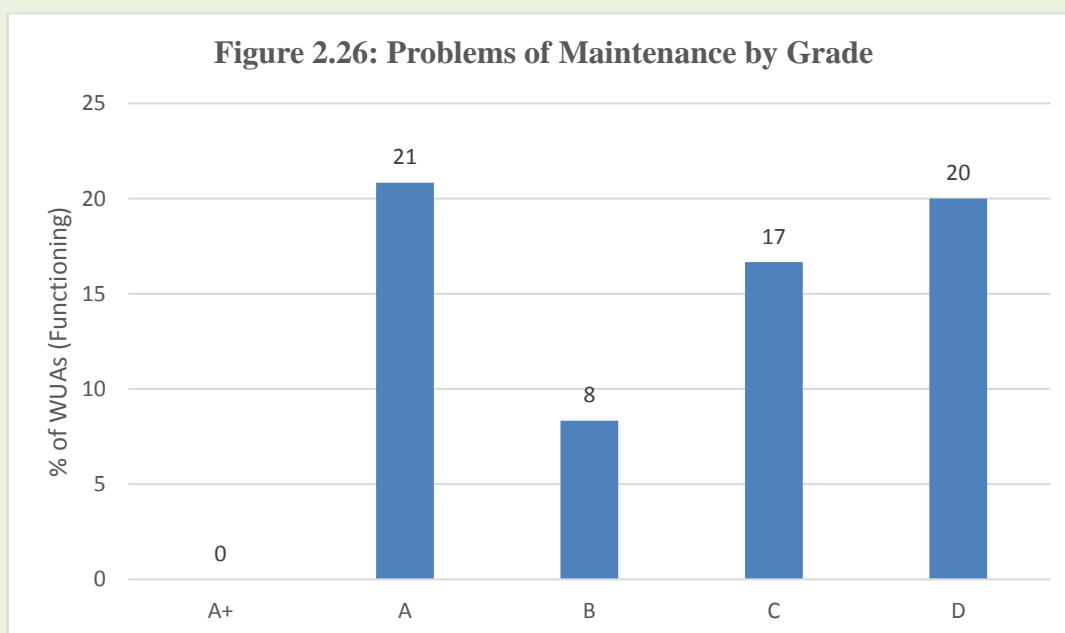
The problem of maintenance is almost similar among groundwater and surface water schemes. 17 percent groundwater and 15 percent surface water schemes have problems of maintenance. However, the RLI schemes reported the highest percentage of maintenance related problems (Figure 2.24).



The problem of maintenance is mainly observed in Batch I and II schemes. None of the schemes from batch III, IV, V and VI have problems of maintenance (Figure 2.25).



WUAs graded A+ have not reported any problem of maintenance. However, other grades of WUAs have problem of maintenance and there is no correspondence between grade of WUA and problem of maintenance (Figure 2.26).



Among the different suggestion within the functioning WUAs, immediate technical assistance is sought the most. This is more so in coastal regions. Skill training for maintenance is suggested more in the Northern Plateau (Table 2.42 and Figure 2.27)

Table 2.42: Suggestions by Functioning WUAs for Betterment of Maintenance Work by Zones

Response	Zones (%)					Total
	Central	Coastal	Hilly	Northern Plateau	Western	
Immediate technical support is essential	13	50	0	6	4	9
Alternative distribution pipeline is required	0	0	0	6	0	2
Beneficiaries should pay water charges in time	0	0	0	0	4	2
Needed Inverter	0	0	0	0	4	2
Supporting Pump motor is essential during break down of working set	0	0	0	0	4	2
Skill training is essential for proper maintenance of structure	0	0	0	12	0	4
No suggestion	88	50	100	76	83	79
Total	100	100	100	100	100	100

Figure 2.27: Suggestions for Betterment of Maintenance Work

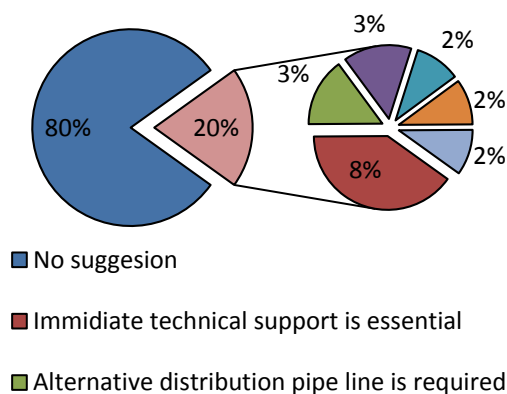


Table 2.42: Suggestions by Functioning WUAs for Betterment of Maintenance Work by Zones

Response	Zones (%)					Total
	Central	Coastal	Hilly	Northern Plateau	Western	
Immediate technical support is essential	13	50	0	6	4	9
Alternative distribution pipeline is required	0	0	0	6	0	2
Beneficiaries should pay water charges in time	0	0	0	0	4	2
Needed Inverter	0	0	0	0	4	2
Supporting Pump motor is essential during break down of working set	0	0	0	0	4	2
Skill training is essential for proper maintenance of structure	0	0	0	12	0	4
No suggestion	88	50	100	76	83	79
	100	100	100	100	100	100

WUAs under groundwater schemes mostly suggested for immediate technical assistance. WUAs with WDS suggested to make inverter available (Table 2.43). To cope up with the breakdown of pump set, the key informants of the RLI schemes emphasized on availability of supporting pump motor (Table 2.43).

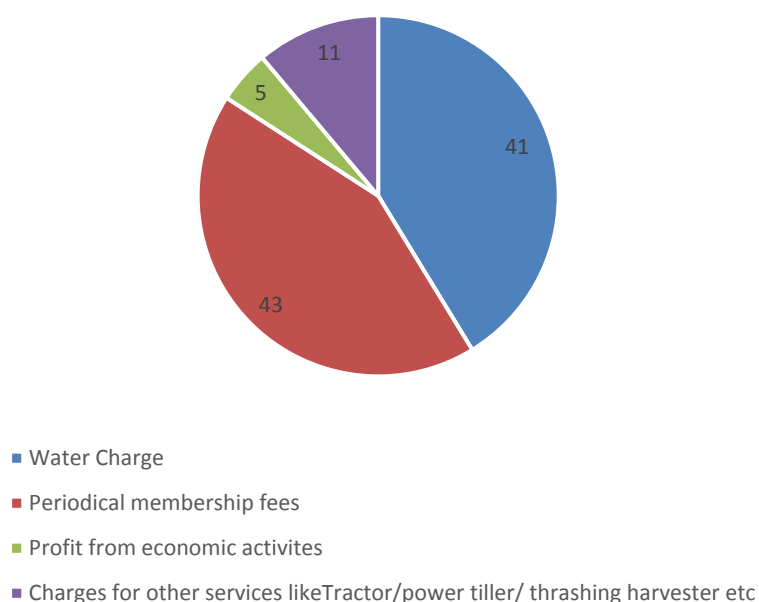
Table 2.43: Suggestions by Functioning WUAs for Betterment of Maintenance Work by Type of Irrigation System (Reclassified Schemes)

Suggestions	Schemes (%)							All
	TW (GW)	PDW (GW)	GW	CD (SW)	RLI (SW)	WDS (SW)	SW	
Immediate technical support is essential	15	0	13	0	10	0	5	10
Alternative distribution pipeline is required	0	0	0	0	10	0	5	2
Beneficiaries should pay water charges in time	4	0	3	0	0	0	0	2
Needed Inverter	0	0	0	0	0	17	5	2
Supporting Pump motor is essential during break down of working set	0	0	0	0	10	0	5	2
Skill training is essential for proper maintenance of structure	7	0	6	0	0	0	0	4
No suggestion	74	100	77	100	70	83	80	78
Total	100	100	100	100	100	100	100	100

2.8 Financial Management

The activities conducted by the WUAs are financed from funds mobilized from membership charges, water charges, profit from the economic activities and charges collected from other services like renting tractor/power tiller/ thrashing harvester etc. However, mobilization of resources is mostly done from funds collected through water charges and membership fees (Figure 2.28).

Figure 2.28: Sources of Funds for Conducting WUA Activities



Profit from economic activities (mainly fishery) is one important source (one-third of sources) of revenue for WUAs functioning in Coastal zone. Income from other service is an important source of revenue for WUAs from Central zone (Table 2.44).

Table 2.44: Sources of Fund of Functioning WUAs by Zones

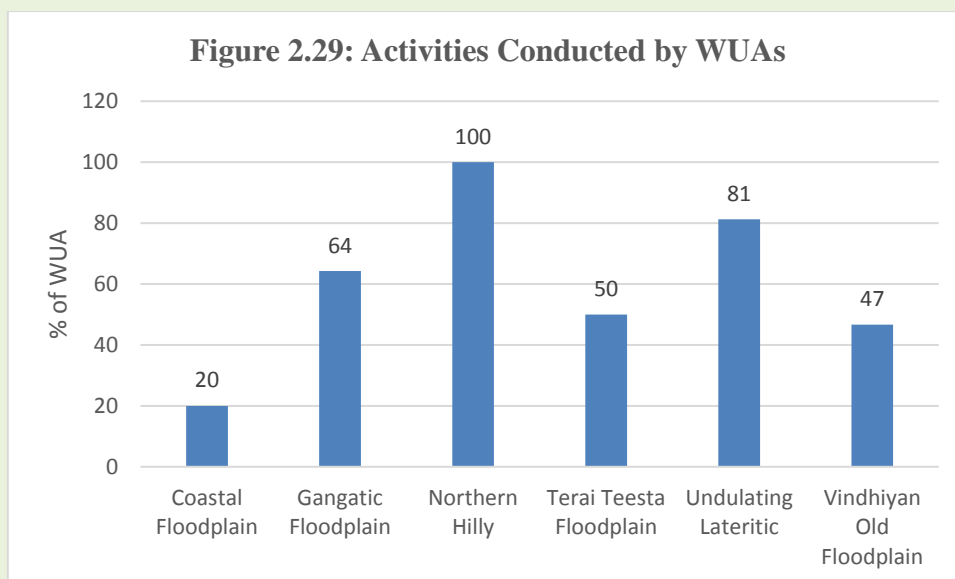
Mobilization of Fund	Zones (%)					All
	Central	Coastal	Hilly	Northern Plateau	Western	
Water Charge	42	33	50	44	39	41
Periodical membership	42	33	50	44	43	43
Profit from economic activities	0	33	0	0	7	5
Charges for other services like Tractor/power tiller/ thrashing harvester etc	17	0	0	11	11	11
Dealing of seeds & Fertilizer	0	0	0	0	0	0
Others(specify)	0	0	0	0	0	0
Total	100	100	100	100	100	100

Amongst different sources, earnings from other services constitute 15 percent of sources for the surface water irrigation schemes, but only 4 percent of revenue sources for the groundwater schemes (Table 2.45).

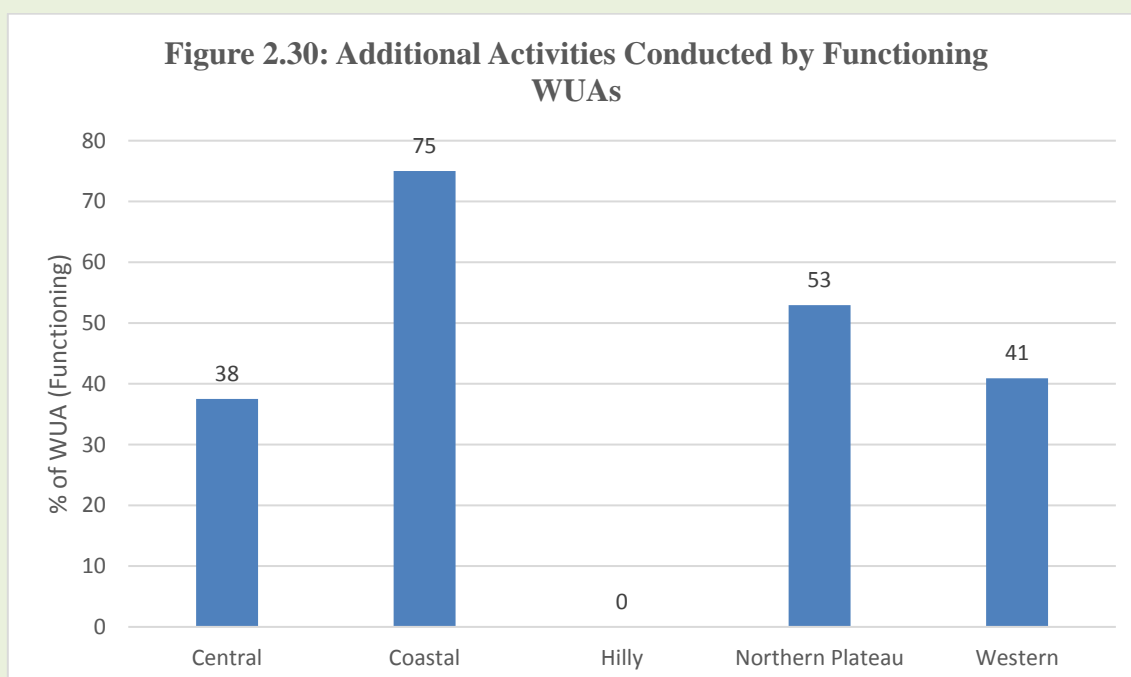
**Table 2.45: Sources of Fund of Functioning WUAs by Type of Irrigation System
(Reclassified Schemes)**

Mobilization of Fund	Schemes (%)							All
	TW (GW)	PDW (GW)	GW	CD (SW)	RLI (SW)	WDS (SW)	SW	
Water Charge	43	40	42	38	38	44	39	41
Periodical membership	48	40	46	50	38	44	42	44
Profit from economic activities	10	0	8	0	0	11	3	5
Charges for other services like Tractor/power tiller/ thrashing harvester etc	0	20	4	13	25	0	15	10
Total	100	100	100	100	100	100	100	100

The WUAs conduct different activities for additional income generation. 38 percent WUAs conduct different activities for additional income generation. All WUAs in Northern Hilly region and 81 percent WUAs in undulating laterite region conduct different activities. Only 20 percent WUAs in Coastal Floodplain region conduct activities for income generation (Figure 2.29).



Within the functioning WUAs, 46 percent have conducted different income generating activities. Around 75 percent of the WUAs in the coastal regions have conducted income generating activities (Figure 2.30).



The WUAs conduct various activities such as fishery, horticulture, poly house, vermicomposting and hatchery. The two most important activities are fishery and horticulture (Table 2.46). Vermicomposting is also another important activities adopted by WUAs of several regions. WUAs in the Vindhyan Old Floodplain conduct all the activities.

Table 2.46: Percentage Distribution of WUA Activities by Agro-climatic Regions

Agro-climatic Regions	Fishery	Horticulture	Poly House	Vermicomposting	Hatchery	All
Coastal Floodplain Regions	100	0	0	0	0	100
Gangatic Floodplain	33	33	0	33	0	100
Northern Hilly	50	50	0	0	0	100
Terai Teesta Floodplain	42	33	0	25	0	100
Undulating Lateritic	35	42	8	12	4	100
Vindhiyan Old Floodplain	29	14	14	29	14	100
Total	37	35	5	19	4	100

Fishery is taken as additional activity in all the regions, more so in the coastal zone. All activities are conducted in the central and western zones (Table 2.47).

Table 2.47: Percentage Distribution of Activities in Functioning WUAs by Zones

Activities	Zones (%)					All
	Central	Coastal	Hilly	Northern Plateau	Western	
Fishery	17	100	50	42	38	36
Horticulture	25	0	50	37	38	34
Poly-house	8	0	0	0	8	5
Vermicomposting	42	0	0	21	13	21
Hatchery	8	0	0	0	4	3
Total	100	100	100	100	100	100

Poly house farming is conducted only in WUAs with PDW schemes. Interestingly, fishery is undertaken by a higher proportion of WUAs with groundwater schemes (Table 2.48).

**Table 2.48: Percentage Distribution of Activities by Type of Irrigation System
(Reclassified Schemes) in Functioning WUAs**

Activities	Schemes (%)							All
	TW (GW)	PDW (GW)	GW	CD (SW)	RLI (SW)	WDS (SW)	SW	
Fishery	59	33	52	43	23	25	29	39
Horticulture	29	33	30	43	46	50	46	39
Poly-house	0	17	4	0	0	0	0	2
Vermicomposting	12	17	13	14	31	13	21	18
Hatchery	0	0	0	0	0	13	4	2
Total	100	100	100	100	100	100	100	100

2.8.1 Membership Fees

Membership fees are charged in 82 percent WUAs. Amongst the WUAs not charging any membership fees, many of them belong to Category I and Category III schemes. On the contrary, WUAs that are charging high membership fees (>Rs. 150) primarily belong to Category I and Category III schemes (Table 2.49). The average membership fee is Rs. 133 per year. Excluding the WUAs that do not charge membership fees, the average membership fee is Rs. 162 per year.

Table 2.49: Percentage Distribution of WUAs by Membership Fees

Membership Fees	Scheme Category			
	I	II	III	All
Rs 0	14	5	56	17
Rs 20-≤50	3	11	11	6
Rs. 50-≤ 100	14	11	11	13
Rs.100-≤150	40	68	0	43
Rs. 150-≤250	17	0	22	13
>Rs 250	11	5	0	8
Total	100	100	100	100

One-fourth of the WUAs functioning in Coastal zone do not charge membership fee. Membership fee is high in Hilly zone (Table 2.50)

Table 2.50: Percentage Distribution of Functioning WUAs by Yearly Membership Fees and Zone

Membership Fees	Central	Coastal	Hilly	Northern Plateau	Western	Total
Rs. 0	0	25	0	0	5	4
Rs. 20 - ≤ 50	0	0	0	0	14	6
Rs. 50 - ≤ 100	13	0	0	6	27	15
Rs. 100 - ≤ 150	63	75	0	47	45	50
Rs. 150 - ≤ 250	25	0	0	29	5	15
Rs. > 250	0	0	100	18	5	10
Total	100	100	100	100	100	100

One-third of WUAs with WDS do not charge membership fees. High membership fee is charged in groundwater schemes (Table 2.51).

Table 2.51: Percentage Distribution of Functioning WUAs by Yearly Membership Fees and Type of Irrigation System (Reclassified Schemes)

Membership Fees	Schemes (%)							Total
	TW (GW)	PDW (GW)	GW	CD (SW)	RLI (SW)	WDS (SW)	SW	
Rs. 0	0	0	0	0	0	33	10	4
Rs. 20 - ≤ 50	4	0	3	0	10	17	10	6
Rs. 50 - ≤ 100	12	50	17	50	0	17	15	16
Rs. 100 - ≤ 150	50	25	47	50	80	33	60	52
Rs. 150 - ≤ 250	19	25	20	0	0	0	0	12
Rs. > 250	15	0	13	0	10	0	5	10
Total	100	100	100	100	100	100	100	100

Membership fees are found to be very low or nil for schemes under batch V and batch VI (Table 2.52).

Table 2.52: Percentage Distribution of Functioning WUAs by Yearly Membership Fees and Batch

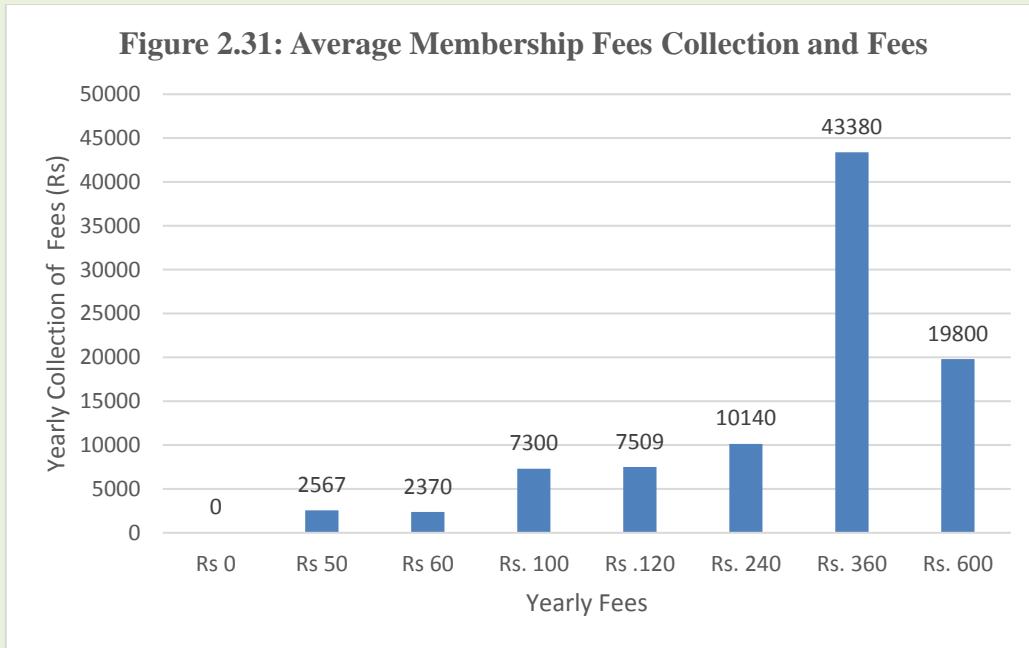
Membership Fees	Batch (%)						Total
	I	II	III	IV	V	VI	
Rs. 0	0	0	0	0	100	0	2
Rs. 20 - ≤ 50	11	4	0	0	0	100	6
Rs. 50 - ≤ 100	11	22	15	0	0	0	16
Rs. 100 - ≤ 150	67	57	38	50	0	0	51
Rs. 150 - ≤ 250	0	13	23	50	0	0	16
Rs. > 250	11	4	23	0	0	0	10
Total	100	100	100	100	100	100	100

Membership fees are found to be moderate for A+ graded WUAs. Interestingly, higher membership fees are observed for D graded WUAs. This implies that membership fees may not have correspondence with the overall performance of the schemes or WUAs (Table 2.53).

Table 2.53: Percentage Distribution of Functioning WUAs by Yearly Membership Fees and Grade

Membership Fees	Grade (%)					Total
	A+	A	B	C	D	
Rs. 0	0	0	0	17	0	2
Rs. 20 - ≤ 50	0	8	0	0	20	6
Rs. 50 - ≤ 100	0	25	17	0	0	16
Rs. 100 - ≤ 150	75	42	58	50	60	51
Rs. 150 - ≤ 250	25	17	8	33	0	16
Rs. > 250	0	8	17	0	20	10
Total	100	100	100	100	100	100

The collection of membership fees increases with the increment of membership fee but decreases subsequently (Figure 2.31).



The average membership fees of functional WUAs is more than Rs. 8000. The average collection of fees increase with the fees in all the zones barring Western zone (Table 2.54). Membership fees is very high at Rs. 600 / year in two STW and one RLI project in Terai Teesta Floodplain, which belongs to Northern Plateau.

Table 2.54: Average Yearly Membership Fee Collection of Functioning WUAs by Zones

Region	Membership Fee	Membership Fees Collected
Central	Rs. 50 - ≤ 100	5,220
	Rs. 100 - ≤ 150	9,768
	Rs. 150 - ≤ 250	11,640
	Total	9,668
Coastal	Rs. 0	-
	Rs. 100 - ≤ 150	19,000
	Total	14,250
Hilly	Rs. > 250	25,560
	Total	25,560
Northern Plateau	Rs. 50 - ≤ 100	9,700
	Rs. 100 - ≤ 150	5,160
	Rs. 150 - ≤ 250	10,896
	Rs. > 250	19,800
	Total	9,698
Western	Rs. 0	-
	Rs. 20 - ≤ 50	2,567
	Rs. 50 - ≤ 100	2,317
	Rs. 100 - ≤ 150	4,812
	Rs. 150 - ≤ 250	3,360
	Rs. > 250	61,200
	Total	6,104
Total		8,828

Average membership fees collection is lower in surface water schemes. It has been observed that as fee increases, collection of fees also increases (Table 2.55).

Table 2.55: Average Yearly Membership Fee Collection of Functioning WUAs by Type of Irrigation Schemes (Reclassified Schemes)

Schemes	Membership Fees	Membership Fees Collected
TW (GW)	Rs. 20 - ≤ 50	4150
	Rs. 50 - ≤ 100	6607
	Rs. 100 - ≤ 150	9729
	Rs. 150 - ≤ 250	11520
	Rs. > 250	30390
	Total	12677
PDW (GW)	Rs. 50 - ≤ 100	1110
	Rs. 100 - ≤ 150	4560
	Rs. 150 - ≤ 250	7680
	Total	3615
GW	Rs. 20 - ≤ 50	4150
	Rs. 50 - ≤ 100	4408
	Rs. 100 - ≤ 150	9360
	Rs. 150 - ≤ 250	10880
	Rs. > 250	30390
	Total	11469
CD (SW)	Rs. 50 - ≤ 100	2460
	Rs. 100 - ≤ 150	3720
	Total	3090
RLI (SW)	Rs. 20 - ≤ 50	2050
	Rs. 100 - ≤ 150	6195
	Rs. > 250	24600
	Total	7621
WDS (SW)	Rs. 0	0
	Rs. 20 - ≤ 50	1500
	Rs. 50 - ≤ 100	1860
	Rs. 100 - ≤ 150	3600
	Total	1760
SW	Rs. 0	0
	Rs. 20 - ≤ 50	1775
	Rs. 50 - ≤ 100	2260
	Rs. 100 - ≤ 150	5350
	Rs. > 250	24600
	Total	4957
All		8864

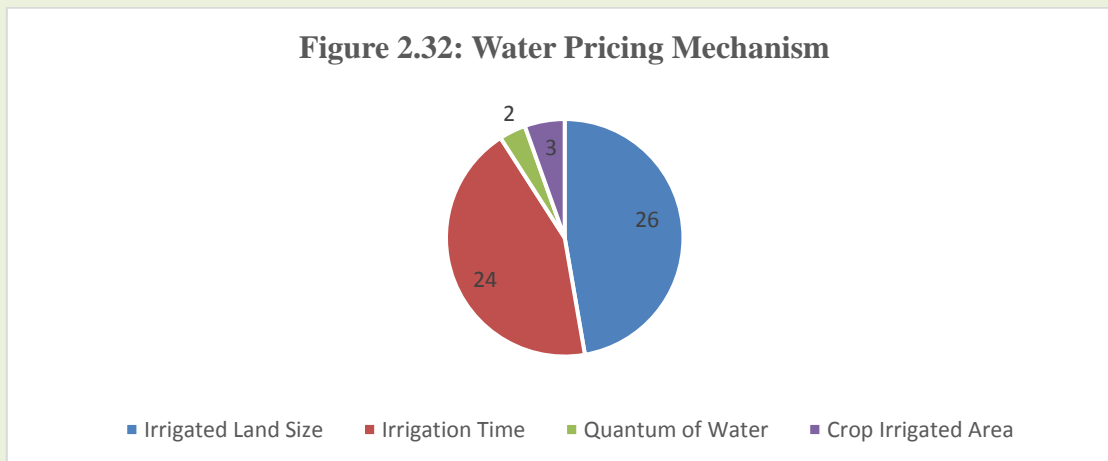
Average collection of membership fees is lower for schemes under batch V and batch VI. Average collection of fees has no systematic relation with the performance of WUAs (Table 2.56).

Table 2.56: Average Yearly Membership Fee Collection of Functioning WUAs by Batch and Grade

Batch						Total
I	II	III	IV	V	VI	
8452	10200	9683	5250	0	1500	9001
Grades						Total
A+	A	B	C	D		
6030	8722	9983	4240	16070	9001	

2.8.2 Water Charges

Water charges are collected from the WUAs that are functioning. The two major water pricing mechanisms are charging based on irrigated land size and charging based on irrigation time (Figure 2.32). The water pricing is also based on type of crop irrigated area in few cases.



The most common criteria used across zones are irrigated land size and hourly consumption. While irrigated land size is mostly used in central zone, hourly consumption is used as a criterion in Northern and Hilly zones (Table 2.57). No water charges are collected by one WUAs with WDS functioning in Western zone.

Table 2.57: Distribution of Functioning WUAs by Criteria of Water Charges in Zones

Criterion	Zones (%)					
	Central	Coastal	Hilly	Northern Plateau	Western	All
Based on land size	75	40	0	33	50	46
Quantum of water used	0	20	0	0	4	4
Based on hourly consumption	25	40	100	61	33	43
Based on crop	0	0	0	6	8	5
No water charges claimed	0	0	0	0	4	2
Total	100	100	100	100	100	100

Quantum of water is used as a criterion only in case of WDS schemes. None of the PDW and WDS schemes charges water on the basis of land irrigated (Table 2.58)

Table 2.58: Distribution of Functioning WUAs by Criteria of Water Charges in Irrigation Schemes (Reclassified Schemes)

Criterion	Schemes (%)							Total
	TW (GW)	PDW (GW)	GW	CD (SW)	RLI (SW)	WDS (SW)	SW	
Based on land size	55	0	48	75	60	0	43	46
Quantum of water used	0	0	0	0	0	29	10	4
Based on hourly consumption	38	100	45	25	30	57	38	43
Based on crop	7	0	6	0	10	0	5	6
No water charges claimed as WUA is non-function	0	0	0	0	0	14	5	2
Total	100	100	100	100	100	100	100	100

The charges may also vary across cultivation season; 25 percent WUAs charge different prices in different cultivation season. If water is charged according to land size, then 25 percent WUAs charge less than Rs. 1000/ per bigha in Rabi season, while a much higher percentage of WUAs in at in Kharif season (67 percent) and in Pre-monsoon season (75 percent) charge less than Rs. 1000/per bigha (Table 2.59). Similarly, if water charges are collected according to irrigation time then it is around Rs. 50/- per hour in Kharif season, which shoots up to Rs. 100/- per hour in Rabi season. Higher charges in Rabi as compared to Kharif season are due to higher demand for irrigation in the former season.

Table 2.59: Percentage Distribution of WUAs by Water Charges in Different Seasons

Water Charge	Rabi	Kharif	Pre-Monsoon
<Rs1000/Bigha	25	67	75
Rs.1000-2000/Bigha	50	33	25
Rs.2000-3000/Bigha	17	0	0
>Rs. 3000/Bigha	8	0	0
Total	100	100	100

Higher water charges are collected by a higher percentage of WUAs in the Rabi season. This may be due to higher economic value of water in Rabi season. Water charges in WUAs of Western and Central Zones are higher, indicating higher economic value of water in these zones (Table 2.60).

Table 2.60: Percentage Distribution of Functioning WUAs by Water Charges in Different Seasons and Zones

Season	Water Charges	Central	Northern Plateau	Western	Total
Rabi	< Rs 1000/Bigha	50	0	25	25
	Rs.1000 - 2000/Bigha	0	100	50	50
	Rs.2000 - 3000/Bigha	50	0	13	17
	≥ Rs. 3000/Bigha	0	0	13	8
	Total	100	100	100	100
Kharif	< Rs 1000/Bigha	100	0	75	67
	Rs.1000 - 2000/Bigha	0	100	25	33
	Rs.2000 - 3000/Bigha	0	0	0	0
	≥ Rs. 3000/Bigha	0	0	0	0
	Total	100	100	100	100
Pre-monsoon	< Rs 1000/Bigha		50	100	75
	Rs.1000 - 2000/Bigha		50	0	25
	Rs.2000 - 3000/Bigha		0	0	0
	≥ Rs. 3000/Bigha		0	0	0
	Total		100	100	100

Water charges are higher in tube well schemes. Lowest range of water charges are imposed for surface water schemes, especially during the Kharif and Pre-monsoon seasons (Table 2.61)

Table 2.61: Percentage Distribution of Functioning WUAs by Water Charges in Different Seasons and Type of Irrigation (Reclassified Schemes)

Season	Water Charges	TW (GW)	GW	CD (SW)	RLI (SW)	SW	Total
Rabi	< Rs 1000/Bigha	14	14	0	50	40	25
	Rs.1000 - 2000/Bigha	57	57	100	25	40	50
	Rs.2000 - 3000/Bigha	14	14	0	25	20	17
	> Rs. 3000/Bigha	14	14	0	0	0	8
	Total	100	100	100	100	100	100
Kharif	< Rs 1000/Bigha	33	33	100	100	100	67
	Rs.1000 - 2000/Bigha	67	67	0	0	0	33
	Rs.2000 - 3000/Bigha	0	0	0	0	0	0
	> Rs. 3000/Bigha	0	0	0	0	0	0
	Total	100	100	100	100	100	100
Pre-Monsoon	< Rs 1000/Bigha	50	50	100	100	100	75
	Rs.1000 - 2000/Bigha	50	50	0	0	0	25
	Rs.2000 - 3000/Bigha	0	0	0	0	0	0
	> Rs. 3000/Bigha	0	0	0	0	0	0
	Total	100	100	100	100	100	100

Water charges do not vary across cultivation season in almost 75 percent WUAs. The charges are relatively less when same charge is applied for all the seasons. 27 percent WUAs charged up to Rs. 100 /- per Bigha and 24 percent WUAs charged up to Rs. 30 / hour (Table 2.62).

Table 2.62: Percentage Distribution of WUAs by Water Pricing (Same Charge for All Seasons)

	Water Charge	Scheme Category			Total
		I	II	III	
Area Wise	≤ Rs. 100/ Bigha	11	40	100	27
	>Rs 100-≤1000/ Bigha	33	60	0	40
	>Rs. 1000/ Bigha	56	0	0	33
	Total	100	100	100	100
Hourly	Up to Rs. 30 / Hour	21	29	25	24
	>Rs. 30-60/ Hour	36	29	50	36
	>Rs. 60-100/ Hour	29	29	25	28
	≥100/ Hour	14	14	0	12
	Total	100	100	100	100

Water charges of a substantial proportion of WUAs in Northern Plateau are higher, both in terms of land size and hourly irrigation charges. Water charges by irrigated land is in the highest bracket for WUAs in coastal zones (Table 2.63)

Table 2.63: Percentage Distribution of Functioning WUAs by Water Pricing (Same Charge for All Seasons) and Zones

Water Charges	Central	Coastal	Hilly	Northern Plateau	Western	Total
Up to Rs. 100/Bigha	50	0		0	40	27
> Rs 100 - ≤1000/Bigha	50	0		25	60	40
> Rs. 1000/Bigha	0	100		75	0	33
Total	100	100	0	100	100	100
Up to Rs. 30 / Hour	0	0	0	20	50	26
> Rs. 30 - 60/ Hour	50	100	100	30	25	39
> Rs. 60 - 100/hour	50	0	0	40	25	30
≥ 100/hour	0	0	0	10	0	4
Total	100	100	100	100	100	100

Water charges (same across season) are in the higher range for larger proportion of WUAs with groundwater scheme than with surface water schemes. PDW schemes impose varied hourly charges - from low to high (Table 2.64).

Table 2.64: Percentage Distribution of Functioning WUAs by Water Pricing (Same Charge for All Seasons) and Type of Irrigation System (Reclassified Schemes)

	TW (GW)	PDW (GW)	GW	CD (SW)	RLI (SW)	WDS (SW)	SW	Total
Up to Rs. 100/Bigha	11		11	100	0		40	21
> Rs 100 - ≤1000/Bigha	33		33	0	100		60	43
> Rs. 1000/Bigha	56		56	0	0		0	36
Total	100		100	100	100		100	100
Up to Rs. 30 / Hour	22	25	23	0	0	60	33	27
> Rs. 30 - 60/ Hour	44	25	38	0	67	40	44	41
> Rs. 60 - 100/hour	33	25	31	100	33	0	22	27
≥ 100/hour	0	25	8	0	0	0	0	5
Total	100	100	100	100	100	100	100	100

2.8.3 Delay in Payment of Water Charges

The members of WUAs delay payment of water charges in 83 percent of the survey WUAs. Although on average 9 members delay in payment of water charges among the surveyed WUAs, the average number of members delaying payment is much higher at 11 considering only those WUAs where members delay payment of water charges.

The percentage of WUAs where all members pay water charges on time is minimum for category II schemes, which comprises surface water irrigation. None of the WUAs formed one year ago have all members paying charges on time (Table 2.65). The average number of members delaying payment of water charges is highest for WUAs aged one year or less.

Table 2.65: Average Number of Members of WUA Delay Payment of Water Charges

		Considering All WUAs (No. of Members)	Considering WUAs where Members Delay Payment (No. of Members)	% of WUAs where no Members Delay in Payment
Category of Scheme	I	10	11	36
	II	9	10	27
	III	6	11	36
	Total	9	11	100
Age of WUAs	Up to 1 year	13	13	0
	1-2 years	8	9	9
	2-3 years	8	9	9
	3 years and above	10	13	82
	Total	9	11	100

The reasons for delay of payment of water charges are the following: inability to sell the produce, crop loss due to excessive rain, less production, lack of anticipation regarding the amount of charge to be paid as the system is newly installed, and non-receipt of sufficient water due to power-cut. The members in a few WUAs reported that the deficit would be recovered before the next season.

Delay in payment of water charges is very common in all regions and also for WUAs of all ages (Table 2.66). However, average number of members delaying payment is higher in the coastal zone.

Table 2.66. Average Number of Members of WUA (Functioning) Delay Payment of Water Charges by Zone and Age

		Considering all WUAs (No of Members)	Considering WUAs Where Members Delay Payment (No of Members)
Zone	Central	15	15
	Coastal	29	38
	Hilly	8	8
	Northern Plateau	6	6
	Western	10	10
	Total	11	11
Age-Wise	Up to 1 Year	13	13
	1-2 Years	9	9
	2-3 Years	9	9
	>3 Years	13	13
	Total	11	11

Average number of members delaying payment is higher in TW and RLI schemes (Table 2.67). Only in coastal region, one WDS project, more than 3 years old, has no members who have delayed payments.

Table 2.67: Average Number of Members of WUA (Functioning) Delay Payment of Water Charges by Type of Irrigation System (Reclassified Schemes)

Schemes	Considering all WUAs (No of Members)	Considering WUAs Where Members Delay Payment (No of Members)
PDW (GW)	6	6
TW (GW)	12	12
GW	11	11
CD (SW)	9	9
RLI (SW)	12	12
WDS (SW)	8	9
SW	10	10
Total	11	11

2.8.4 Collection of Charges

The WUAs collected Rs. 7286 from yearly membership fees, Rs. 44184 from water charges, and Rs. 238 from agri-equipment during last three cultivation season (Table 2.68). Hence, the prime source of revenue for the WUAs was water charges. However, the average actual collection was less than proposed collection. On average, the WUAs collected Rs.1271 less on membership fees and Rs. 6031 less on water charges. Considering all the WUAs, on average WUAs earned Rs. 906 from protected fisheries. After excluding WUAs that have not conducted any activity, the average earnings from activities were Rs. 19500.

Table 2.68: Average Collection of Fees and Charges during Last Three Cultivation Seasons

Yearly Membership Fees (Rs)			Water Charges (Rs)			Renting of Agri-equipment (Rs)			Protected Fisheries - Actual (Rs)
Actual Received	Proposed Collection	Variation	Actual Received	Proposed Collection	Variation	Actual Received	Proposed Collection	Variation	
7286	8557	1271	44184	49131	6031	238	3767	173	906

The difference between actual and proposed collection of fees and charges are highest for WUAs functioning in Coastal zone (Table 2.69). Difference between actual and proposed collection of fees and charges is higher in groundwater schemes.

Table 2.69: Average Collection of Fees and Charges during Last Three Cultivation Seasons of Functional WUAs

		Yearly Membership Fees (Rs)			Water Charges (Rs)			Renting of Agri-equipment (Rs)			Protected Fishery (Rs)
		Actual Received	Proposed Collection	Variation	Actual Received	Proposed Collection	Variation	Actual Received	Proposed Collection	Variation	Actual
Zones	Central	9668	11723	2055	41345	45095	9668	1100	8350	1286	0
	Coastal	14250	17880	3630	213600	238933	14250	0		0	0
	Hilly	25560	28440	2880	0	0	25560	0	0	0	0
	Northern Plateau	9698	11049	1352	80538	84187	9698	44	700	0	0
	Western	6104	7161	1057	16519	19669	6104	259	2450	29	2786
	Total	8828	10368	1540	65367	71788	8828	291	4460	216	1219
Schemes	TW (GW)	12677	14621	1944	46894	51929	5034	0	0	0	0
	PDW (GW)	3615	4215	600	0	0	0	0	0	0	0
	GW	11469	13234	1765	40642	45005	4363	0	0	0	0
	CD (SW)	3090	3825	735	525	625	100	0	0	0	0
	RLI (SW)	7621	9210	1589	19378	20358	980	840	1740	900	0
	WDS (SW)	1760	2265	505	1491	1517	26	733	817	83	6500
	SW	4957	6050	1093	10241	10759	518	640	1115	475	1950
	All	8864	10360	1496	28482	31307	2825	256	446	190	780

During 2018-19, the WUAs earned on average Rs. 71443, with 74 percent generated through collection of water charges (Table 2.70). The WUAs expended on average Rs. 55467 during 2018-19. 27 percent expenditure was made on operator charges and 48 percent on electricity bill. The WUAs generated a surplus of Rs. 16006 during 2018-19.

Table 2.70: Income and Expenditure of WUAs during 2018-19

	Items	Average (Rs)
Expenditure	Stationary Bill	301
	Tiffin Bill	294
	Pan Card	43
	Operator Charge	15164
	Meeting	882
	Transit	696
	Bank Charge	158
	Social Function	1301
	Fertilizer and Pesticide	25
	Audit	129
	Labour Charge	50
	Repairing and Maintenance	5536
	Fishery Activity	1412
	Orchard	361
	Donation	357
	Electricity Bill	26532
	Pipe Charge	429
	Others	1327
	Total Expenditure	55437
Income	Member subscription	4338
	Water charge	52546
	Bank Interest	46
	Equipment	2085
	Fishery Activity	2902
	Others	208
	Total Income	71443
Surplus (Income - Expenditure)		16006

There are on average 8 non-paid staff and no paid staff in the managing committees of the WUAs. There are on average two paid staff and less than one non-paid staff as MI operators. Almost all the paid staffs as MI operator are members of WUA. 38 percent of the WUAs do

not have any MI staff. MI staff is not available for 31 percent category I schemes, 47 percent category II schemes, and 44 percent category III schemes.

The WUAs do not have any paid staff to look into technical matters, to maintain different register, and to maintain accounts. In very few WUAs there are an un-paid staff to look into technical matters. There is on average one un-paid staff to maintain different register and also to maintain accounts.

The financial condition (captured through surplus) of functioning WUAs is better in Northern Plateau and Western zones (Table 2.71). WUAs with tube well schemes have better financial condition. WUAs with surface water schemes (CD and RLI) have worse financial condition than WDS amongst SW schemes.

Table 2.71: Average Income and Expenditure of Functioning WUAs

		Income (Rs/Year)	Expenditure (Rs/Year)	Surplus (Rs/ Year)
Zones	Central	231665	224669	6996
	Hilly	1270	1460	-190
	Northern Plateau	54468	35881	18587
	Western	52892	34544	18347
	Total	71443	55437	16006
Schemes	TW (GW)	118027	90251	27776
	PDW (GW)	6394	5027	1367
	GW	106864	81729	25135
	CD (SW)	6333	6400	-67
	RLI (SW)	28753	33093	-4340
	WDS (SW)	25244	15388	9856
	SW	20843	17878	2965
	Total	71443	55437	16006

Around 36 percent WUAs take assistance of financial experts for financial management (Table 2.72). 23 percent of WUAs have a financial expert in their association itself. Those WUAs which have taken assistance of external financial expert are all more than two years old.

Table 2.72: Percentage Distribution of WUAs Sought Assistance from Financial Expert for Financial Assessment

Response	Age of WUAs				Total
	Up to 1 year	1-2 years	2-3 years	3 years and above	
Yes, assistance taken from outsider	0	0	12	11	8
Having expert in our association	67	15	18	25	23
Assistance provided by different government institutions	0	0	12	4	5
No assistance taken	33	85	59	61	64
Total	100	100	100	100	100

2.9 Institutional Functioning

It has been observed that only 5 percent WUAs maintain a notice board. None of the WUAs aged up to two years maintain notice board (Table 2.73).

Table 2.73: Percentage of WUAs Maintained Notice Board

Response	Age of WUAs				Total
	Up to 1 year	1-2 years	2-3 years	3 years and above	
Yes	0	0	12	3	5
No	100	100	88	97	95
Total	100	100	100	100	100

The WUAs are expected to maintain cash book for transparency. It is observed that 45 percent WUAs do not maintain cashbook (Table 2.74). All the WUAs that were formed in last one year maintained the cashbook.

The petty cashbook is maintained by 23 percent WUAs and ledger book is maintained by 10 percent WUAs. These two documents are maintained by 33 percent WUAs formed in last one year.

The passbook of bank account is maintained by 71 percent WUAs.

Table 2.74: Percentage Distribution of WUAs Maintaining Important Financial Documents during Last Six Months

	Response	Age of WUAs				Total
		Up to 1 year	1-2 years	2-3 years	3 and above	
Cashbook	Yes, regularly	100	46	47	55	53
	Yes, irregularly	0	0	0	3	2
	No	0	54	53	41	45
	Total	100	100	100	100	100
Petty Cashbook	Yes, regularly	33	0	29	21	19
	Yes irregularly	0	8	0	3	3
	No	67	92	71	76	77
	Total	100	100	100	100	100
Ledger Book	Yes, regularly	33	8	6	7	8
	Yes irregularly	0	0	0	3	2
	No	67	92	94	90	90
	Total	100	100	100	100	100
Bank Account	Yes, regularly	67	67	80	63	68
	Yes irregularly	0	0	0	5	3
	No	33	33	20	32	29
	Total	100	100	100	100	100

Pump logbook is maintained by 56 percent WUAs. Water charges register book is maintained by 71 percent WUAs and register book for other services are maintained by merely 30 percent WUAs (Table 2.75).

All the WUAs formed during last one year maintain the pump logbook, water charges register book, register book for other services and minutes book for all general meetings since inception.

**Table 2.75: Percentage Distribution of WUAs Maintaining Important Documents
Related to Operations during Last Six Months**

	Response	Up to 1 year	1-2 years	2-3 years	3 and above	All
Pump Logbook	Yes regularly	100	31	29	28	32
	Yes irregularly	0	39	18	24	24
	No	0	31	53	48	44
	Total	100	100	100	100	100
Water charges register book	Yes regularly	100	31	47	31	39
	Yes irregularly	0	46	29	31	32
	No	0	23	24	38	29
	Total	100	100	100	100	100
Register book for other services	Yes regularly	100	0	35	28	27
	Yes irregularly	0	8	0	3	3
	No	0	92	65	69	69
	Total	100	100	100	100	100
Maintain minutes register book of general meetings (since inception)	Yes regularly	100	31	41	38	40
	Yes irregularly	0	0	6	7	5
	No	0	69	53	55	55
	Total	100	100	100	100	100

Crop planning register is maintained by 55 percent WUAs and irrigation schedule register is maintained by 24 percent WUAs (Table 2.76). All the WUAs formed during last one year, maintained crop planning register.

**Table 2.76: Percentage Distribution of WUAs Maintaining Important Documents
Related to Agricultural Activities**

	Response	Age of WUAs				Total
		Up to 1 year	1-2 years	2-3 years	3 and above	
Crop planning and actual cropping register	Yes regularly	100	15	35	31	32
	Yes irregularly	0	31	24	21	23
	No	0	54	41	48	45
	Total	100	100	100	100	100
Irrigation schedule register	Yes regularly	33	8	29	17	19
	Yes irregularly	33	0	0	7	5
	No	33	92	71	76	76
	Total	100	100	100	100	100

The WUAs in coastal regions have performed worse than average on maintenance of all documents barring cash book, minutes book maintenance. Most functioning WUAs maintain bank account passbook barring those in Coastal and Hilly zones (Table 2.77).

Table 2.77: Percentage Distribution of Functioning WUAs Maintaining Regularly Important Documents by Zones

		Central	Coastal	Hilly	Northern Plateau	Western	Total
Financial /Accounting	Cash book	63	75	100	53	59	60
	Petty Cash Book	38	0	0	29	18	23
	Bank Account Passbook	100	25	0	100	83	81
	Ledger	13	25	0	12	9	10
Operational/ Institutional	Notice Board	13	0	0	0	9	6
	Minutes Book	50	50	0	53	41	46
	Water Charges Register Book	50	25	100	53	45	46
	Pump Logbook Registered	50	0	100	47	36	38
	Crop Planning and actual cropping register	50	0	100	47	32	37
	Irrigation Schedule register	25	0	0	41	14	23
	Other services register book	38	0	0	41	27	31

Comparatively lesser proportion of WUAs under surface water schemes has maintained bank account passbook and ledger books. Higher proportion of WUAs under surface water schemes reported maintenance of the notice board. Very low percentage of surface water schemes has maintained irrigation schedule register (Table 2.78).

Table 2.78: Percentage Distribution of Functioning WUAs Maintaining Regularly Important Documents by Type of Irrigation System (Reclassified Schemes)

		TW (GW)	PDW (GW)	GW	CD (SW)	RLI (SW)	WDS (SW)	SW	Total
Financial/ Accounting	Cash book	58	25	53	100	60	50	65	58
	Bank Account Passbook	86	100	88	100	60	60	69	79
	Petty cash book	23	25	23	0	30	33	25	24
	Ledger book	15	0	13	0	0	17	5	10
Operational/ Institutional	Notice board	0	0	0	25	10	17	15	6
	Minutes books	42	25	40	75	40	50	50	44
	Water charges register book	38	25	37	75	50	50	55	44
	Pump Logbook Register	35	25	33	50	40	33	40	36
	Crop Planning and actual cropping register	35	25	33	75	30	33	40	36
	Irrigation Schedule register	31	25	30	0	20	17	15	24
Register book for other services	31	25	30	50	30	33	35	32	

A higher proportion of schemes developed after Batch I maintain records on cash book, pump logbook, water charges register book, register book for other services, minutes of meeting, cropping planning register, and irrigation schedule register. All schemes of Batch I and Batch IV maintain bank account passbook (Table 2.79)

Table 2.79: Percentage Distribution of Functioning WUAs Maintaining Regularly Important Documents by Batch

		Batch (%)						Total
		I	II	III	IV	V	VI	
Financial / Accounting	Cash book	44	61	77	50	0	100	61
	Petty cash book	22	35	15	0	0	0	24
	Ledger Book	11	13	0	25	0	0	10
	Bank Account Passbook	100	88	71	100	0	0	81
Operational / Institutional	Notice board	0	13	0	0	0	0	6
	Pump Logbook Registered	22	48	38	25	0	100	39
	Water charges register book	22	52	54	50	0	100	47
	Register book for other services	22	43	23	0	0	100	31
	Minutes register book of general meetings (since inception)	22	52	54	50	0	100	47
	Crop Planning and actual cropping register	22	48	38	0	0	100	37
	Irrigation Schedule register	11	35	23	0	0	0	24

Maintenance of Bank Account Passbook by the WUAs is found to be higher among the better graded WUAs. Surprisingly, it has been observed that a higher proportion of WUAs with poorer grade maintain irrigation schedule register (Table 2.80).

**Table 2.80: Percentage Distribution of Functioning WUAs Maintaining Regularly
Important Documents by Grade**

		Grades (%)					Total
		A+	A	B	C	D	
Financial / Accounting	Cash book	25	75	58	50	40	61
	Petty cash book	0	29	17	17	40	24
	Ledger Book	0	13	8	0	20	10
	Bank Account Passbook	100	88	71	67	67	81
Operational / Institutional	Notice board	0	13	0	0	0	6
	Pump Logbook Registered	25	46	25	50	40	39
	Water charges register book	25	54	42	33	60	47
	Register book for other services	0	42	25	17	40	31
	Minutes register book of general meetings (since inception)	25	58	42	33	40	47
	Crop Planning and actual cropping register	25	46	25	33	40	37
	Irrigation Schedule register	0	21	25	33	40	24

2. 10 Perception about Operation

The key informant about the WUAs was asked about their perception on efficiency of the MI pump operators. 77 percent of the key informants perceive that efficiency of pump operators is either good or very good. 88 percent key respondents from category I schemes perceive the MI operators are good and very good (Table 2.81). However, the same perception (good and very good) is expressed by only 60 percent key respondents of category II and category III schemes.

As far as the need for involving the third party as consultant for better performance and enhance corpus is concerned, 24 percent key informants of WUAs perceive that third party or external involvement or help is essential in future for running the WUAs. This help may be required for maintenance of MI systems or maintenance of documents, especially regarding the financial

matters. The least percentage of key informants require external help in future is from category II schemes.

Table 2.81: Percentage Distribution of Key Informants by Perception about MI Operator’s Efficiency and Necessity of Third party (External) Involvement in Future

	Response	Scheme Category (%)			All
		I	II	III	
MI Operator’s efficiency	Very Good	8	20	20	13
	Good	79	40	40	64
	Average	8	10	40	13
	Bad	4	20	0	8
	Very Bad	0	10	0	3
	Total	100	100	100	100
Third party (External) Involvement Essential	Yes	26	16	33	24
	No	60	68	33	59
	WUA not functioning	14	16	33	17
	Total	100	100	100	100

Average or bad perception about MI operator’s efficiency is higher for WUAs operating in the Western zone (Table 2.82).

Table 2.82: Percentage Distribution of Key Informants of Functioning WUAs by Perception about MI Operator’s Efficiency and Zones

Response	Central	Coastal	Hilly	Northern Plateau	Western	Total
Very Good	14	0	100	0	20	12
Good	86	67	0	100	27	66
Average	0	33	0	0	20	10
Bad	0	0	0	0	33	12
Very Bad	0	0	0	0	0	0
Total	100	100	100	100	100	100

Higher percentage of key respondents under surface water (RLI and WDS) schemes perceived efficiency of MI operator as very good. of. Perceived efficiency is reported as bad in all CD projects (Table2.83). In around 88 percent tube well schemes, the key informant perceived that efficiency of MI operators is either good or very good. This is much higher as compared to surface water schemes.

Table 2.83: Percentage Distribution of Key Informants of Functioning WUAs by Perception about MI Operator’s Efficiency and Type of Irrigation System (Reclassified Schemes)

Response	Schemes (%)						Total
	TW (GW)	GW	CD (SW)	RLI (SW)	WDS (SW)	SW	
Very Good	8	8	0	33	25	27	14
Good	79	79	0	67	25	45	69
Average	8	8	0	0	25	9	9
Bad	4	4	100	0	25	18	9
Total	100	100	100	100	100	100	100

There is no systematic relation between MI operator’s efficiency and batch of the scheme (Table 2.84).

Table 2.84: Percentage Distribution of Key Informants of Functioning WUAs by Perception about MI Operator’s Efficiency and Batch

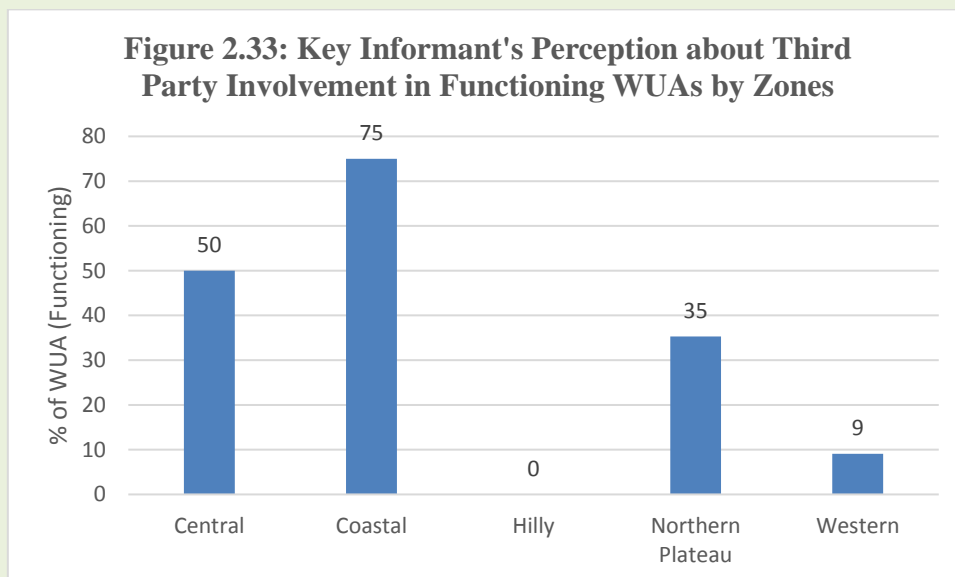
Response	Batch (%)						All
	I	II	III	IV	V	VI	
Very Good	0	7	36	0	0	0	14
Good	83	73	55	67	100	0	68
Average	17	0	9	33	0	100	11
Bad	0	20	0	0	0	0	8
Total	100	100	100	100	100	100	100

No systematic relation has also been observed between perception of MI operator’s efficiency and grade of WUAs. However, one-fourth of the D graded WUAs perceive efficiency level as ‘bad’ (Table 2.85).

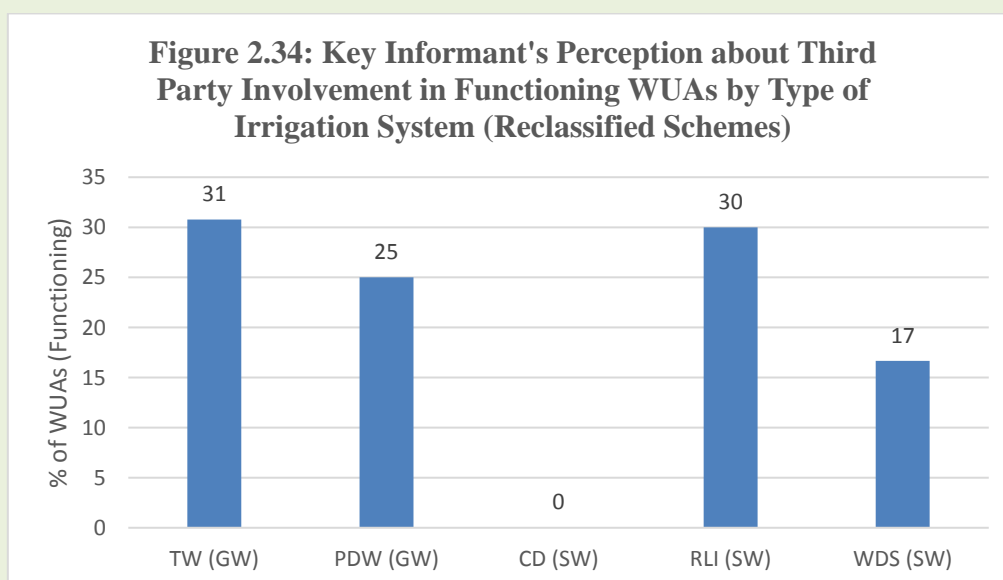
Table 2.85: Percentage Distribution of Key Informants of Functioning WUAs by Perception about MI Operator’s Efficiency and Grade

Response	Grades (%)					All
	A+	A	B	C	D	
Very Good	0	12	20	25	0	14
Good	100	59	70	75	75	68
Average	0	18	10	0	0	11
Bad	0	12	0	0	25	8
Total	100	100	100	100	100	100

29 percent of key informants of functioning WUAs believe that third party involvement is essential. This belief is highest in Coastal zone and lowest in Western and Hilly zones (Figure 2.33).

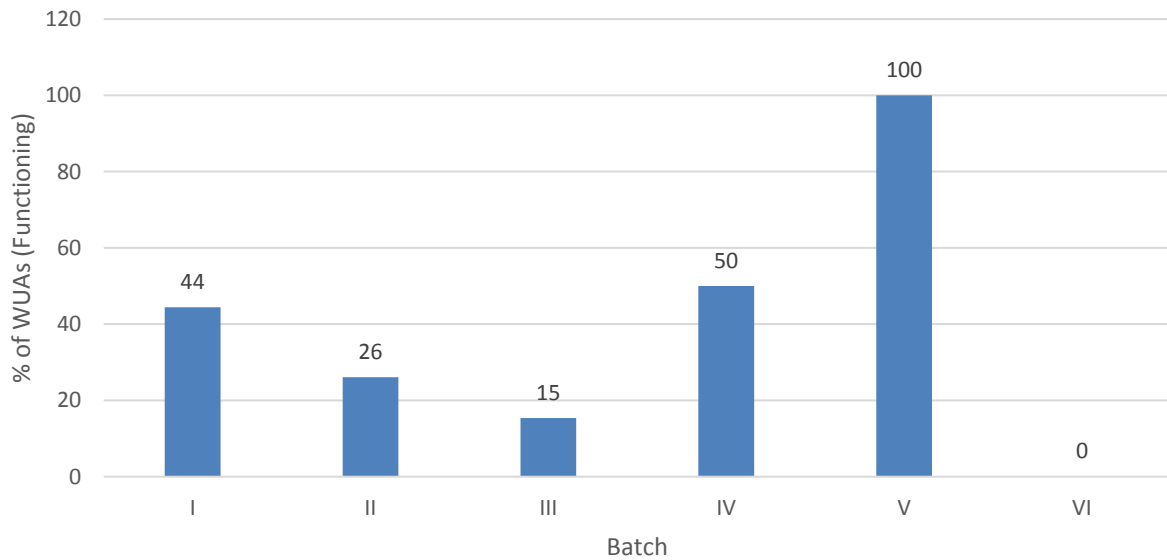


Third party involvement is perceived to be essential more in groundwater schemes (Figure 2.34). Key informants of 30 percent groundwater schemes and of 20 percent surface water schemes believe so.



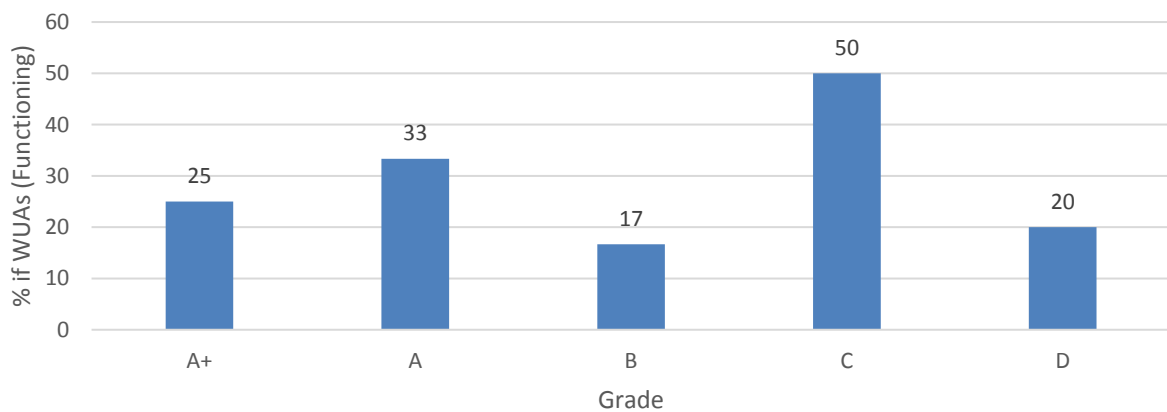
There is no systematic relation between perception of necessity of third-party involvement and batch of the scheme (Figure 2.35).

Figure 2.35: Key Informant's Perception about Third Party Involvement in Functioning WUAs by Batch



There is no systematic relation between perception of necessity of third-party involvement and grade of the scheme (Figure 2.36).

Figure 2.36: Key Informant's Perception about Third Party Involvement in Functioning WUAs by Grade

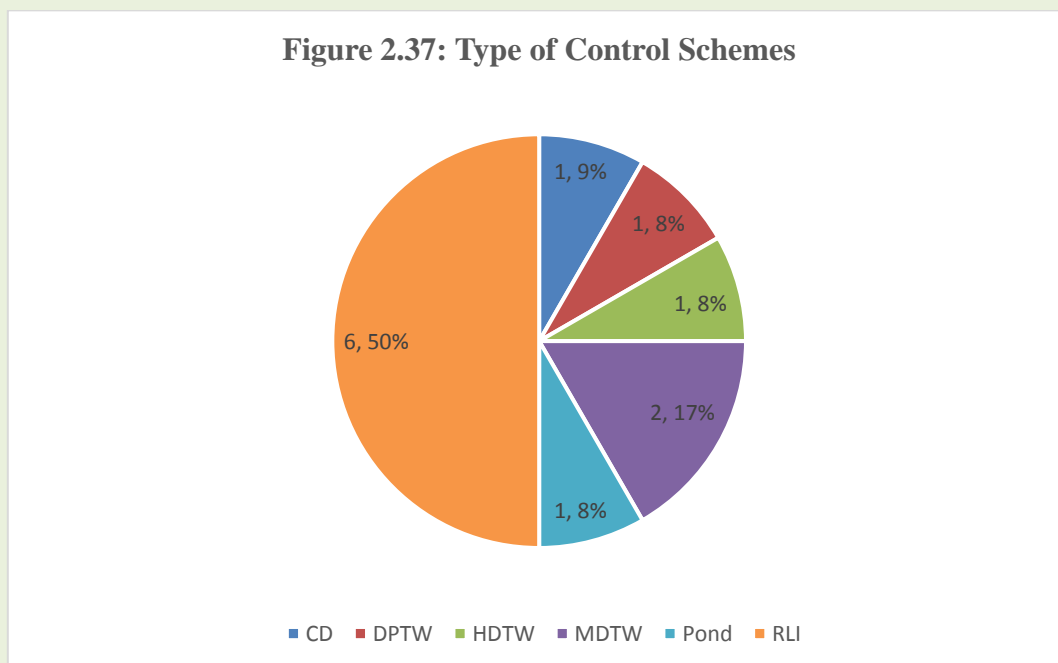


There are only two solar tube wells in the sample located in the Northern Plateau. One of the schemes is fully functioning and the other one is partially functioning. Both are Batch IV schemes. The fully functional WUA is graded A and the partially functional WUA is graded A+. These schemes irrigate 200 Bighas and 160 Bighas of land respectively. Both the WUAs have maintained the minutes book of last three general body meetings. Issues regarding member subscription, crop planning, and fishery were discussed in the meetings. However,

both the WUAs do not conduct any additional income generating activities. They impose water charges based on hourly consumption of water – Rs. 50 per hour in fully functional scheme and Rs. 20 per hour in partially functional scheme. The membership fees are Rs. 240 per year in fully functional and Rs. 120 per year in partially functional WUAs. None of these systems have any problem of maintenance or problem of water supply such as day off. The partially functional WUA have MI staff, whose efficiency is perceived to be good. None of them need any third-party involvement for improvement of their operation and finances.

2.11 Treatment vis-à-vis Control WUAs

The control group consists of twelve minor irrigation schemes. Half of the schemes are River Lift Irrigation (RLI) (Figure 2.37). Barring three schemes, all are more than 20 years old. The most recently developed scheme is a check dam (CD) developed in 2019.



None of the WUAs in the control group are registered, while all the WUAs in the treatment group are registered under West Bengal Societies Registration Act, 1961.

The WUAs are similar with regard to average number of members in association, average number of beneficiaries and average number of managing committee members, as demonstrated by the T test of means (Table 2.86). However, they are different with regard to gender composition. The controls WUAs have very few women as members or beneficiaries.

They have no female members in their managing committees. On the contrary, the treatment WUAs has significantly higher number of female as members, beneficiaries and managing committee members.

Table 2.86: Average Number of Members of Treatment and Control WUAs

		Male	Female	Total
Members in Association	Treatment	56	10	66
	Control	57	1	58
	T test (p-value)	0.922	0.000	0.642
Beneficiary	Treatment	53	10	63
	Control	63	1	63
	T test (p-value)	0.560	0.000	0.994
Managing Committee Members	Treatment	6	2	8
	Control	8	0	8
	T test (p-value)	0.408	0.000	0.745

The average designated and actual command area of treatment and control WUAs are not very different (Table 2.87). The difference is statistically insignificant.

Table 2.87: Designated and Actual Command Area of Treatment and Control WUAs

	Designated Command Area (Bigha)	Actual Command Area (Bigha)
Treatment	174	123
Control	183	125
T test (p-value)	0.908788	0.947836

The average number of member households by category of size of land holding is similar between treatment and control WUAs (Table 2.88). The differences between treatment and control WUAs in this regard are statistically insignificant.

Table 2.88: Average Number of Member Households by Land Holding of Treatment and Control WUAs

Land Size		No. of Households
Below 1 acre (HHs)	Treatment	45
	Control	49
	T test (p-value)	0.727
1-3 acre (HHs)	Treatment	20
	Control	20
	T test (p-value)	0.994
3-5 acre (HHs)	Treatment	3
	Control	5
	T test (p-value)	0.454
Above 5 acre (HHs)	Treatment	1
	Control	3
	T test (p-value)	0.297

With regard to institutional functioning, the control WUAs are far behind the treatment WUAs. WUAs in control group could not provide any document on any meeting of general body. On the other hand, 81 percent WUAs in treatment group could provide document regarding last three meetings of general body. None of the WUAs in control group could produce any minutes of meeting. On the other hand, 84 percent treatment group WUAs could produce minutes of the meeting.

The MI of WUAs in the control group are either maintained by block office or not maintained at all. 41 percent of the control WUAs is not maintained. On the other hand, all the WUAs in the treatment group maintain their irrigation system.

None of the WUAs in the control group has done any crop planning. On the other hand, more than half of the treatment groups WUAs have maintained register for crop planning.

2.12 Regression Analysis

We have attempted to look into the determinants of yearly collection of membership fees, delay in paying water charges and necessity of third-party involvement in WUAs in future.

2.12.1 Yearly Collection of Membership Fees

The collection of membership fees should be having direct relation with total number of members and the fees. However, the collection of membership fees may not increase at the same rate with the increase in fees; it may increase at a decreasing rate. The lower the economic status of the members, the lesser the collection of fees is expected. The economic status of the members is captured by size of land holding. The higher the number of members having land less than 1 acre of land, lower the collection of membership fees is expected. Similarly, the higher the number of members having land 1 acre and above, higher the collection of membership fees is expected. The collection of fees is likely to be higher when the members believe that the WUA would not be captured by large farmers. Hence, higher the percentage of marginal farmers (land less than 1 acre) and higher the percentage of sharecroppers, larger should be collection of membership fees. The sharecroppers ensure that the membership charges are deposited on time by the members. The higher is the transaction cost of collective action in WUA, lesser the membership fee is likely to be collected. The transaction cost of collective action is higher when the WUA covers a higher number of villages under the command area. Hence, the collection of membership fees is expected to be lesser.

The econometric models are given below:

Model I:

$$\text{MEM_FEES_COLLECT} = \beta_0 + \beta_1 \text{TOT_MEM} + \beta_2 \text{FEES} + \beta_3 \text{SQ_FEES} + \beta_4 \text{SMALL_FARMER} + \beta_4 \text{PER_SMALL_FARMER} + \beta_5 \text{PER_SHARECROP} + \beta_6 \text{NUM_VILL_COM}$$

Model II:

$$\text{MEM_FEES_COLLECT} = \beta_0 + \beta_1 \text{TOT_MEM} + \beta_2 \text{FEES} + \beta_3 \text{SQ_FEES} + \beta_4 \text{LARGE_FARMER} + \beta_4 \text{PER_SMALL_FARMER} + \beta_5 \text{PER_SHARECROP} + \beta_6 \text{NUM_VILL_COM}$$

Where

MEM_FEES_COLLECT = Yearly Collection of Membership Fees

TOT_MEM = Total number of registered members

FEES = Individual Membership Fee

SQ_FEES = Square of Membership Fee

SMALL_FARMER = Number of members having land below 1 acre

LARGE_FARMER = Number of members having land 1 acre and above

PER_SMALL_FARMER = Percentage of members having land below 1 Acre (amongst all land-owning members and sharecroppers)

PER_SHARECROP = Percentage of sharecroppers (amongst all land-owning members and sharecroppers)

NUM_VILL_COM = Number of villages under command area

We have constructed two models to avoid multicollinearity problem due to correlation between SMALL_FARMER and LARGE_FARMER. The regression result demonstrates that both Model I and Model II are fitted well and explains 89 percent variation of the dependent variable MEM_FEES_COLLECT. All the independent variables of both the models are statistically significant in explaining the variation of dependent variable (Table 2.89).

Table 2.89: Determinants of Yearly Collection of Membership Fees

Independent Variables	Dependent Variable: Yearly Collection of Membership Fees (MEM_FEES_COLLECT)	
	Coefficients (Model I)	Coefficients (Model II)
Total number of registered members (TOT_MEM)	348.57*** (42.23) [#]	68.28 (12.18)
Individual Membership Fees (FEES)	81.17*** (15.18)	81.17 (15.18)
Square of Membership Fees (SQ_FEES)	-0.06** (0.02)	-0.06** (0.02)
Number of members having land 1 acre and above (LARGE_FARMER)		280.29*** (48.54)
Number of members having land below 1 acre (SMALL_FARMER)	-280.29*** (48.54)	
Percentage of members having land below 1 Acre (PER_SMALL_FARMER)	14533.75*** (2904.44)	14533.75 (2904.44)
Percentage of sharecroppers (PER_SHARECROP)	11856.24** (5818.2)	11856.24** (5818.2)
Number of villages under command area (NUM_VILL_COM)	-1134.85* (662.19)	-1134.85* (662.19)
Constant	-18853.62*** (2631.15)	-18853.62*** (2631.15)
Number of Observations	52	52
Prob> F	0.00	0.00
R-square	0.89	0.89
Adj R-square	0.87	0.87

Number in the parenthesis is standard error

* Significant at 10% level

** Significant at 5% level

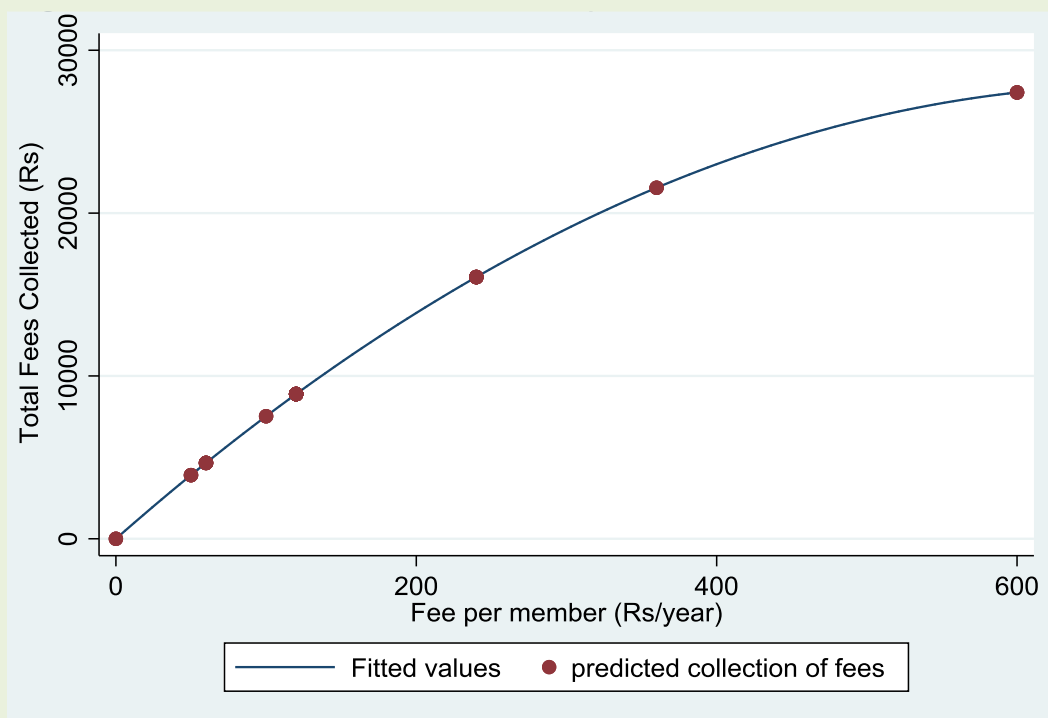
*** Significant at 1% level

Increase in number of members and membership fee (rate) improves yearly collection of membership fees. The interesting part is that with subsequent increase in membership fee total

collection of membership fees would increase but by a decreasing amount. If number of small farmers (less than one acre of land) in the WUAs are higher than fees collection would be lower. Similarly, higher the number of farmers with land one acre and above, more is collection of membership fees of WUAs. However, higher the percentage of small farmers (less than one acre of land) and higher the percentage of sharecropper, lower the yearly collection of fees. As the number of villages under the command area increase the collection of fees falls.

The policy implication of this regression analysis is that the membership fees itself should not be very high. The impact of individual membership fee (rate) on total collection of fees is represented in Figure 2.38. The y-axis measures the predicted values of membership fees and square of fees altogether ($\beta_2 \text{FEES} + \beta_3 \text{SQ_FEES}$) calculated from Model I. The x-axis measures the yearly individual membership fee.

Figure: 2.38: Collection of Membership Fees and Fee Per Member



Furthermore, WUAs should not have a high disparity in land holdings amongst members. Higher the proportion of large land holders as compared to small land holders lower would be the collection of membership fees. On the other hand, if the members of the WUAs are better off with regard to land holdings in general then collection of membership fees would increase.

Hence, more homogeneous members but with larger the land holding are better for collection of membership fees and financial sustainability of WUAs.

WUAs should be formed in such a manner that the command area covers lesser number of villages.

2.12.2 Delay in Payment of Water Charges

Delayed payment of water charges is one of institutional bottlenecks of functioning of WUAs. The number of members making delayed payment would depend directly on the size of WUA, captured by number of registered members of WUAs. The delay in payment may also depend on economic condition of the members. Higher the number of members with land one acre and above, lesser number of members is expected to delay payment of water charges. Similarly, higher the number of members having land below one acre, higher number of members are expected to delay payment of water charges.

If percentage of small land holders (less than one acre) is high, then the small farmers would believe that the chances of WUA being captured by large farmers are less. Hence, higher the percentage of small land holders (less than one acre), the lesser the number of members making delay in payment is expected.

Higher is the command area (keeping number of members unchanged) lesser is the difficulty of collection of water charges and hence lesser number of delayed payment of water charges is expected. Moreover, higher the command area greater is the possibility of gaining economies of scale of the scheme. Hence, net benefits are likely to be higher. As a result, lesser number of delayed payments of water charges is expected.

The following economic models are constructed:

Model I:

$$\text{NUM_DEL_WAT_CHG} = \beta_0 + \beta_1 \text{ TOT_MEM} + \beta_2 \text{ PER_SMALL_FARMER} + \beta_3 \text{ LARGE_FARMER} + \beta_4 \text{ COMMAND_AREA}$$

Model II:

$$\text{NUM_DEL_WAT_CHG} = \beta_0 + \beta_1 \text{ TOT_MEM} + \beta_2 \text{ PER_SMALL_FARMER} + \beta_3 \text{ SMALL_FARMER} + \beta_4 \text{ COMMAND_AREA}$$

Where

NUM_DEL_WAT_CHG = Number of members delay payment of water charges

COMMAND_AREA = Command Area (Bigha)

We have constructed Model I and Model II to avoid multicollinearity problem due to correlation between LARGE_FARMER and SMALL_FARMER. Further, to avoid multicollinearity problem due to correlation between TOT_MEM and SMALL_FARMER, we have dropped TOT_MEM and constructed Model III as the following.

Model III:

$$\text{NUM_DEL_WAT_CHG} = \beta_0 + \beta_1 \text{ PER_SMALL_FARMER} + \beta_2 \text{ SMALL_FARMER} + \beta_3 \text{ COMMAND_AREA}$$

The regression results demonstrate that all the models are very well fitted with ability to predict around 80 percent of the variation of the dependent variable. The independent variable TOT_MEM in Model II is statistically insignificant. It may be due to multicollinearity problem in Model II. All other independent variables are statistically significant (Table 2.90).

Table 2.90: Determinants of Number of Members Delay Payment of Water Charges

Independent Variable: Number of members delay payment of water charges (NUM_DEL_WAT_CHG)			
	Coefficients (Model I)	Coefficients (Model II)	Coefficients (Model III)
Total number of registered members (TOT_MEM)	0.21*** (0.02) #	-0.07 (0.06)	
Percentage of members having land below one Acre (PER_SMALL_FARMER)	-11.94** (4.49)	-11.94** (4.49)	-8.77** (3.51)
Number of members having land one acre and above (LARGE_FARMER)	-0.28*** (0.07)		
Number of members having land below one acre (SMALL_FARMER)		0.28*** (0.07)	0.2*** (0.02)
Command Area (COMMAND_AREA)	-0.02* (0.01)	-0.02* (0.01)	-0.02* (0.01)
Constant	11.95*** (3.56)	11.95*** (3.56)	9.24*** (2.64)
No of Observations	50	50	50
Prob> F	0.00	0.00	0.00
R-squared	0.7995	0.7995	0.7938
Adj R-squared	0.7816	0.7816	0.7803

Number in the parenthesis is standard error

* Significant at 10% level

** Significant at 5% level

*** Significant at 1% level

The results reveal that higher the number of members in a WUA more is the number of members delaying payment of water charges. More is the number of larger farmers (land size one acre and more) lesser is the number of members making delay in payment. Higher is the number of small farmers (less than one acre of land), more is the number of farmers delaying payments. However, higher the percentage of small farmers in the WUA, the lesser is the number of the cases of delay in payment of water charges. Higher the command area of the scheme, the lesser is the number of farmers making delayed payment of water charges.

The policy implications are that the WUAs should be consisting of more homogeneous farmers, although having more farmers with larger land size is better. A WUA should be developed in such a manner that it covers a larger command area given the number of members remaining constant.

2.12.3 Third party involvement in WUA

The WUAs that are financial and operationally self-sustainable are less likely to find third party involvement essential in future. Third party involvement is less likely to be considered essential by the WUAs if collection of membership fees is meeting the targets. The latter is measured by actual collection as a percentage of proposed collection of membership fees. If the WUAs have found no problem in maintenance, then they are less likely to consider third party involvement essential in future.

The WUAs which have schemes involving more complicated machines are more likely to find that third party involvement essential in future. Amongst the different types of schemes, those having tube-wells are more complicated with regard to engineering as compared to other schemes.

The time spent since handover of the schemes is likely to have negative impact on perception of WUAs regarding necessity of third-party involvement in future. Higher the months spent since handover of the schemes lesser it is likely that WUAs would find third party involvement essential in future.

The institutional factors are likely to impact the necessity for taking help of third party in future. Stronger the institutions lesser is the likelihood of seeking third party involvement. WUAs that conduct general body meeting occasionally are weaker with regard to institutional functioning and hence more likely to seek third party involvement in future. If members other than the chairperson contribute land for the project, then it increases accountability and hence the WUA is less likely to find third party involvement essential in future. The WUAs that do not maintain register books are weak with regard to institutional functioning and hence are more likely to consider third party involvement essential in future.

The econometric models are given below:

Model I:

$$\text{THIRD_INVOLVE} = \beta_0 + \beta_1 \text{ACTUAL_PRO} + \beta_2 \text{NO_PROB_MAIN} + \beta_3 \text{ALL_TUBEWELL} + \beta_4 \text{MONTHS_HANDOVER} + \beta_5 \text{OCCASIONAL_MEET} + \beta_6 \text{LAND_MAM} + \beta_7 \text{REGIS_MINUTES}$$

It is observed that WUAs that have problem in maintenance are on average 44 months old (since handover of schemes) and those not having problem in maintenance are on average 34 months old. Hence, there could be problem of multicollinearity due to relation between NO_PROB_MAIN and MONTHS_HANDOVER.

Furthermore, it has been observed that in WUAs where the members other than chairperson have contributed land for the project, 61 percent of the WUAs do not maintain register of minute's book. Hence, there is possibility of multicollinearity problem due to relation between REGIS_MINUTES and LAND_MEM

Hence, to avoid multicollinearity problem we have also considered a second model dropping MONTHS_HANDOVER and REGIS_MINUTES variables.

Model II:

$$\text{THIRD_INVOLVE} = \beta_0 + \beta_1 \text{ACTUAL_PRO} + \beta_2 \text{NO_PROB_MAIN} + \beta_3 \text{ALL_TUBEWELL} + \beta_4 \text{OCCASIONAL_MEET} + \beta_5 \text{LAND_MAM}$$

Where

THIRD_INVOLVE = Third party (external) involvement in WUA is essential in future

ACTUAL_PRO = Actual collection as a percentage of proposed collection of membership fee

NO_PROB_MAIN = No problem towards maintenance

ALL_TUBEWELL = All types of Tube well Schemes

MONTHS_HANDOVER = Months Spend since Handover of Scheme

OCCASIONAL_MEET = Occasional General Meeting

LAND_MEM = Land provided by Members other than Chairperson

REGIS_MINUTES = Register of minutes books not maintained

The dependent variable THIRD_INVOLVE is limited dependent variable. Hence, we have estimated the parameters of the model through Logit model. The two models are very well fitted with the ability to make 90 percent correct prediction by Model I and 84 percent correct prediction by Model II (Table 2.91).

Table 2.91: Determinants of Third party (External) involvement in Future Considered Essential by WUAs

Dependent Variable: Third party involvement in WUA is essential in future (THIRD_INVOLVE)		
Independent Variables	Marginal effects (Model I)	Marginal Effects (Model II)
Actual collection as a percentage of proposed collection of membership fees (ACTUAL_PRO)	-0.01** (0.005)	-0.01** (0.005)
No problem towards maintenance (NO_PROB_MAIN)	-0.34*** (0.102)	-0.49*** (0.11)
All types of Tubewell Schemes (ALL_TUBEWELL)	0.18** (0.082)	0.16 (0.108)
Months Spend since Handover of Scheme (MONTHS_HANOVER)	0.01** (0.003)	
Occasional General Meeting (OCCASIONAL_MEET)	0.22*** (0.071)	0.33*** (0.119)
Land provided by Members other than Chairperson (LAND_MEM)	-0.26** (0.113)	-0.24** (0.116)
Register of minutes books not maintained (REGIS_MINUTES)	-0.38 (0.262)	
Number of Observations	50	50
Prob> chi2	0.00	0.00
Pseudo R2	0.62	0.48
Correctly classified	90%	84%

Number in the parenthesis is standard error

* Significant at 10% level

** Significant at 5% level

*** Significant at 1% level

In Model I, the independent variables found statistically significant are ACTUAL_PRO, NO_PROB_MAIN, ALL_TUBEWELL, MONTHS_HANOVER, OCCASIONAL_MEET and LAND_MEM. In Model II, the independent variables found statistically significant are ACTUAL_PRO, NO_PROB_MAIN, OCCASIONAL_MEET and LAND_MEM. The variable REGIS_MINUTES is statistically insignificant in Model I. The variable ALL_TUBEWELL is significant only in Model I.

The regression results demonstrates that a one percent increase in actual collection of membership fees over proposed collection is likely to increase chances of response favouring third party involvement in future by 10 percent. If the WUA conducts general body meeting occasionally then they are at least 20 percent (22 percent in Model I and 33 percent in Model II) more likely to find third party involvement necessary. If members other than chairperson have contributed land in the project, then chances of finding third party involvement necessary falls down by more than 20 percent (26 percent in Model I and 24 percent in Model II).

If the WUAs have found no problem in maintenance, then the chances of favouring third party involvement decreases by more than 30 percent (34 percent in Model I and 49 percent by Model II). If the system is tube well then there is 18 percent higher chances of perceiving third party involvement necessary.

It was expected that as the age of the WUAs increases, they are more likely to find third party involvement in future not essential. However, the regression model results do not support the hypothesis. On the contrary, the chances of perceiving third party involvement essential increases by one percent due to increase in age of WUA by one month.

The regression results suggest that WUAs should be encouraged to generate revenues out of collection of membership fees to make them independent in future. They should be provided with systems which are less prone to maintenance problems. WUAs should be encouraged to have regular general body meetings. It is important that all the members share some amount of fixed capital (such as land) for the scheme. The latter two initiatives would improve transparency and accountability and make the WUAs independent in future.

2.13 Summary

The WUAs surveyed for the study were registered between 2012 and 2018. 40 percent of the WUAs were registered without any delay after handing over the scheme. At the time of survey, 70 percent of the schemes were fully functional, 13 percent were partially functional, and 17 percent were abandoned. The highest percentages of fully functional schemes were from category II and highest percentages of abandoned schemes were from category III. However, average number of outlets and percentage of outlets malfunctioning is highest for category I schemes.

The WUAs have on average 66 members, amongst which 56 are male and 10 are female. Female representation in WUAs is highest for category II schemes. There are on average 45 members owning land below 1 acre and 20 members between 1-3 acres. There are 14 sharecroppers per WUAs who are not registered members.

There are managing committee and general body of the WUAs. The members of managing committee remained unchanged for 81 percent WUAs since inception. 71 percent managing committees do not conduct meetings separately. The general body meeting of the WUAs are generally conducted monthly (38 percent WUAs) and quarterly (21 percent WUAs). Weekly and fortnightly meetings are conducted more in Batch I, II and III WUAs. The minutes of the last three general body meetings were taken properly in 96 percent of functioning WUAs. The important issues discussed in the general body meetings were crop planning, membership fee, income and expenditure of WUA. Financial audit was conducted in 65 percent WUAs. The percentage of WUAs that have conducted financial audit increases with age of WUAs. A lesser percentage of WUAs of recent batches conduct financial audit. Furthermore, financial audit has been conducted more in WUAs that have a greater number of members and larger command area.

The schemes were developed with the contribution of land by members including chairperson. Only members (without chairperson) contributed land in 46 percent WUAs. 37 percent WUAs made contract with the land contributors while taking the land. The contract was made to deliver free water or water at reduced charge and employ land contributor as operator and compensate accordingly. The machines of the schemes were provided by WBADMI programme. Agri-equipment were provided to 62 percent WUAs.

The maintenance works of MI systems are done systematically in 17 percent WUAs. In 57 percent WUAs maintenance is done by land contributor and in 27 percent WUAs it is done by other members of association. However, other members of association are involved in maintenance in 74 percent category II schemes, which are surface water irrigation. Hence, collective action in maintenance is better in surface water irrigation. The WUAs also sought external help for maintenance. The older WUAs have sought external help more than the newer ones.

During last one year, 65 percent WUAs faced problem of non-availability of water supply. The major causes were power cut (29 percent) and sudden breakdown (39 percent). Problem of non-availability of water supply is least in case of category I schemes, which are tube well. Problem of maintenance of MI systems were reported by 30 percent WUAs, which increases with the age of WUAs. The WUAs suggested that immediate technical support be given to resolve problems of maintenance.

Problems of water supply is highest in the WUAs from the central zone and for the RLI schemes. Problems of water supply is higher for surface water schemes. The problems of maintenance are highest in Coastal and Northern Plateau. RLI schemes also are more frequently plagued by maintenance problem.

The major sources of income of WUAs are periodic membership fees and water charges. A membership fee is charged from 82 percent WUAs. The yearly membership fees range from Rs. 50 to Rs.600. Water charges are collected on the basis of irrigated land or irrigation time. Water charges are higher in Rabi as compared to Kharif. Moreover, water charges are relatively less when it is uniform across seasons. Higher water charges during Rabi and discriminating charges according to seasons indicate water pricing according to need of water for cultivation.

To generate additional income, 38 percent WUAs conduct different activities such as fishery, horticulture and vermicomposting. 75 percent WUAs functioning in the coastal area undertake additional activities for income generation. They all take fishery as additional activity. One-fourth of the WUA functioning in the coastal zone do not charge membership fee. Overall, one-third of the WDS schemes do not charge membership fee, although they are functioning. The WUAs spend majorly on operator charges and electricity bills.

On average, 9 members per WUA delay payment of water charges. All the WUAs formed one year ago have members delaying payment of water charges. 8 percent WUAs have taken assistance of external financial experts. Those WUAs which have taken assistance of external financial expert are all more than two years old. Almost all the paid MI pump operators are members of WUA. 77 percent key informants of WUAs expressed that pump operators are efficient. This satisfaction is higher for category I schemes.

The functioning of WUA as institution is much better for the newly formed WUAs. The WUAs that were formed in last one year maintained the cashbook. All the WUAs formed during last one year maintain the crop planning register, pump logbook, water charges register book and register book for other services.

Barring regular maintenance of cashbook and minutes book, the WUAs functioning in the coastal zones have performed worse with respect to regular maintenance of different documents supporting smooth and transparent institutional functioning. A lesser percentage of WUAs with surface water schemes have regularly maintained bank account passbook and ledger book. Schemes developed after Batch I maintain records better. More WUAs with higher grades have regularly maintained bank passbook.

The comparison between treatment vis-à-vis control WUAs reveal that treatment WUAs are much better with regard to functioning of institutions. None of the WUAs in the control group are registered, while all the WUAs in the treatment group are registered under West Bengal Societies Registration Act, 1961. The average numbers of female members, beneficiaries and managing committee members are much higher for treatment WUAs as compared to control WUAs. WUAs in control group could not provide any document on any meeting of general body. The MI of WUAs in the control group are either maintained by block office or not maintained at all. None of the WUAs in the control group have done any crop planning.

The regression analysis implies that higher the number of members having large land holdings and lower the number of members having small land holdings, higher is the collection of membership charges and lower is the number of members delaying payment of water charges. However, higher the percentage of small farmers (or lesser is the heterogeneity amongst the farmers), higher is the collection of membership fees and lower the number of members delaying water charges. This implies that WUAs would be financially sustainable when a greater number of large land holders are present but heterogeneity of farmers (with regard to

size of land holdings) is less. It is interesting to note that as percentage of sharecropper's increase, collection of membership fees also increases, although sharecroppers themselves are not members of WUA. The presence of sharecroppers makes WUAs financially more viable.

The higher the number of villages covered by the command area, the higher is the difficulty in collection of membership fees. However, higher the command area (keeping number of members constant) lesser is the delay in payment of water charges. This implies WUAs should be formed in such a manner that it covers fewer villages but higher command area with lesser or same number of members. The total collection of membership fees increases with increase in the rate of membership fees, but it increases at a decreasing rate. Hence, membership fees should not be very high.

While forming the WUAs general members should be encouraged to provide land for the scheme. It increases accountability in functioning of the schemes. The transparency as well as accountability of the WUAs increases with the regular meetings of general body. If the member (other than chairperson) provides land for the scheme and general meeting is conducted regularly then WUAs come out to be stronger over a period of time and they perceive that they would be able to run the WUA without any third party or external assistance. The WUAs that face no problem of maintenance and collect membership fee as planned are more likely to perceive external assistance less important in the future. Hence, the MI systems should be simple so that there is minimum maintenance problem. Moreover, WUAs should be encouraged to enhance their efforts to increase their actual collection of member fees up to their potential.

CHAPTER 3: MEMBERS AND THEIR INTERACTION WITH WUAs

3.1 Introduction

Involvement of members at every step is critical for the success of the WUAs. Ostrom (1992) argued that the crafting of an effective institutions crucially depends on peoples' involvement in setting the operational and collective choice rules regulating decision making and conflict resolution processes and their enforcements. Peoples' involvement also tend to make the management of resources more sustainable. The WUA has the potential of being an effective institution as it facilitates the process of devising and continuously modifying the rules according to a set of collective-choice and constitutional rules. Importantly, it has also been observed that collective action in management of irrigation is shaped by technology and social relations (Narain, 2004). For example, social organisation pattern by castes and local political groups influence individual actor's ability to mobilise rules and thereby his/her access to water (Narain 2003). However, the studies of participatory irrigation management predominantly focus on the impacts and outcomes of irrigation management transfer and very little attention is paid to the operation processes of the WUA and the contextual factors affecting the same (Narain, 2004).

Against this background, this chapter, based on the responses of 407 sampled WUA members in West Bengal, documents the pattern of their farming practices and diversification of economic activities; their access and satisfaction with the irrigation water; how the members from different sections of the community act and interact with each other in order to accomplish the goals of participatory irrigation management and their implications for mechanisms for governance of WUA as well as sustainability of WUA as an institution; their participation in the training and capacity building program and adoption of new or improved technologies and finally the perceptions of members as regards the effectiveness of the WUAs. Moreover, an attempt has been made to examine the role of women in the WBADMI project and its implications for women empowerment. We have also surveyed 43 members under non-WBADMI program and, based on their responses and attendant indicators, made a comparison of the performances of the WBADMI program vis-à-vis non-WBADMI program.

To systematically examine members' responses, analysis has been performed along two distinct spectrums. First, we have used three broad classifications of minor irrigation schemes under WBADMI program for the purpose of our analysis. Category I includes TW, TW(Solar), STW, STDW, PDW, MDTW, LDTW, DPTW, DPTW (Solar); category II includes SFMIS, RLI, CD and category III includes WDS, Watershed, Sprinkler. Second, among the surveyed

WUAs, some are found to be non-functional. So, we have also considered only functional WUAs for examining members' participation in WUA activities, training and capacity building programs and members' satisfaction with the irrigation water as well as WUAs as institutions. Based on the nature of the minor irrigation schemes, we have reclassified the WUAs under two categories – ground water irrigation (consisting of DPTW, DPTW (solar), LDTW, MDTW, STDW, STW, TW, TW (solar) and PDW) and surface water irrigation (consisting of CD, RLI, SFMIS and WDS). Selected relevant indicators are also being examined separately for TW, PDW, CD, WDS and RLI to understand the nature of scheme specific variations in members' responses regarding participatory outcomes and satisfaction levels. Five zones, namely central, coastal, hilly, northern plateau have been considered to present zone wise variations in the members' responses. We have also considered the members' responses in reference to the batch of a scheme (six batches – I, II, III, IV, V and VI) based on when it was handed over. The WBADMI project has also evolved a set of guidelines to grade the WUAs in five categories (A+, A, B, C and D). So, we have presented grade wise analysis of the selected relevant indicators.

Apart from the socio-economic condition of the community, the composition of the WUA members has implications for political economy dimensions of the institutional development. Table 1 presents the socio-economic characteristics of the sampled WUA members across the three categories of irrigation facilities. The WUAs appear to be inclusive as they are represented by members belonging to different social groups. Among the sampled members, about two fifth belonged to the general category; one third belonged to the SC and ST groups and one fourth members belonged to the other category (i.e. Muslim). The pattern of social group wise membership across the three categories of the irrigation system broadly appears to be in conformity with the above trend with slightly higher proportion of respondents under category I schemes belonged to the general category.

Table 3.1: Ethnicity wise Distribution of WUA Members (in %)

	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
General	45.10	31.03	27.78	39.56
SC/ST	32.94	34.48	38.89	33.91
OBC	1.57	4.31	0.00	2.21
Others	20.39	30.17	33.33	24.32

Source: Primary Survey, 2019

Economic status of the sample members is captured through their land holding status. Table 2 shows that about 82 percent of our sampled members are marginal farmers (with land less than 1 hectare) and about 13 percent are small farmers (with land of 1 - 2 hectares). Moreover, in terms of monthly income, majority of the sampled respondents across three categories of irrigation schemes and four ethnic groups were bracketed within the two income slabs – monthly income of less than INR 5000 and monthly income of INR 5000 to INR 10000.

Table 3.2: Distribution of WUA Members (in %) (in terms of land holding)

	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Marginal Farmers	82.75	77.59	88.89	81.82
Small Farmers	13.73	14.66	8.33	13.51
Semi Medium Farmers	3.53	7.76	2.78	4.67

Notes: Marginal Farmers <1 hectare; Small Farmers 1 – 2 hectares; Semi Medium Farmers: 2 – 4 hectares

Source: Primary Survey, 2019

Table 3.3: Distribution of WUA Members (in %) by Monthly Income

	Category I					Category II					Category III				
	Rs. <5000	Rs. 5000 to 10000	Rs. 10001 to 15000	Rs. 15001 to 20000	Rs. Above 20000	Rs. <5000	Rs. 5000 to 10000	Rs. 10001 to 15000	Rs. 15001 to 20000	Rs. Above 20000	Rs. <5000	Rs. 5000 to 10000	Rs. 10001 to 15000	Rs. 15001 to 20000	Rs. Above 20000
General	34.78	42.61	15.65	4.35	2.61	13.89	61.11	2.78	11.11	11.11	0.00	80.00	10.00	10.00	0.00
SC/ST	32.14	52.38	11.90	2.38	1.19	22.50	62.50	7.50	2.50	5.00	21.43	71.43	7.14	0.00	0.00
OBC	0.00	25.00	50.00	0.00	25.00	60.00	40.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Muslim	21.15	55.77	15.38	5.77	1.92	14.29	57.14	22.86	0.00	5.71	25.00	50.00	25.00	0.00	0.00

Source: Primary Survey, 2019

One of the important goals of WBADMI scheme is to ensure equitable distribution of water among marginal people and to increase their agricultural production. Thus, at least in terms of membership, it appears that the project has been successful in bringing poor and farmers belonging to the marginalized section under the ambit of WUA.

3.2 Pattern of Farming Practices and Diversification of Economic Activities

In order to assess the agricultural situation under the WBADMI program, data was collected on the farming practices that included land cultivated, cropping pattern and yield in the MI command area. We have observed differences in agricultural performance of the sampled members in terms of the above indicators across three different categories of irrigation system. Average land cultivated during kharif season is found to be highest for all three categories. As expected, in pre-kharif season, the average land cultivated found to be lower compared to the other two seasons. Average land cultivated ranged from 1.29 bigha for category III to 2.45 bigha for category II in the rabi season. The irrigation schemes in the kharif season mostly supplemented the rainfall. Importantly, significant portion of the cultivated land in rabi season remained unutilized before the introduction of WBADMI program. The inter category variations in the same is highest in kharif and lowest in pre-kharif season.

Table 3.4: Average Land Cultivated in Different Irrigation Schemes (in Bigha)

		Kharif	Rabi	Pre-Kharif
Irrigation Classification	Category I	3.68	2.23	0.58
	Category II	4.41	2.45	0.57
	Category III	3.31	1.29	0.56

Source: Primary Survey, 2019

Physical characteristics of the schemes like low water storage capacity of surface irrigation schemes, low flow in RLI schemes, crop characteristics like water intensity could have contributed to such inter category variations. These could also be due to local contextual differences in operation and management of irrigation schemes especially with respect to the design, capacity building, organizational support and community involvement. Given the project's success in bringing significant portion of land under cultivation during rabi and pre-kharif seasons, efforts should be to scale up the scheme through proper demand management of irrigation schemes as well as improving the irrigation efficiency.

The cropping intensity has also been calculated by summing up the gross cropped area and net sown area for sampled farmers under three categories of irrigation system. The cropping intensity is highest (188.53) for category I schemes followed by the cropping intensity of 184.98 for the category II schemes and 168.70 for category III schemes. This indicates the better performance of ground water schemes compared to the surface water schemes.

Table 3.5: Category Wise Cropping Intensity

		Cropping Intensity
Irrigation Classification	Category 1	188.53
	Category 2	184.98
	Category 3	168.70

Source: Primary Survey, 2019

Our scheme wise reclassification of the WUAs portrays the same trend. Among the ground water schemes, TW schemes recorded highest cropping intensity of 188.96. On the other hand, among the surface water schemes, the cropping intensity is highest for CD schemes (190.19) followed by the RLI schemes (184.40).

Table 3.6: Scheme/Category Wise Cropping Intensity

	CI ¹
TW	188.96
PDW	181.20
GW	188.53
CD	190.19
RLI	184.40
WDS	152.81
SW	177.72

Source: Primary Survey, 2019

¹Cropping Intensity = (Gross Cropped Area/Net sown area) *100

Table 3.7: Batch Wise Cropping Intensity

	CI
I	197.28
II	186.70
III	201.73
IV	202.83
V	125.00
VI	120.00

Source: Primary Survey, 2019

The batch-wise cropping intensity reveals the better performances of the WUAs belonging to batch IV and batch III, closely followed by the cropping intensity of batch I.

Importantly, some of the previous studies noted much lower cropping intensities in some of the sampled districts of West Bengal during the pre-WBADMINI phase (IWMI, 2019). The substantial increase in cropping intensities can be attributed to significant increase in rabi cultivation which has only become possible after introduction of WBADMINI project.

Table 3.8: District-wise Cropping Intensity

District	Crop Intensity
Bankura	189.7
Bardhaman	167.9
Birbhum	205.6
Coochbehar	190.7
Darjeeling	146.0
Howrah	196.5
Jalpaiguri	196.4
Jhargram	154.8
Malda	144.3
Murshidabad	141.8
Nadia	210.7
Paschim Medinipur	191.2
Purba Medinipur	187.8
Purulia	155.2
South 24 Parganas	192.0
South Dinajpur	235.5
Uttar Dinajpur	210.6

Source: Primary Survey, 2019

Moreover, we have found significant inter-district variations with respect to cropping intensities. Four districts- namely South Dinajpur, Uttar Dinajpur, Nadia and Birbhum recorded cropping intensities in the range of 205% to 235%. Apart from them, for seven districts – Bankura, Cooch Behar, Howrah, Jalpaiguri, Nadia, Paschim Medinipur, Purba Medinipur and South 24 Parganas, the cropping intensities ranged from 187.8% to 196.5%. Cropping intensities in the six districts – Bardhaman, Darjeeling, Jhargram, Malda, Murshidabad and Purulia were much lower (140% to 167.9%), with the figure being lowest for Darjeeling (140%). Leaving aside the local contextual factors, this inter district difference can partly be attributed to both the type of schemes operating within each district and differential efficiency

in operation and management of schemes. In better performing districts, comparatively much higher proportion of members were found to be dependent on schemes of TW, PDW, CD and RLI with better availability of water. Operational and managerial efficiency of the schemes was another crucial factor – e.g. South 24 Parganas with greater proportion of members dependent on schemes like WDS and RLI and Darjeeling with cent percent members dependent on TW schemes experienced higher and lower cropping intensities respectively.

It is also observed that there has been significant increase in the number of crops and proportion of area under them, especially in the rabi and pre-kharif seasons. As expected, in majority of the districts, more than 90 percent of the land was used for paddy production in the kharif season. In rabi season, members grew many crops and vegetables like mustard, potato, maize, tomato, brinjal, radish, cucumber, pumpkin, leafy vegetables etc. In some districts, members also continued to grow rabi paddy. In general, it is evident that following introduction of WBADMI project, a range of different irrigation schemes harnessed the water resources of the region productively and members also made more productive use of agricultural land by growing two to three crops a year including cash crops, instead of the traditional one rain-fed subsistence crop. This, in turn, could provide enhanced employment opportunities and income for the beneficiaries.

In order to understand the extent and nature of crop diversification, we have used the Herfindahl Index (H.I.) as follows:

$$P_i = \frac{A_i}{\sum_{i=1}^n A_i}$$

Where P_i = proportion of i th crop; A_i = area under i th crop (ha) and n = total number of crops.

$$\text{Then the H.I.} = \sum_{i=1}^n P_i^2$$

The value of “H.I.” varies from zero to one. It takes the value of one when there is complete specialization in crop and approaches zero when the number of crops is more showing increasing diversification.

Comparison of district wise crop diversification indices in three seasons reveals some interesting facts. The extent of diversification in the kharif season for most of the district was

quite less as they recorded higher index values. The only exception was Malda. On a positive note, all the district experienced crop diversification, albeit, of different magnitudes in rabi season. Districts like Cooch Behar, Bardhaman, South Dinajpur, Jalpaiguri, Murshidabad, Birbhum and Nadia recorded significant crop diversification.

Table 3.9: District-wise Herfindahl Index

District	Kharif	Rabi	Pre-Kharif
Bankura	1.00	0.29	0.38
Bardhaman	1.00	0.23	0.44
Birbhum	1.00	0.28	0.25
Coochbehar	0.98	0.22	0.28
Darjeeling	0.83	0.29	0.41
Howrah	0.83	0.36	0.43
Jalpaiguri	0.99	0.26	0.23
Jhargram	0.96	0.32	0.77
Malda	0.55	0.29	1.00
Murshidabad	0.86	0.28	0.35
Nadia	0.60	0.28	0.61
Paschim Medinipur	0.99	0.88	0.68
Purba Medinipur	0.84	0.60	0.51
Purulia	1.00	0.31	0.38
South 24 Pargana	0.94	0.30	0.31
South Dinajpur	0.78	0.25	1.00
Uttar Dinajpur	0.97	0.37	0.48

Source: Calculated on the basis of information from Primary Survey, 2019

All of them, except Murshidabad, also has comparatively higher cropping intensities, implying that areas under rabi crops in these districts had diversified a lot. Paschim Medinipur and Purba Medinipur recorded significantly higher value of H.I. indicating higher dependence of rabi paddy, which has high water requirements. As per the H.I value, Malda diversified a lot, but the district's cropping intensity was low. Even during the pre-kharif season, the evidence for members of different districts diversifying their crop production, is quite strong. The magnitude of diversification is quite high for Jalpaiguri, Birbhum and Cooch Behar district.

Overall, the trend of diversification is clear among the districts of West Bengal. This has lessened the members' dependence on paddy as the only source of income. Most importantly, such diversification is directly correlated with members' receipt of sufficient water from minor

irrigation schemes. It is also important here to recognize that the crop diversification decision of members is not entirely driven by irrigation reforms initiated by the WBADMI project alone but also depends on factors like prices of the crops, availability of other infrastructural facilities, market linkages and so on. So, it is imperative to strengthen the agricultural support services and awareness program to make familiar with alternative farming strategies and motivate farmers to try crop diversification. For example, boro paddy is water intensive but maize is not and also profit from maize cultivation may exceed that from boro paddy cultivation. But we have found that members were not interested enough to scale up their maize production as they were not familiar with the process.

3.3 Migration

Improved irrigation facilities play a critical role in mediating migrant worker flows by providing alternative livelihood and income generating options for potential migrants. The members were asked about their opinion regarding the scheme's impact on income and migration. Almost, 83 percent of the members reported that, after introduction of WBADMI project, their income improved which discouraged their family members to migrate. Rest considered their improvement in income as insignificant which forced them to explore the opportunities for migration.

Table 3.10. Members' Responses regarding Insignificant Increase in Income and Incentives for Migration (in %)

	Yes	No
GW	18.82	81.18
SW	13.29	86.71
ALL	16.83	83.17

Source: Primary Survey, 2019

Table 3.11: Zone-wise Members' Responses regarding Insignificant Increase in Income and Incentives for Migration (in %)

	Yes	No
Central	18.06	81.94
Coastal	21.31	78.69
Hilly	12.50	87.50
Northern Plateau	22.73	77.27
Western	13.60	86.40

Source: Primary Survey, 2019

Among the five zones, comparatively higher proportion of WUA members belonging to northern plateau and coastal zones expressed their willingness to migrate. However only 2.3 percent of the family members of the sampled members reported outmigration in the last one year.

3.4 Perception of Farmers: Access to Irrigation Water and Water Management

The WBADMI project envisages transferring of management responsibilities to the WUAs to ensure fair, equitable and efficient use of available water. This section, based on members' feedback, attempts to evaluate water management planning and practices by the WUAs formed under the WBADMI project. Analysis of irrigation sources used by the members reveals that 62 percent of the surveyed members used schemes under category I (TW, TW (Solar), STW, STDW, PDW, MDTW, LDTW, DPTW, DPTW (Solar)), 28 percent of the members depended on schemes under category II (SFMIS, RLI, CD) and the rest received water from schemes under category III.

Table 3.12: District-wise Distribution of Members' Use of Schemes under Different Schemes (in %)

District	Irrigation Classification		
	Category 1	Category 2	Category 3
Bankura	0.00	100.00	0.00
Bardhaman	80.00	20.00	0.00
Birbhum	41.67	58.33	0.00
Coochbehar	69.23	30.77	0.00
Darjeeling	100.00	0.00	0.00
Howrah	26.67	57.78	15.56
Jalpaiguri	93.75	6.25	0.00
Jhargram	0.00	52.63	47.37
Malda	60.00	40.00	0.00
Murshidabad	46.15	53.85	0.00
Nadia	58.82	41.18	0.00
Paschim Medinipur	100.00	0.00	0.00
Purba Medinipur	95.92	0.00	4.08
Purulia	0.00	71.43	28.57
South 24 Parganas	0.00	48.15	51.85
South Dinajpur	100.00	0.00	0.00
Uttar Dinajpur	100.00	0.00	0.00
All	62.65	28.50	8.85

Source: Primary Survey, 2019

Wide district wise variations have also been observed. In district like Uttar Dinajpur, South Dinajpur, Paschim Medinipur, Darjeeling, Purba Medinipur, Jalpaiguri and Birbhum, 80 to 100 percent of the sampled members used schemes under Category 1 where as in Bankura and Purulia, majority of the sampled members depended on schemes under Category 2. Almost half of the sampled members of South 24 Parganas and Jhargram received water from schemes under category 3.

3.4.1 Availability of Water

We enquired the members about their perception regarding the adequacy of water availability. Water availability seems to be adequate as 65 percent of the members reported receiving adequate water as per their requirement while 32 percent members reported receiving adequate water as per the water schedule. Among the three categories of irrigation schemes, water availability seems to better match the water requirement of the members under Category I and

Category II schemes. In terms of social groups, higher proportion of members belonging to the SC/ST group compared to the rest reported receiving water as per their requirement across all the three categories of the irrigation schemes.

Table 3.13: Members' Responses regarding the Availability of Water (in %)

Water availability	Category I	Category II	Category III	Total
Received adequate water as per schedule	30.04	32.65	42.86	31.53
Received adequate water as per requirement	67.81	62.24	47.62	65.06
Received inadequate water as per schedule	1.29	2.04	4.76	1.70
Received inadequate water as per requirement	0.86	3.06	4.76	1.70

Source: Primary Survey, 2019

Table 3.14: Members' Responses Ethnicity-wise regarding the Availability of Water (in %)

	Category I				Category II				Category III			
	Receive adequate water as per schedule	Receive adequate water as per requirement	Receive inadequate water as per schedule	Receive inadequate water as per requirement	Receive adequate water as per schedule	Receive adequate water as per requirement	Receive inadequate water as per schedule	Receive inadequate water as per requirement	Receive adequate water as per schedule	Receive adequate water as per requirement	Receive inadequate water as per schedule	Receive inadequate water as per requirement
General	36.63	61.39	0.99	0.99	37.14	60.00	0.00	2.86	62.50	37.50	0.00	0.00
SC/ST	21.52	75.95	1.27	1.27	25.00	66.67	2.78	5.56	30.77	53.85	7.69	7.69
OBC	50.00	50.00	0.00	0.00	40.00	60.00	0.00	0.00	0.00	0.00	0.00	0.00
Others	28.57	69.39	2.04	0.00	36.36	59.09	4.55	0.00	0.00	0.00	0.00	0.00

Source: Primary Survey, 2019

We have also examined scheme-wise variations in water availability. Among the ground water schemes, cent percent members under PDW scheme reported receipt of adequate water as per the requirement while 97 percent of the members using water under TW schemes reported adequate availability of water either as per requirement or as per schedule. Among the surface water schemes, adequacy of water found to be highest for CD schemes followed by the RLI schemes. In contrast, almost 11 percent of the members depending on WDS schemes reported inadequate availability of water.

Table 3.15: Scheme/Category-wise Members' Responses regarding the Availability of Water (in %)

Water Availability	Irrigation Scheme/Category							Total
	TW	PDW	GW	CD	RLI	WDS	SW	
Received adequate water as per schedule	31.96	0.00	30.04	29.17	32.84	36.84	32.73	30.90
Received adequate water as per requirement	65.75	100.00	67.81	70.83	61.19	52.63	61.82	65.89
Received inadequate water as per schedule	1.37	0.00	1.29	0.00	2.99	5.26	2.73	1.75
Received inadequate water as per requirement	0.91	0.00	0.86	0.00	2.99	5.26	2.73	1.46

Source: Primary Survey, 2019

Zone-wise analysis of members' responses reveals that adequacy of water availability as per the requirement is highest in the northern plateau zone. In central and coastal zones, relatively higher proportion of members reported adequate availability of water as per schedule.

Table 3.16: Zone-wise Members' Responses regarding the Availability of Water (in %)

Water Availability	Central	Coastal	Hilly	Northern Plateau	Western
Received adequate water as per schedule	47.89	59.02	25.00	7.95	25.81
Received adequate water as per requirement	50.70	37.70	75.00	90.91	67.74
Received inadequate water as per schedule	1.41	1.64	0.00	1.14	2.42
Received inadequate water as per requirement	0.00	1.64	0.00	0.00	4.03

Source: Primary Survey, 2019

In terms of water availability, schemes under batch V, IV and II are found to better match the water requirement of the members. Also 30 to 40 percent of the members under batch I, II, III and VI reported availability of water as per the schedule.

Table 3.17: Batch-wise Members' Responses regarding the Availability of Water (in %)

Water Availability	Batch Classification					
	I	II	III	IV	V	VI
Received adequate water as per schedule	30.00	28.72	42.11	7.69	0.00	40.00
Received adequate water as per requirement	65.00	68.62	55.26	76.92	100.00	60.00
Received inadequate water as per schedule	1.67	1.06	2.63	7.69	0.00	0.00
Received inadequate water as per requirement	3.33	1.60	0.00	7.69	0.00	0.00

Source: Primary Survey, 2019

In terms of grade classification, almost three fourths of the members under WUAs graded as B, C and D reported adequate availability of water as per the requirement while almost 40 to 45 percent members under WUAs graded as A+ and A reported adequate availability of water as per the water schedule. This is indicative of better water mapping practices in those WUAs having crucial implications for equitable and efficient use of available water.

Table 3.18: Grade-wise Members' Responses regarding the Availability of Water (in %)

Water Availability	Grade Classification				
	A+	A	B	C	D
Received adequate water as per schedule	44.44	39.53	21.35	18.18	19.05
Received adequate water as per requirement	55.56	56.40	77.53	77.27	73.81
Received inadequate water as per schedule	0.00	1.16	1.12	4.55	4.76
Received inadequate water as per requirement	0.00	2.91	0.00	0.00	2.38

Source: Primary Survey, 2019

Better availability of water under TW, PDW, CD and RLI schemes could partly be attributed to bio-physical characteristics of the schemes. In practice, water availability is not a serious problems for most of the schemes during kharif season. The location, water level as well as water lifting and storage capacity of the schemes are important determinants of water availability, especially in rabi and pre-kharif season with almost cent percent dependence on irrigation water. Most of the TWs and PDWs are located in places where agricultural farmers had little access to water earlier and they had to migrate to the urban areas for work during the dry seasons. In such locations, members considered the WBADMIA program as important policy intervention in improving the availability of irrigation water for them. Moreover, schemes like TW, PDW, river lifting schemes tap high groundwater storage and flowing rivers with large catchment areas. In contrast, storage capacity of schemes like WDS is low due to the impoundment of water from small local catchment areas. Seepage and evaporation, especially during the dry seasons further depletes their water levels. Apart from the bio-physical characteristics, operation and management processes also influence the availability of water under each category as evident from higher proportion of members reporting availability of adequate water as per the schedule in A+ and A graded WUAs. Acknowledging such influences and designing locally context specific management practices might, thus, improve the performance of schemes in meeting water demand across each scheme.

3.4.2 Water Charges

WUAs collect water charges and use the same for maintenance and operation of the MI structure. Fixing of water rate is very crucial component of water management. In most of the schemes, 51 – 68 percent of the members reported that water rates are fixed by the MC through discussion with all the members. 20 percent of the respondents reported that the MC on its own decided the water rate.

Table 3.19: Members' Responses regarding the Committee/Personnel Responsible for Fixing Water Charges (in %)

	Category I	Category II	Category III	Total
Managing Committee	17.60	26.53	23.81	20.45
MC in discussion with all member	68.24	51.02	61.90	63.07
By ADMIP personnel	0.86	3.06	0.00	1.42
Don't Know	12.45	16.33	14.29	13.64
Government	0.86	0.00	0.00	0.57
No Water Charges	0.00	3.06	0.00	0.85

Source: Primary Survey, 2019

Among the three categories of irrigation schemes, higher proportion of member under category I schemes reported fixation of water rates through democratic process. However, when enquired about the exact method of water charges calculation, almost half of the members expressed their ignorance. Among the three categories, about 28 percent of the members under category I reported that water charges are set on the basis of electricity charges whereas 15 percent of the members under category II reported that water charges are based on future operation cost. Only about 5 percent of the members considered current as well as future maintenance costs as the basis for calculating water charges.

Table 3.20: Members' Responses Regarding Calculation of Water Charges (in %)

	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Periodic Maintenance cost	1.18	0.88	5.56	1.49
Energy charges	28.35	17.70	0.00	22.83
Operator fee	0.39	0.00	0.00	0.25
future repair cost	4.72	15.04	8.33	7.94
Expenditure of meetings	0.00	0.00	2.78	0.25
Any Other	0.39	1.77	0.00	0.74
Don't Know	45.67	45.13	61.11	46.90
Response (1+2+3)	1.97	7.08	5.56	3.72
Response (1+3+4)	0.39	1.77	2.78	0.99
Response (1+2)	2.76	1.77	8.33	2.98
Response (1+2+4)	1.57	0.00	0.00	0.99
Response (1+5)	0.00	0.00	2.78	0.25
Response (1+3)	0.39	0.00	0.00	0.25
Response (1+2+3+4)	0.79	0.00	0.00	0.50
Response (2+3)	1.18	3.54	0.00	1.74
Response (2+3+4)	7.09	3.54	2.78	5.71
Response (2+4)	1.97	1.77	0.00	1.74
Response (3+4)	1.18	0.00	2.78	0.99

Notes: 1-Periodic maintenance cost; 2-energy charges; 3-Operator fee

4-Future repair cost; 5: Expenditure for holding meetings etc.

Source: Primary Survey, 2019

Table 21 reflects large variations in water charges paid by the members across seasons and across schemes. In kharif season, the average expenses on account of water charges ranged from INR 461.74 under surface water schemes to INR 558.76 under ground water schemes; the same ranged from INR 1389.13 under surface water schemes to INR 1588.83 under ground water schemes in rabi season. In pre-kharif season, members under surface water schemes incurred average water charges related expenses of INR 762.73 while the same was INR 1661.13 for members under ground water schemes.

Table 3.21: Scheme/Category-wise Members' Water Consumption (in Bigha) and Payment of Water Charges (in Rs)

		Scheme/Category						
		TW	PDW	GW	CD	RLI	WDS	SW
Kharif	Consumption	3.30	4.39	3.36	3.40	3.71	3.32	3.57
	Charges	574.26	296.43	558.76	135.00	694.38	84.38	461.74
Rabi	Consumption	2.35	3.55	2.42	2.50	2.82	2.09	2.63
	Charges	1605.87	1335.71	1588.83	472.22	1938.55	186.67	1389.13
Pre Kharif	Consumption	2.28	3.00	2.29	1.87	2.26	1.63	1.99
	Charges	1688.36	0.00	1661.13	1021.10	504.38	0.00	762.73

Source: Primary Survey, 2019

In general, water charges are fixed either on the basis of area (per bigha per season) or on the basis of per hour. Charges based on hour remain same across the three seasons. In the Kharif season, although members used greater amount of land for cultivation, their expenses on account of payment of water charges were low as irrigation water was used only to supplement rainwater and so the water requirements were low. In Rabi and pre-kharif seasons, irrigation water requirements were high and higher consumption of water resulted in higher expenditure owing to the payment of water charges. Moreover, some schemes during Rabi season impose different water charges for different crops to adequately match their water intensities, contributing to the variations in expenses on water charges. The differences in water charges across the schemes could be attributed to their nature of operation. For many schemes such as TW, PDW and RLI, the distribution of water is managed in a centralized manner with high electricity charges for operation, making the consumption of irrigation water more costly. On the other hand, schemes like WDS imposes comparatively lower water charges. One positive feature of these differential water charges is that WUAs attempted to determine water charges on the basis of cost recovery principle. So, in case of improvement in livelihood opportunities, the members would be more willing to pay water charges, thereby strengthening the financial sustainability of the project.

3.4.3 Satisfaction with the MI Structure

Since members' feedback expresses their appraisal for quality of irrigation schemes, we enquired whether the members enjoy the MI structure or not. On a positive note, almost 87

percent of the members expressed their satisfaction or enjoyment with the MI structure under the WBADMI project.

Table 3.22: Members' Responses on Enjoyment with the MI Structure (in %)

	Yes	No
Category I	91.76	8.24
Category II	85.34	14.66
Category III	58.33	41.67
Total	86.98	13.02

Source: Primary Survey, 2019

The proportion of satisfied members is highest (91.76 percent) for category I schemes, closely followed by category II schemes (85.34 percent). In contrast, almost 42 percent of the members under category III schemes were dissatisfied with the MI structure. Assessment of satisfaction status across four ethnic groups reveals that higher proportions of SC/ST member compared to the member of general category were satisfied with the MI structure for all the categories, excepting for schemes under category II.

Table 3.23: Members' Responses Ethnicity-wise on Enjoyment with the MI Structure (in %)

	Irrigation Category					
	Category 1		Category 2		Category 3	
	Yes	No	Yes	No	Yes	No
General	88.70	11.30	97.22	2.78	80.00	20.00
SC/ST	94.05	5.95	90.00	10.00	92.86	7.14
OBC	100.00	0.00	100.00	0.00	0.00	0.00
Others	94.23	5.77	65.71	34.29	0.00	100.00

Source: Primary Survey, 2019

57 percent of the members were satisfied with the MI structure due to availability of water during both kharif and rabi season, with the corresponding figure being highest (62.82 percent) for schemes under category I and being lowest (28.57 percent) for schemes under category III. Availability of water only during the kharif season made 21 percent of the members satisfied with the MI structure whereas only about 11 percent of the members were satisfied due to availability of water during rabi season. However, when the dissatisfied members were asked to provide reasons, 41 percent of them did not provide any specific reason. 17 percent of the members were dissatisfied as they did not access water as per their requirement due to breaking

down of the irrigation structure. Importantly, around one third of the respondents complained about the non-receipt of adequate water due to non-payment of electricity charges.

Table 3.24: Members' Responses regarding the Reasons for Enjoying MI Structure (in %)

Reasons	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Water always available in Kharif	20.09	24.24	19.05	21.19
Water always available in Rabi	9.40	12.12	19.05	10.73
Water always available in Pre-Kharif	1.28	0.00	0.00	0.85
Low water charges	2.14	1.01	9.52	2.26
Good quality of water	1.28	0.00	0.00	0.85
Response (1+2)	62.82	47.47	28.57	56.50
Response (1+3)	0.85	3.03	0.00	1.41
Response (1+4)	0.00	1.01	0.00	0.28
Response (1+2+4)	0.00	2.02	0.00	0.56
Response (1+2+3)	0.00	1.01	0.00	0.28
Response (1+2+5)	0.00	1.01	0.00	0.28
Response (1+5)	0.00	1.01	0.00	0.28
Response (2+3)	0.43	2.02	14.29	1.69
Response (2+4)	0.43	0.00	0.00	0.28
Response (2+5)	0.00	3.03	4.76	1.13
Response (2+3+5)	0.00	1.01	0.00	0.28
Response (3+5)	1.28	0.00	4.76	1.13

Note: 1: Water always available in kharif; 2: Water always available in Rabi

3: Water always available in pre-kharif; 4: Low water charges

5: Good quality of water

Source: Primary Survey, 2019

In general, the TWs are installed on the land owned by a particular member. Although the WUAs are responsible for payment of electricity bill, that member or some members close to him pay the electricity bill. So, when they stop paying the electricity bill, the supply of irrigation water gets affected. Moreover, many members use his/her own pump set to get irrigation under WDS, SFMIS schemes. These members expected the support organization to buy new pump sets for them and, so, expressed dissatisfaction with the MI structure.

Table 3.25: Members' Responses regarding the Reasons for Not Enjoying MI Structure (in %)

Reasons	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Water not available due to broken structure	42.86	0.00	0.00	16.98
Water not available due to technical problem	14.29	0.00	6.67	7.55
Closed due to non-payment of electric bill	4.76	100.00	0.00	33.96
Others	38.10	0.00	93.33	41.51

Note: 2: Water not available due to technical problem;

3: Closed due to non-payment of electric bill

Source: Primary Survey, 2019

Regular and planned maintenance of the minor irrigation infrastructure is one of the most critical tasks that shapes the long-term sustainability of MI project. Poor maintenance generally worsens the infrastructures and endangers their efficient utilization. Consequently, limited benefits and high maintenance costs of such infrastructures demotivate the members to participate in the WUA activities related to them. We have analysed members' responses regarding maintenance of MI structure both before and after the season. Table 28 shows that about 78 percent of the members rated the maintenance of MI structure before season as excellent or good. The corresponding figure recorded improvement to 85 percent in 'after season' spell. For about 20 percent of the member, the maintenance of MI structure in the 'before season' spell appeared as average and the corresponding figure reduced to about 13 percent for 'after season' maintenance. As the proportion of members rating the maintenance as poor or very poor remained same for both 'before season' and 'after season' spell, it seems

that some of the members, who rated the maintenance as average in ‘before season’ spell, found improvement in the same in the ‘after season’ spell.

Table 3.26: Members' Perception Regarding Maintenance of MI Structure (in %) - Before Season and After Season

	Irrigation Category						Total	
	Category I		Category II		Category III			
	Before	After	Before	After	Before	After	Before	After
Excellent/Good	79.40	89.27	78.57	78.57	68.42	68.42	78.57	85.14
Average	19.74	9.87	19.39	18.37	26.32	31.58	20.00	13.43
Poor/Very Poor	0.86	0.86	2.04	3.06	5.26	0.00	1.43	1.43

Source: Primary Survey, 2019

Among the three different categories of irrigation schemes, comparatively higher proportion of members under Category I and Category II rated the maintenance of MI structure in both ‘before season’ and after season’ spells as excellent and good.

Regarding the frequency of maintenance, 61 percent of the members reported occasional maintenance of MI structure. Around 21 percent of the members reported that maintenance works are done twice in year while 10 percent of the members reported yearly maintenance of the irrigational infrastructure.

Table 3.27: Members' Responses Regarding Frequency of Maintenance of MI Structure (in %)

	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Once in a year	8.12	9.09	23.81	9.32
Twice in a year	17.95	27.27	19.05	20.62
Occasionally	63.68	57.58	47.62	61.02
Never	0.43	0.00	0.00	0.28
DK	9.83	6.06	9.52	8.76

Source: Primary Survey, 2019

Moreover, almost equal proportion of members identified the WUA and farmers getting benefits from the MI structure as the authority/persons responsible for maintenance of the

infrastructure. Even around eight percent of the members thought that landowners, in whose land the infrastructure is constructed, perform the necessary maintenance works. It seems that, among the three categories of irrigation system, the involvement of the WUA in maintenance works was relatively more in category II schemes whereas farmers themselves were more involved in maintenance works in category I schemes. Relatively unsatisfactory maintenance of schemes under category III could be due to improper planning and design and therefore, it is imperative to adopt extensive maintenance works with preferably proactive involvement of the WUAs.

Table 3.28: Members' Responses Regarding Authority/Persons Responsible for Maintenance of MI Structure (in %)

	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
A	38.89	56.57	47.62	44.35
B	54.27	35.35	33.33	47.74
C	6.84	8.08	19.05	7.91

Note: A - WUAs; B - Benefitted Farmers on their own

C - Land owner in whose land MI structure constricted

Source: Primary Survey, 2019

The discourses on collective action indicates that a sense of ownership, among the members or user of an association or the infrastructure created under it, comes out clearly from their involvement in not only the maintenance but also during the construction phase of the MI scheme. We have enquired about the type and specifics of the involvement of the members during the construction phase. About 35 percent of the respondents contributed land for construction of the irrigational infrastructure. 32 percent of the members reported that the MI structures were constructed in the government land. Rest of the respondents reported that lands of the other WUA members were used for construction purpose. Interestingly, more members contributed their land in schemes under category I schemes.

Table 3.29: Members' Responses regarding Land Donation for MI Structure (in %)

Land donated by	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Member himself/herself	40.78	24.14	30.56	35.14
Other WUA Member	29.41	31.03	58.33	32.43
Government	29.80	44.83	11.11	32.43

Source: Primary Survey, 2019

Table 3.30: Members' Responses regarding Type of Involvement during Construction of MI Structure (in %)

	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Passive	60.78	58.62	22.22	56.76
Active	12.55	16.38	19.44	14.25
No Involvement	26.67	25.00	58.33	28.99

Note: Passive - Member was briefed about the scheme

Active: Member was personally present during construction

Source: Primary Survey, 2019

On the other hand, for about 57 percent of the respondents, the mode of involvement was passive in the form of only being briefed about the scheme. Only 14 percent of the members were actively involved through their presence during the construction phase. Almost one third of the respondents were not involved in any form in the construction phase. Only 5 percent of the member offered their labour during construction of MI structures.

Table 3.31: Members' Responses regarding Involvement as Labour during Construction of MI Structure (in %)

	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Paid labour	4.71	0.00	0.00	2.95
Unpaid labour	2.35	4.31	0.00	2.70
No involvement	92.94	95.69	100.00	94.35

Source: Primary Survey, 2019

This, to some extent, reflects low emphasis as well commitment of the farmers during construction phase, indicating the weakness of the WUAs as institution. Importantly, more members involved, either passively or actively, in the construction phase of schemes under Category I and Category II. Non-involvement of the members appeared to be quite significant for schemes under Category III. Regarding the WUAs' initiatives towards upgradation of infrastructural facilities, only 2 percent respondents, all of them under Category I schemes, reported any such initiatives which included use of new pump sets, new spouts and new pipeline.

Overall, apart from contributing land, members' involvement in the maintenance of the irrigation system is limited. Nevertheless, comparatively higher involvement of the members in schemes under Category I could be due to that fact that such schemes were predominantly introduced in the areas with near absence or complete lack of any irrigational facilities. Improved availability of irrigation water and its potentials for increasing agricultural productivity and encouraging diversification of economic activities might have motivated the members to get involved in such schemes. Moreover, small individual command areas and existence of centralized distribution infrastructure in case of many schemes under Category I might also have facilitated higher member involvement at different phases MI schemes.

3.4.4 Problems with water delivery and introduction of new methods

Efficient irrigation water management also involves the introduction of sprinkler and drip irrigation interventions and adoption of water conservation method. On account of both these interventions, almost all the members either were simple unaware of any such intervention or reported that no such intervention took place. Only two percent of the members acknowledged the introduction of rain gun and drip irrigation method. Given the potentials of such interventions for efficient use of water and reduction in operation and maintenance costs, limited use of them is a serious policy concern. When enquired about the problems in water delivery, 90 percent of the members did not report any problem. Very few members complained about leakage problem, electricity problem, pump problems. Only about 5 percent of the members specifically mentioned the limited availability of water during pre-kharif season.

Table 3.32: Members' Responses regarding the Problems in Water Delivery (in %)

Type of Problems	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Water Charges are high	0.00	3.03	0.00	0.85
Not properly defined rotation of distribution	1.28	1.01	9.52	1.69
Limited availability of water due to leakage seepage etc.	0.43	2.02	0.00	0.85
Limited availability of water due to irregular payment of electricity charges	0.43	0.00	0.00	0.28
Limited availability of water due to absence of pump	0.00	2.02	4.76	0.85
Others	4.27	3.03	14.29	4.52
No Problem	93.59	88.89	71.43	90.96

Source: Primary Survey, 2019

This is quite consistent with the fact that after introduction of the WBADMI project, the members could access irrigation water, which was unavailable earlier, especially during the rabi and kharif seasons. Consequently, the members disregarded other problems and expected the WBADMI project to improve their production and therefore income levels and life quality significantly.

3.5 Members' Involvement in Participatory Management Processes and their Perception of Participatory Management Practices

3.5.1 Members Participation in the WUA Meetings

The WUAs are supposed to hold frequent meetings with its Managing Committee and an annual General Body Meeting with the water-user members. These meetings provide the forum where users belonging to different socio-economic groups can voice their opinion, criticize MC members and suggest solutions to practical problems. The scope of deliberations, between users and office bearers of the WUAs on local irrigation issues, provide the much-required accountability mechanism and incentive structures and thereby, has immense potential to strengthen the WUA as an institution. Participation, apart from being an input to the building of accountability, is also considered as an output in sense of empowerment. Effective

participation is, in fact, reinforcing in nature in the sense that once the process is started, it leads to further increase in the level and scope of participation. Thus, the potential of inclusive and democratic decision making can determine the institutional success or failure of WUA. This section attempts to capture the scope and nature of participatory practices by the members based on indicators related to their attendance and mode of involvement and issues for discussion in the WUA meetings as part of WBADMI program.

The members were asked about their general attendance to any of the two WUA meetings, mentioned above. 75 percent of the members attended the WUA meetings more than twice in the last one year. About 16 percent of the members attended one or two of such meetings while the rest never attended any meetings of the WUAs. Among the three categories of irrigation schemes, the attendance rate was highest for category II, closely followed by category I. Only half of the members under category III schemes reported their attendance in more than two WUA meetings.

Table 3.33: Members' Responses on their Meeting Attendance (in %)

Meeting Attendance	Irrigation Category			Total
	I	II	III	
Once	5.9	2.6	13.9	5.7
Twice	13.3	3.4	27.8	11.8
More Than Twice	76.1	80.2	52.8	75.2
Never	4.7	13.8	5.6	7.4

Source: Primary Survey, 2019

If we compare the attendance of the members for four different social groups, we have found that almost same proportion of members belonging to general and SC/ST category attended more than two meetings of WUA. However, the corresponding figures were in the range of 60 to 66 percent for the other two social groups.

Table 3.34: Members' Responses (Ethnicity-wise) on their Meeting Attendance (in %)

	Meeting Attendance	Irrigation Category			Total
		I	II	III	
General	Once	8.70	0.00	0.00	6.21
	Twice	8.70	0.00	20.00	7.45
	More Than Twice	75.65	97.22	60.00	79.50
	Never	6.96	2.78	20.00	6.83
ST/SC	Once	1.19	2.50	0.00	1.45
	Twice	16.67	7.50	7.14	13.04
	More Than Twice	78.57	82.50	92.86	81.16
	Never	3.57	7.50	0.00	4.35
OBC	Once	0.00	20.00	0.00	11.11
	Twice	50.00	0.00	0.00	22.22
	More Than Twice	50.00	80.00	0.00	66.67
	Never	0.00	0.00	0.00	0.00
Others	Once	7.69	2.86	41.67	10.10
	Twice	15.38	2.86	58.33	16.16
	More Than Twice	75.00	60.00	0.00	60.61
	Never	1.92	34.29	0.00	13.13

Source: Primary Survey, 2019

Proper intimation of date and time of the WUA meetings is one of the important preconditions for ensuring higher attendance in the meetings. When enquired about the intimation processes, 86.5 percent of the members reported receiving information through one to one interaction. 6 percent of the members were contacted over phone. 7.4 percent of the members were simply unaware about any such meetings.

Table 3.35: Members' Response on Meeting Intimation (in %)

Response on meeting intimation	Irrigation Category			Total
	I	II	III	
Through One-on-One interaction	91.4	75.9	86.1	86.5
Others (Over Phone)	3.9	10.3	8.3	6.1
DK	4.7	13.8	5.6	7.4

Source: Primary Survey, 2019

Table 3.36: Members' Response (Ethnicity-wise) on Meeting Intimation (in %)

	Response on meeting intimation	Irrigation Category			Total
		I	II	III	
General	Through One-on-One interaction	88.70	86.11	50.00	85.71
	Others (Over Phone)	4.35	11.11	30.00	7.45
	DK	6.96	2.78	20.00	6.83
ST/SC	Through One-on-One interaction	92.86	85.00	100.00	91.30
	Others (Over Phone)	3.57	7.50	0.00	4.35
	DK	3.57	7.50	0.00	4.35
OBC	Through One-on-One interaction	100.00	80.00	0.00	88.89
	Others (Over Phone)	0.00	20.00	0.00	11.11
	DK	0.00	0.00	0.00	0.00
Others	Through One-on-One interaction	94.23	54.29	100.00	80.81
	Others (Over Phone)	3.85	11.43	0.00	6.06
	DK	1.92	34.29	0.00	13.13

Source: Primary Survey, 2019

Among the three categories of irrigation schemes, higher proportion of members under category I schemes reported receiving meeting information through one to one interaction. Mode of such information availability did not seem to vary much among the four different social groups. Interestingly, although quite a high proportion of members from 'other' category received meeting information through one to one interaction, but they rarely attended the WUA meetings.

Members' responses regarding their signing the attendance register is an important indicator of transparency of WUA meetings. The meetings seem to be transparent as 93 percent of the members claimed to sign the attendance register every time they attended the meeting.

Table 3.37: Members' Response on Signing the Meeting Attendance Register (in %)

	Irrigation Category			Total
	I	II	III	
Always	91.8	95.0	91.2	92.6
Sometimes	4.9	2.0	2.9	4.0
Never	3.3	3.0	5.9	3.4

Source: Primary Survey, 2019

Table 3. 38: Members' Response (Ethnicity-wise) on Signing the Meeting Attendance Register (in %)

		Irrigation Category			Total
		I	II	III	
General	Always	96.26	97.14	100.00	96.67
	Sometimes	3.74	2.86	0.00	3.33
	Never	0.00	0.00	0.00	0.00
ST/SC	Always	90.12	91.89	100.00	91.67
	Sometimes	4.94	0.00	0.00	3.03
	Never	4.94	8.11	0.00	5.30
OBC	Always	75.00	100.00	0.00	88.89
	Sometimes	25.00	0.00	0.00	11.11
	Never	0.00	0.00	0.00	0.00
Others	Always	86.27	95.65	75.00	87.21
	Sometimes	5.88	4.35	8.33	5.81
	Never	7.84	0.00	16.67	6.98

Source: Primary Survey, 2019

Moreover, the corresponding percentage figures remain more or less same across the three categories irrigation schemes and social groups.

Incidence of the WUAs meetings also depends on their functional status. Considering only the functional WUAs, we have also analysed members' attendance in the WUA meetings. Quite expectedly, it has been observed that comparatively higher proportion of members (85 percent) reported to attend WUA meetings more than twice in the last one year. Among the ground water schemes, members' participation in meeting is found to be higher for TW while the same

among the surface water schemes is found to be higher for CD and RLI. Among the zones, comparatively higher proportion of WUA members under northern plateau and central reported to attend WUA meetings more than twice in the last one year, with the corresponding figure being highest for northern plateau at 97 percent. Moreover, batch wise members' participation in WUA meeting indicates highest participation by the member under IV and VI while 80 to 86 percent of the members under batch I, II and III reported to attend the WUA meeting more than twice.

Table 3.39: Scheme/Category-wise Members' Responses on their Meeting Attendance (in %)

Meeting Attendance	Irrigation Scheme/Category							Total
	TW	PDW	GW	CD	RLI	WDS	SW	
Once	4.09	0.00	3.85	0.00	4.41	0.00	2.70	3.48
Twice	12.73	35.71	14.10	0.00	4.41	8.33	3.60	10.72
More Than Twice	83.18	64.29	82.05	100.00	91.18	83.33	92.79	85.51
Never	0.00	0.00	0.00	0.00	0.00	8.33	0.90	0.29

Source: Primary Survey, 2019

Table 3.40: Zone-wise Members' Responses on their Meeting Attendance (in %)

Meeting Attendance	Zone				
	Central	Coastal	Hilly	Northern Plateau	Western
Once	0.00	9.84	0.00	0.00	4.80
Twice	11.11	11.48	25.00	2.27	14.40
More Than Twice	88.89	78.69	75.00	97.73	80.00
Never	0.00	0.00	0.00	0.00	0.80

Source: Primary Survey, 2019

Further, better graded WUAs (A+ and A) seemed to be successful in convening meeting at frequent intervals as almost all the members' under them reported to attend such meeting more than twice in last one year. Overall, it has been observed that WUA meetings were held on regular basis with more frequent participation of member under TW, CD and RLI schemes, schemes belonging to batch IV, VI, III and II, and better-graded schemes.

Table 3.41: Grade-wise Members' Responses on their Meeting Attendance (in %)

Meeting Attendance	Grade Classification				
	A+	A	B	C	D
Once	0.00	2.91	5.62	9.09	0.00
Twice	0.00	6.98	19.10	18.18	9.09
More Than Twice	100.00	90.12	75.28	72.73	90.91
Never	0.00	0.00	0.00	0.00	0.00

Source: Primary Survey, 2019

Table 3.42: Batch-wise Members' Responses on their Meeting Attendance (in %)

Meeting Attendance	Batch Classification					
	I	II	III	IV	V	VI
Once	1.64	4.23	3.95	0.00	0.00	0.00
Twice	18.03	8.99	10.53	0.00	100.00	0.00
More Than Twice	80.33	86.77	85.53	100.00	0.00	100.00
Never	0.00	0.00	0.00	0.00	0.00	0.00

Source: Primary Survey, 2019

Public deliberations on issues affecting local farmers, exchange of ideas among the different stakeholders, etc. legitimize the democratic decision-making process which, in turn, improve accountability and transparency of the entire process. So, we enquired about the mode of participation of members who attended the WUA meetings. Half of the members preferred to simply sit and listen to the proceedings of the meetings. The rest of the members actively participated in discussions. Among the three different categories, meetings under category II schemes experienced highest proportion (58 percent) of active member participation, followed by category I schemes (46 percent) and category III schemes (44 percent).

Table 3.43: Members' Response on Mode of Participation in Meeting (in %)

Raised any issues in meeting	Irrigation Category			Total
	I	II	III	
Yes	46.9	58.0	44.1	49.6
No	53.1	42.0	55.9	50.4

Source: Primary Survey, 2019

**Table 3.44: Members' Response Ethnicity-wise on Mode of Participation in Meeting
(in %)**

	Raised any issues in meeting	Irrigation Category			Total
		I	II	III	
General	Yes	50.47	62.86	37.50	52.67
	No	49.53	37.14	62.50	47.33
ST/SC	Yes	46.91	64.86	42.86	51.52
	No	53.09	35.14	57.14	48.48
OBC	Yes	75.00	20.00	0.00	44.44
	No	25.00	80.00	0.00	55.56
Others	Yes	37.25	47.83	50.00	41.86
	No	62.75	52.17	50.00	58.14

Source: Primary Survey, 2019

In terms of social groups, excepting for category III schemes, we did not find any significant differences between the members belonging to general and SC/ST category who actively participated in WUA meetings. In contrast, the proportions of active participants belonging to the 'other' category were significantly lower for schemes under category II and category III.

Members' mode of participation among the functional WUAs portrays similar picture. Among the different categories of schemes, almost 60 percent of the members reported to actively participated in the meetings under the RLI schemes. Among the zones, 68 percent of the WUA members belonging to northern plateau reported to actively participated in the WUA meeting while 60 percent of the members belonging to coastal and hilly region preferred passive mode of attendance. Moreover, significant proportion of member under scheme V and I are found to be active participant in the WUA meetings. Among the graded WUAs, comparatively higher proportion of members under A+ and D graded WUAs seemed to prefer to simply sit and listen to the proceedings of the meetings.

Table 3.45: Scheme/Category-wise Members' Response on Mode of Participation in Meeting (in %)

Raised any issues in meeting	Irrigation Scheme/Category							
	TW	PDW	GW	CD	RLI	WDS	SW	Total
Yes	49.34	7.14	46.91	50.00	59.42	52.00	56.80	50.27
No	50.66	92.86	53.09	50.00	40.58	48.00	43.20	49.73

Source: Primary Survey, 2019

Table 3.46: Zone-wise Members' Response on Mode of Participation in Meeting (in %)

Raised any issues in meeting	Zones				
	Central	Coastal	Hilly	Northern Plateau	Western
Yes	44.44	40.98	37.50	68.18	47.58
No	55.56	59.02	62.50	31.82	52.42

Source: Primary Survey, 2019

Table 3.47: Batch-wise Members' Response on Mode of Participation in Meeting (in %)

Raised any issues in meeting	Batch Classification					
	I	II	III	IV	V	VI
Yes	62.30	49.21	46.05	38.46	100.00	40.00
No	37.70	50.79	53.95	61.54	0.00	60.00

Source: Primary Survey, 2019

Table 3.48: Grade-wise Members' Response on Mode of Participation in Meeting (in %)

Raised any issues in meeting	Grade Classification				
	A+	A	B	C	D
Yes	38.89	55.81	51.69	50.00	31.82
No	61.11	44.19	48.31	50.00	68.18

Source: Primary Survey, 2019

Table 3.49 shows that discussions in the WUA meetings mostly centered on issues related to new agricultural/horticultural/fisheries techniques and practices. Only 12 percent of the

members reported that some discussions took place on financial matter, for example, on water charges and audit report. Very little discussions were held on other important aspects like crop planning, seed distribution, water distribution, distribution of inputs in horticulture and fisheries, membership and registration of the WUAs and overall functioning of the WUAs. These are essential topics that the WUA members are expected to deliberate and they also need to be trained for sustainable management MI schemes in the future.

Table 3.49: Members' Responses regarding Major Issues Discussed in the Meetings
(in %)

Issues	Irrigation Category			Total
	I	II	III	
Farming technology	43.43	45.57	50.00	44.57
Water charges	0.00	2.53	4.55	1.09
Audit report	11.43	10.13	4.55	10.51
Distribution of water	4.00	7.59	4.55	5.07
Seed distribution	8.00	8.86	9.09	8.33
Crop planning	13.14	2.53	4.55	9.42
Accessories	2.86	0.00	0.00	1.81
Training	7.43	0.00	9.09	5.43
Electricity	0.57	0.00	0.00	0.36
WUAs' operation	1.71	5.06	9.09	3.26
Distribution of Fertilizer	0.00	0.00	4.55	0.36
Fishery	3.43	5.06	0.00	3.62
Distribution of horticulture inputs	0.00	1.27	0.00	0.36
Distribution of fishery inputs	0.00	2.53	0.00	0.72
Operator	0.57	1.27	0.00	0.72
WUA registration	1.14	3.80	0.00	1.81
WUA membership	1.14	3.80	0.00	1.81
Members conflict	1.14	0.00	0.00	0.72

Source: Primary Survey, 2019

When being enquired whether any discussions were held on individual issues, 64 percent of the members responded positively and also their problems were solved. Such discussions were most successful for category II schemes with 73 percent of the respondents reported discussion

on and solution of their problem. When analysed across the social groups, higher proportion of members belonging to general and SC/ST category recorded positive response, with the relevant figure being highest among the SC/ST members. Moreover, 25 percent of the members reported that although discussions took place on their issues, but their problems remained unsolved. 10 percent of the members complained that their issues were not even being discussed in the WUA meetings. Incidence of absence of any discussion or inability to solve problems seemed to be more prevalent in case of schemes under category III.

Table 3.50: Members' Response regarding Discussion on their Issues in Meetings (in %)

	Irrigation Category			Total
	I	II	III	
Discussed and Solved	61.3	73.0	55.9	63.9
Discussed but not solved	28.4	19.0	20.6	25.2
Not discussed	10.3	8.0	23.5	10.9

Source: Primary Survey, 2019

Table 3.51: Members' Response (Ethnicity-wise) regarding Discussion on their Issues in Meetings (in %)

		Irrigation Category			Total
		I	II	III	
General	Discussed and Solved	57.94	80.00	75.00	64.00
	Discussed but not solved	33.64	20.00	25.00	30.00
	Not discussed	8.41	0.00	0.00	6.00
ST/SC	Discussed and Solved	70.37	81.08	64.29	72.73
	discussed but not solved	20.99	16.22	21.43	19.70
	Not discussed	8.64	2.70	14.29	7.58
OBC	Discussed and Solved	75.00	20.00	0.00	44.44
	discussed but not solved	25.00	40.00	0.00	33.33
	Not discussed	0.00	40.00	0.00	22.22
Others	Discussed and Solved	52.94	60.87	33.33	52.33
	discussed but not solved	29.41	17.39	16.67	24.42
	Not discussed	17.65	21.74	50.00	23.26

Source: Primary Survey, 2019

Overall, it seems that, in general, WUA meetings were held on regular basis and the MC members took initiatives to disseminate information regarding the date and time of the meetings. Meeting attendance did not show any significant variations across the four social groups. Comparatively higher attendance in some schemes e.g. TW, RLI could be due to the fact that most of the schemes have small group sizes and centralized implementation approach in terms of centralized pump house and associated distribution infrastructure to distribute water having greater scope of participation and this, in turn, incentivises the members to participate. However, almost half of the members preferred not to raise any issue. This could be either due to the fact that the MC members and farmers who donated land for the scheme dominate the discussion and propose new plan and activities or due to the decisions taken in the WUAs are acceptable to all WUA members. Nevertheless, it is imperative to take necessary steps to ensure greater participation by the farmers and most importantly, the participation needs to be more effective. Sustained campaign program for generating the farmers' interest / awareness about the WUAs and their necessity as well as capacity building of the farmers have the potentiality to strengthen the usefulness of the WUA meetings.

3.5.2 Members' Participation in Crop Development Plan

Preparation of crop development plan and water mapping are two important constituents of water management. Based on the climate, soil condition and other infrastructure facilities (e.g. roads, markets etc.) available in the command areas, it is crucial to facilitate the water users to have a choice of crops, cropping sequence, timing of water supply, period of supply and also frequency of supply so that they can maximize the incomes and returns from economic activities. Therefore, involvement of all the members in crop development plan can be useful for achieving optimum utilization of available water resources, precisely as per the crop needs. This section discusses the participation of member in preparing crop development plan in pre-kharif, kharif and rabi seasons. During the pre-kharif season, almost half of the respondents were unaware of any crop development plan while another 20 percent of the member reported that no crop development plans were prepared. Only about 18 percent of the members confirmed the preparation and documentation of crop development plan.

Table 3.52: Members' Responses regarding their Participation in Crop Development in Kharif Season (in %)

	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Prepared and Documented	32.91	38.38	19.05	33.62
Prepared but not Documented	5.98	19.19	23.81	10.73
Not prepared	22.22	28.28	28.57	24.29
Don't Know	38.89	14.14	28.57	31.36

Source: Primary Survey, 2019

Table 3.53: Members' Responses regarding their Participation in Crop Development in Rabi Season (in %)

	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Prepared and Documented	32.05	37.37	28.57	33.33
Prepared but not Documented	8.12	22.22	19.05	12.71
Not prepared	20.09	27.27	23.81	22.32
Don't Know	39.74	13.13	28.57	31.64

Source: Primary Survey, 2019

Table 3.54: Members' Responses regarding their Participation in Crop Development in Pre-Kharif Season (in %)

	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Prepared and Documented	15.81	24.24	19.05	18.36
Prepared but not Documented	7.26	13.13	19.05	9.60
Not prepared	17.52	26.26	28.57	20.62
Don't Know	59.40	36.36	33.33	51.41

Source: Primary Survey, 2019

Table 3.55: (Scheme/Category-wise) Members' Responses regarding their Participation in Crop Development in Kharif Season (in %)

	TW	PDW	GW	CD	RLI	WDS	SW	Total
Prepared and Documented	34.55	7.14	32.91	41.18	39.71	10.00	36.84	34.04
Prepared but not Documented	6.36	0.00	5.98	29.41	14.71	20.00	17.89	9.42
Not prepared	20.91	42.86	22.22	11.76	30.88	40.00	28.42	24.01
Don't Know	38.18	50.00	38.89	17.65	14.71	30.00	16.84	32.52

Source: Primary Survey, 2019

Table 3.56: (Grade-wise) Members' Responses regarding their Participation in Crop Development in Kharif Season (in %)

	A+	A	B	C	D
Prepared and Documented	22.22	35.47	26.97	63.64	25.00
Prepared but not Documented	33.33	11.05	10.11	9.09	2.27
Not prepared	33.33	23.26	22.47	4.55	40.91
Don't Know	11.11	30.23	40.45	22.73	31.82

Source: Primary Survey, 2019

In contrast, during kharif and rabi seasons, the proportion of members reporting preparation and documentation of crop development plan almost doubled. Analysis of percentage of members reporting preparation and/or documentation of crop plan vis-à-vis non preparation of the same across the functional schemes reveals some inter scheme variations. During the pre-kharif season, almost 40 percent of the members under RLI scheme and 25 percent of the members under the TW schemes reported preparation and/or documentation of crop plan. The corresponding figures during rabi and kharif seasons for CD, RLI and TW hovered between 40 to 70 percent. Moreover, comparatively higher proportion of members under batch III, IV and V reported preparation and/or documentation of crop plan. During Kharif and Rabi seasons, apart from these three batches, almost 42 percent of members under batch II were aware of preparation of crop plan. Further, quite expectedly, comparatively higher proportion of members under better graded WUAs reported preparation and/or documentation of crop plan. On a positive note, comparatively greater proportion of members' (almost 60 percent) awareness about crop plan under WUAs graded as C also attests these WUAs' endeavours in preparing as well as documenting crop plan during the kharif and rabi seasons.

Table 3.57: (Batch-wise) Members' Responses regarding their Participation in Crop Development in Kharif Season (in %)

	I	II	III	IV	V	VI
Prepared and Documented	22.95	31.75	47.37	23.08	100.00	0.00
Prepared but not Documented	4.92	11.64	10.53	15.38	0.00	40.00
Not prepared	34.43	22.22	22.37	30.77	0.00	20.00
Don't Know	37.70	34.39	19.74	30.77	0.00	40.00

Source: Primary Survey, 2019

Table 3.58: (Scheme/Category-wise) Members' Responses regarding their Participation in Crop Development in Rabi Season (in %)

	TW	PDW	GW	CD	RLI	WDS	SW	Total
Prepared and Documented	33.64	7.14	32.05	47.06	36.76	20.00	36.84	33.43
Prepared but not Documented	8.64	0.00	8.12	23.53	19.12	10.00	18.95	11.25
Not prepared	19.09	35.71	20.09	11.76	29.41	30.00	26.32	21.88
Don't Know	38.64	57.14	39.74	17.65	14.71	40.00	17.89	33.43

Source: Primary Survey, 2019

Table 3.59: Grade-wise Members' Responses regarding their Participation in Crop Development in Rabi Season (in %)

	A+	A	B	C	D
Prepared and Documented	22.22	36.05	26.97	54.55	25.00
Prepared but not Documented	33.33	12.79	10.11	18.18	4.55
Not prepared	33.33	19.77	23.60	4.55	36.36
Don't Know	11.11	31.40	39.33	22.73	34.09

Source: Primary Survey, 2019

Table 3.60: Batch-wise Members' Responses regarding their Participation in Crop Development in Rabi Season (in %)

	I	II	III	IV	V	VI
Prepared and Documented	19.67	31.22	47.37	30.77	100.00	20.00
Prepared but not Documented	9.84	13.76	10.53	15.38	0.00	20.00
Not prepared	27.87	21.16	22.37	30.77	0.00	0.00
Don't Know	42.62	33.86	19.74	23.08	0.00	60.00

Source: Primary Survey, 2019

Table 3.61: Scheme/Category-wise Members' Responses regarding their Participation in Crop Development in pre-Kharif Season (in %)

	TW	PDW	GW	CD	RLI	WDS	SW	Total
Prepared and Documented	16.82	0.00	15.81	11.76	27.94	10.00	23.16	17.93
Prepared but not Documented	7.73	0.00	7.26	5.88	13.24	10.00	11.58	8.51
Not prepared	17.73	14.29	17.52	11.76	27.94	40.00	26.32	20.06
Don't Know	57.73	85.71	59.40	70.59	30.88	40.00	38.95	53.50

Source: Primary Survey, 2019

Table 3.62: Grade-wise Members' Responses regarding their Participation in Crop Development in pre-Kharif Season (in %)

	A+	A	B	C	D
Prepared and Documented	16.67	16.28	19.10	31.82	13.64
Prepared but not Documented	38.89	7.56	6.74	18.18	6.82
Not prepared	33.33	17.44	22.47	4.55	36.36
Don't Know	11.11	58.72	51.69	45.45	43.18

Source: Primary Survey, 2019

Table 3.63: Batch-wise Members' Responses regarding their Participation in Crop Development in pre Kharif Season (in %)

	I	II	III	IV	V	VI
Prepared and Documented	13.11	16.93	23.68	15.38	100.00	0.00
Prepared but not Documented	8.20	6.35	15.79	23.08	0.00	20.00
Not prepared	29.51	20.11	17.11	30.77	0.00	0.00
Don't Know	49.18	56.61	43.42	30.77	0.00	80.00

Source: Primary Survey, 2019

3.5.3 Members' Participation in Water Mapping

Water mapping, based on crop development plan, contains details crop specific water requirements of the members in the three seasons. If properly done with the involvement of the local farmers, water mapping can match the demand and supply of water and, thus, can ensure efficient utilization and equitable distribution of water resources under different MI schemes. Members' awareness about preparation and documentation of water map reflects their involvement in as well as transparency of the entire process. Table 49 to Table 51 reveal that half of the members were unaware of any such water mapping in all the three seasons.

Table 3.64: Members' Responses regarding their Participation in Water Mapping in Kharif Season (in %)

	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Mapping done and documented	19.23	22.22	19.05	20.06
Mapping done but not Documented	2.14	1.01	0.00	1.69
Not mapped	28.21	32.32	23.81	29.10
Don't Know	50.43	44.44	57.14	49.15

Source: Primary Survey, 2019

Table 3.65: Members' Responses regarding their Participation in Water Mapping in Rabi Season (in %)

	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Mapping done and documented	20.94	22.22	19.05	21.19
Mapping done but not Documented	2.14	1.01	0.00	1.69
Not mapped	27.35	29.29	33.33	28.25
Don't Know	49.57	47.47	47.62	48.87

Source: Primary Survey, 2019

Table 3.66: Members' Responses regarding their Participation in Water Mapping in Pre-Kharif Season (in %)

	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Mapping done and documented	12.39	15.15	19.05	13.56
Mapping done but not Documented	0.43	4.04	0.00	1.41
Not mapped	30.34	30.30	38.10	30.79
Don't Know	56.84	50.51	42.86	54.24

Source: Primary Survey, 2019

Moreover, 30 percent of the respondents reported that no water mappings were prepared in last three seasons. Only 20 percent of the members reported preparation and/or documentation of water mappings during kharif and rabi seasons. The corresponding figure dropped down to 13 percent in the pre-kharif seasons. Scheme-wise analysis of members' responses regarding the preparation of water mapping reveals that during all the three seasons comparatively greater proportion of members under TW, RLI and CD reported preparation and/or documentation of water mapping, with the corresponding figures being highest for RLI schemes. Moreover, 20 to 30 percent members under batch II and III WUAs reported their participation in water mapping. We have also observed a positive association between the grade of the WUAs and members' participation in the water mapping with relatively higher percentage of members under better graded WUAs reported participation in preparation of water mapping.

Table 3.67: Scheme/Category-wise Members' Responses regarding their Participation in Water Mapping in Kharif Season (in %)

	TW	PDW	GW	CD	RLI	WDS	SW	Total
Prepared and Documented	20.45	0.00	19.23	11.76	27.94	0.00	22.11	20.06
Prepared but not Documented	1.82	7.14	2.14	5.88	0.00	0.00	1.05	1.82
Not prepared	28.64	21.43	28.21	11.76	33.82	40.00	30.53	28.88
Don't Know	49.09	71.43	50.43	70.59	38.24	60.00	46.32	49.24

Source: Primary Survey, 2019

Table 3.68: Grade-wise Members' Responses regarding their Participation in Water Mapping in Kharif Season (in %)

	A+	A	B	C	D
Prepared and Documented	22.22	22.67	17.98	22.73	13.64
Prepared but not Documented	0.00	1.16	3.37	0.00	2.27
Not prepared	55.56	29.07	24.72	22.73	34.09
Don't Know	22.22	47.09	53.93	54.55	50.00

Source: Primary Survey, 2019

Table 3.69: Batch-wise Members' Responses regarding their Participation in Water Mapping in Kharif Season (in %)

	I	II	III	IV	V	VI
Prepared and Documented	14.75	20.11	30.26	0.00	0.00	0.00
Prepared but not Documented	1.64	2.65	0.00	0.00	0.00	0.00
Not prepared	29.51	28.57	27.63	61.54	0.00	20.00
Don't Know	54.10	48.68	42.11	38.46	100.00	80.00

Source: Primary Survey, 2019

Table 3.70: Scheme/Category-wise Members' Responses regarding their Participation in Water Mapping in Rabi Season (in %)

	TW	PDW	GW	CD	RLI	WDS	SW	Total
Prepared and Documented	22.27	0.00	20.94	17.65	26.47	0.00	22.11	21.28
Prepared but not Documented	1.82	7.14	2.14	0.00	1.47	0.00	1.05	1.82
Not prepared	27.73	21.43	27.35	11.76	32.35	60.00	31.58	28.57
Don't Know	48.18	71.43	49.57	70.59	39.71	40.00	45.26	48.33

Source: Primary Survey, 2019

Table 3.71: Grade-wise Members' Responses regarding their Participation in Water mapping in Rabi Season (in %)

	A+	A	B	C	D
Prepared and Documented	22.22	25.58	14.61	31.82	13.64
Prepared but not Documented	0.00	0.58	4.49	0.00	2.27
Not prepared	50.00	27.91	25.84	22.73	31.82
Don't Know	27.78	45.93	55.06	45.45	52.27

Source: Primary Survey, 2019

Table 3.72: Batch-wise Members' Responses regarding their Participation in Water Mapping in Rabi Season (in %)

	I	II	III	IV	V	VI
Prepared and Documented	19.67	20.63	30.26	0.00	0.00	0.00
Prepared but not Documented	0.00	2.12	2.63	0.00	0.00	0.00
Not prepared	29.51	26.46	27.63	61.54	100.00	20.00
Don't Know	50.82	50.79	39.47	38.46	0.00	80.00

Source: Primary Survey, 2019

Table 3.73: Scheme/Category-wise Members' Responses regarding their Participation in Water Mapping in pre-Kharif Season (in %)

	TW	PDW	GW	CD	RLI	WDS	SW	Total
Prepared and Documented	13.18	0.00	12.39	17.65	16.18	0.00	14.74	13.07
Prepared but not Documented	0.45	0.00	0.43	0.00	5.88	0.00	4.21	1.52
Not prepared	31.36	14.29	30.34	5.88	36.76	60.00	33.68	31.31
Don't Know	55.00	85.71	56.84	76.47	41.18	40.00	47.37	54.10

Source: Primary Survey, 2019

Table 3.74: Grade-wise Members' Responses regarding their Participation in Water Mapping in pre-Kharif Season (in %)

	A+	A	B	C	D
Prepared and Documented	22.22	13.37	11.24	18.18	13.64
Prepared but not Documented	0.00	0.00	3.37	9.09	0.00
Not prepared	44.44	31.40	30.34	22.73	34.09
Don't Know	33.33	55.23	55.06	50.00	52.27

Source: Primary Survey, 2019

Table 3.75: Batch-wise Members' Responses regarding their Participation in Water Mapping in pre Kharif Season (in %)

	I	II	III	IV	V	VI
Prepared and Documented	9.84	11.64	25.00	0.00	0.00	0.00
Prepared but not Documented	0.00	2.65	0.00	0.00	0.00	0.00
Not prepared	42.62	27.51	27.63	61.54	100.00	20.00
Don't Know	47.54	58.20	47.37	38.46	0.00	80.00

Source: Primary Survey, 2019

Overall, the awareness about the preparation and/or documentation of crop plan as well as the water mapping exercises of the members can, at best, be described as low and few members were involved in the same. At the same time, relatively higher proportion of members' participation in water planning under TW and RLI schemes could be due to their centralized mode of operation of pump house and associated distribution of water that reflects the need for water distribution plans. Nonetheless, general limited participation in water mapping could jeopardise the WBADMI project's goal of equitable distribution of water and, also, could weaken the WUAs, thereby impairing the long-term sustainability of the project itself. So, policy makers needs to sensitize members regarding the importance of crop plan and water mapping and encourage them to participate in preparation of such plans.

3.6 Members' Perception on Governance of WUAs

The WBADMI project, through the formation of the WUAs, facilitates the involvement of local community in management of water resources. The effectiveness of WUA as an institution crucially depends on the extent to which the decision-making processes are collective in nature and thereby on the underlying accountability and transparency mechanisms. This section attempts to analyse the members' perception regarding the governance processes of the sampled WUAs. Members' awareness regarding the selection of managing committee can be considered as one of the important indicators for transparent and democratic functioning of the WUA. About 62 percent of the sampled respondents reported that the MC members are selected through either the AGM involving all members or with AGM involving at least half of the members. 35 percent of the members are found to be unaware about the selection process. Only

three percent of the members seemed to be unhappy as they reported non-occurrence of any AGM or only the land donors becoming the MC member. We did not observe any differences in the members' perception on MC selection among the three different irrigation categories. When evaluated across different ethnic groups, some differences become evident. Higher proportion of members belonging to the SC/ST group and Muslim community as compared to the general category members reported selection of MC members through the AGM.

Table 3.76: Members' Perception regarding Managing Committee Selection (in %)

	Irrigation Category			Total
	I	II	III	
Selection done through all members, AGM involving all members/ AGM involving 50% of the member	60.39	63.79	66.67	61.92
No general meetings held	1.18	0.00	0.00	0.74
Only land donors are member of managing committee	2.75	2.59	0.00	2.46
DK	35.69	33.62	33.33	34.89

Source: Primary Survey, 2019

Table 3.77: Members' Perception Ethnicity-wise regarding Managing Committee Selection (in %)

		Irrigation Category			Total
		I	II	III	
General	Selection done through all members, AGM involving all members/ AGM involving 50% of the member	57.39	61.11	80.00	59.63
	No general meetings held	2.61	0.00	0.00	1.86
	Only land donors are member of managing committee	5.22	2.78	0.00	4.35
	Do not know	34.78	36.11	20.00	34.16
ST/SC	Selection done through all members, AGM involving all members/ AGM involving 50% of the member	65.48	67.50	85.71	68.12
	No general meetings held	0.00	0.00	0.00	0.00
	Do not know	33.33	32.50	14.29	31.16
OBC	Selection done through all members, AGM involving all members/ AGM involving 50% of the member	25.00	40.00	0.00	33.33
	No general meetings held	0.00	0.00	0.00	0.00
	Only land donors are member of managing committee	0.00	0.00	0.00	0.00
	Do not know	75.00	60.00	0.00	66.67
Others	Selection done through all members, AGM involving all members/ AGM involving 50% of the member	61.54	65.71	33.33	59.60
	No general meetings held	0.00	0.00	0.00	0.00
	Only land donors are member of managing committee	0.00	5.71	0.00	2.02
	Do not know	38.46	28.57	66.67	38.38

Source: Primary Survey, 2019

Awareness regarding the decision-making processes in the WUA is found to be moderate among the sampled members. Only about 60 percent of the members reported that the MC

takes decision through meeting and discussion with majority members. About 34 percent of the members were ignorant about the decision-making processes of the WUAs. Moreover, comparatively higher proportion of members belonging to the SC/ST group thought that the MC takes decision based on the AGM.

Table 3.78: Members' Perception regarding Decision Making Processes in WUA (in %)

Knowledge of decision making processes in WUA	Irrigation Category			Total
	I	II	III	
MC makes decision on their own	7.06	3.45	2.78	5.65
MC through general meeting (involving more than 50 % members)	58.43	60.34	69.44	59.95
Decision taken by few members who controls WUA	1.15	2.44	0.00	1.45
Do not know	34.12	35.34	27.78	33.91

Source: Primary Survey, 2019

Table 3.79: Members' Perception (Ethnicity-wise) regarding Decision Making Processes in WUA (in %)

	Decision making processes in WUA	Irrigation Category			Total
		I	II	III	
General	MC makes decision on their own	6.09	5.56	10.00	6.21
	MC through general meeting (involving more than 50 % members)	58.26	58.33	70.00	59.01
	Decision taken by few members who controls WUA	0.00	0.00	0.00	0.00
	Do not know	35.65	36.11	20.00	34.78
ST/SC	MC makes decision on their own	8.33	0.00	0.00	5.07
	MC through general meeting (involving more than 50 % members)	63.10	62.50	92.86	65.94
	Decision taken by few members who controls WUA	0.00	0.00	0.00	0.00
	Do not know	28.57	37.50	7.14	28.99
OBC	MC makes decision on their own	0.00	0.00	0.00	0.00
	MC through general meeting (involving more than 50 % members)	25.00	40.00	0.00	33.33
	Decision taken by few members who controls WUA	0.00	0.00	0.00	0.00
	Do not know	75.00	60.00	0.00	66.67
Others	MC makes decision on their own	7.69	5.71	0.00	6.06
	MC through general meeting (involving more than 50 % members)	53.85	62.86	41.67	55.56
	Decision taken by few members who controls WUA	1.92	2.86	0.00	2.02
	Do not know	36.54	28.57	58.33	36.36

Source: Primary Survey, 2019

Scheme-wise analysis of members' responses regarding decision making processes conform to the above mentioned broad trend, *albeit* with marginal inter scheme variations. Almost two third of the members under the CD scheme reported that the MC takes decision through meeting and discussion with majority members while the corresponding figures were around

60 percent for TW, RLI and WDS schemes. Among the zones, almost 40 percent of the WUA members under coastal and hilly region were unaware about the decision-making processes. In contrast, almost three fourths of the WUA members under northern plateau and central zones reported their awareness regarding decisions based on MC meetings. Importantly, it has been observed that the scope for participatory decision making is higher in better graded WUAs. Almost 78 percent of the members under A+ grade WUA reported that decisions were made in consultation with the majority members in the meeting.

Table 3.80: Scheme/Category-wise Members Perception regarding Decision Making Processes in WUA (in %)

Knowledge of decision making processes in WUA	Irrigation Scheme/Category							
	TW	PDW	GW	CD	RLI	WDS	SW	Total
MC makes decision on their own	7.47	0.00	7.06	8.33	2.35	3.70	3.50	5.78
MC through general meeting (involving more than 50 % members)	58.92	50.00	58.43	66.67	60.00	59.26	60.14	59.05
Decision taken by few members who controls WUA	0.41	0.00	0.39	0.00	1.18	0.00	0.70	0.50
Do not know	33.20	50.00	34.12	25.00	36.47	37.04	35.66	34.67

Source: Primary Survey, 2019

Table 3.81: Zone-wise Members' Perception regarding Decision Making Processes in WUA (in %)

Knowledge of decision-making processes in WUA	Zones				
	Central	Coastal	Hilly	Northern Plateau	Western
MC makes decision on their own	1.39	3.28	0.00	6.82	10.40
MC through general meeting (involving more than 50 % members)	70.83	54.10	62.50	75.00	52.00
Decision taken by few members who controls WUA	0.00	1.64	0.00	0.00	0.80
Do not know	27.78	40.98	37.50	18.18	36.80

Source: Primary Survey, 2019

Among the different batches, the decision-making processes were found to be more participatory in the WUAs under batch IV, V and VI. In contrast, about 30 to 40 percent of the members under batch I and II WUAs reported either their ignorance about the process or the process being dominated by the MC members. This could be due to the fact that regular re-election of the previous MC members and their subsequent domination in the entire decision-making processes constricted the space of participatory practices for the WUAs of older batches.

Table 3.82: Grade-wise Members' Perception regarding Decision Making Processes in WUA (in %)

Knowledge of decision-making processes in WUA	Grade Classification				
	A+	A	B	C	D
MC makes decision on their own	0.00	2.33	11.24	0.00	15.91
MC through general meeting (involving more than 50 % members)	77.78	65.70	62.92	63.64	40.91
Decision taken by few members who controls WUA	0.00	0.00	2.25	0.00	0.00
Do not know	22.22	31.98	23.60	36.36	43.18

Source: Primary Survey, 2019

Table 3.83: Batch-wise Members' Perception regarding Decision Making Processes in WUA (in %)

Knowledge of decision-making processes in WUA	Batch Classification					
	I	II	III	IV	V	VI
MC makes decision on their own	8.20	6.35	5.26	0.00	0.00	0.00
MC through general meeting (involving more than 50 % members)	52.46	60.32	68.42	92.31	100.00	80.00
Decision taken by few members who controls WUA	1.64	0.00	1.32	0.00	0.00	0.00
Do not know	37.70	33.33	25.00	7.69	0.00	20.00

Source: Primary Survey, 2019

The mechanism of conflict management assumes enormous significance in ensuring trust among the members and thereby strengthening the functioning of the WUA. Almost one third of the sampled members reported absence of any conflict, with the corresponding figure being highest for category I schemes. Importantly, quite a significant proportion of members (44 %) expressed their ignorance about any sort of conflict in managing water resources.

Table 3.84: Members' Perception regarding Solving Conflict Issues in WUA (in %)

Knowledge of solving conflict issues in WUA	Irrigation Category			Total
	I	II	III	
Conflict resolved through MC/Sub-committees (SC) level meetings	12.55	17.24	22.22	14.74
Conflict resolved by members without MC/SC intervention	0.39	4.31	2.78	1.72
Conflict resolved through general meeting	3.14	11.21	11.11	6.14
Conflict remains unresolved	0.78	0.00	0.00	0.49
No Conflict	38.43	26.72	16.67	33.17
Do not know	44.71	40.52	47.22	43.73

Source: Primary Survey, 2019

In case of conflicts among the WUA members, MC or different subcommittees of the WUA plays some role in solving the conflicts. Around 7 percent of the members reported that conflicts are solved through discussion in the general meeting of the WUAs. It is also observed that ethnicity did not play an important role in terms of members' perception of conflict management processes. The lower reporting of conflicts could be due to equitable supply of water and, also, because members' interest in keeping status quo in WUA activities.

Table 3.85: Members' Perception Ethnicity-wise regarding Solving Conflict Issues in WUA (in %)

	Conflict Solving Processes in WUA	Irrigation Category			Total
		I	II	III	
General	Conflict resolved through MC/Sub-committees (SC) level meetings	10.43	19.44	50.00	14.91
	Conflict resolved by members without MC/SC intervention	0.87	0.00	10.00	1.24
	Conflict resolved through general meeting	4.35	2.78	0.00	3.73
	Conflict remains unresolved	0.87	0.00	0.00	0.62
	No Conflict	37.39	30.56	10.00	34.16
	Do not know	46.09	47.22	30.00	45.34
ST/SC	Conflict resolved through MC/Sub-committees (SC) level meetings	10.71	17.50	21.43	13.77
	Conflict resolved by members without MC/SC intervention	0.00	7.50	0.00	2.17
	Conflict resolved through general meeting	1.19	10.00	28.57	6.52
	Conflict remains unresolved	0.00	0.00	0.00	0.00
	No Conflict	40.48	30.00	35.71	36.96
	Do not know	47.62	35.00	14.29	40.58
OBC	Conflict resolved through MC/Sub-committees (SC) level meetings	0.00	20.00	0.00	11.11
	Conflict resolved by members without MC/SC intervention	0.00	0.00	0.00	0.00
	Conflict resolved through general meeting	0.00	40.00	0.00	22.22
	Conflict remains unresolved	0.00	0.00	0.00	0.00
	No Conflict	0.00	0.00	0.00	0.00
	Do not know	100.00	40.00	0.00	66.67
Others	Conflict resolved through MC/Sub-committees (SC) level meetings	21.15	14.29	0.00	16.16
	Conflict resolved by members without MC/SC intervention	0.00	5.71	0.00	2.02
	Conflict resolved through general meeting	3.85	17.14	0.00	8.08
	Conflict remains unresolved	1.92	0.00	0.00	1.01
	No Conflict	40.38	22.86	0.00	29.29
	Do not know	32.69	40.00	100.00	43.43

Source: Primary Survey, 2019

Nevertheless, any case of conflict requires careful redressal mechanism preferably within the association and this can be done by building the capacity of the WUA members.

For understanding how far the WUAs' functioning is transparent, we have analysed members' perception regarding disclosure and circulation of physical and financial information including the audited report. Importantly, quite a significant proportion of members reported their ignorance about any disclosure and circulation of physical and financial information.

Table 3.86: Members' Perception regarding Transparency of WUA (in %)

Transparency of WUA	Irrigation Category			Total
	I	II	III	
Proactive disclosure in place	12.94	16.80	22.22	15.23
Non-members have on-demand access to physical and financial information	2.75	1.60	5.56	2.70
MC meeting minutes containing physical and financial matters circulated amongst members	3.92	4.00	2.78	3.93
Most MC members aware of the last meetings discussion on physical and financial matters	3.14	9.60	16.67	4.18
Latest audit report shared with Registrars of Societies	9.80	7.20	0.00	8.35
Latest audit report findings shared with all WUA members in AGM	5.49	12.00	13.89	8.35
DK	61.96	48.80	38.89	57.25

Source: Primary Survey, 2019

Only about 16 percent of the respondents reported that the latest audited report findings are shared with the registrar of the societies and all WUA members in the AGM. According to 4 percent of the surveyed members, only the MC members are aware of physical and financial information related to the irrigation schemes. On the other hand, 15 percent of the respondents reported the proactive disclosure of all such information. In terms of social groups, slightly higher percentage of general category members as against the SC/ST members are found to be aware of the necessary details.

Table 3.87: Members' Perception Ethnicity-wise regarding Transparency of WUA (in %)

	Knowledge of WUA transparency	Irrigation Category			
		I	II	III	Total
General	Proactive disclosure in place	9.57	19.44	20.00	12.42
	Non-members have on-demand access to physical and financial information	2.61	0.00	20.00	3.11
	MC meeting minutes containing physical and financial matters circulated amongst members	4.35	2.78	0.00	3.73
	Most MC members aware of the last meetings discussion on physical and financial matters	2.61	0.00	30.00	3.73
	Latest audit report shared with Registrars of Societies	11.30	2.78	0.00	8.70
	Latest audit report findings shared with all WUA members in AGM	6.96	19.44	0.00	9.32
	Do not know	62.61	55.56	30.00	59.01
ST/SC	Proactive disclosure in place	17.86	12.50	28.57	17.39
	Non-members have on-demand access to physical and financial information	1.19	2.50	0.00	1.45
	MC meeting minutes containing physical and financial matters circulated amongst members	4.76	7.50	7.14	5.80
	Most MC members aware of the last meetings discussion on physical and financial matters	2.38	7.50	21.43	5.80
	Latest audit report shared with Registrars of Societies	10.71	5.00	0.00	7.97
	Latest audit report findings shared with all WUA members in AGM	5.95	7.50	28.57	8.70
	Do not know	57.14	57.50	14.29	52.90
OBC	Proactive disclosure in place	0.00	40.00	0.00	22.22
	Non-members have on-demand access to physical and financial information	0.00	20.00	0.00	11.11
	MC meeting minutes containing physical and financial matters circulated amongst members	0.00	0.00	0.00	0.00
	Most MC members aware of the last meetings discussion on physical and financial matters	0.00	0.00	0.00	0.00
	Latest audit report shared with Registrars of Societies	0.00	0.00	0.00	0.00
	Latest audit report findings shared with all WUA members in AGM	0.00	0.00	0.00	0.00
	Do not know	100.00	40.00	0.00	66.67
Others	Proactive disclosure in place	13.46	20.00	16.67	16.16
	Non-members have on-demand access to physical and financial information	5.77	0.00	0.00	3.03
	MC meeting minutes containing physical and financial matters circulated amongst members	1.92	2.86	0.00	2.02
	Most MC members aware of the last meetings discussion on physical and financial matters	5.77	0.00	0.00	3.03
	Latest audit report shared with Registrars of Societies	5.77	17.14	0.00	9.09
	Latest audit report findings shared with all WUA members in AGM	1.92	14.29	8.33	7.07
	Do not know	65.38	45.71	75.00	59.60

Source: Primary Survey, 2019

Scheme-wise analysis of members' perception regarding transparency indicates the presence of inter scheme differences, albeit mixed in nature.

Table 3.88: Scheme/Category-wise Members' Perception regarding Transparency of WUA (in %)

Transparency of WUA	Irrigation Scheme/Category							
	TW	PDW	GW	CD	RLI	WDS	SW	Total
Proactive disclosure in place	12.86	14.29	12.94	29.17	16.47	18.52	18.18	14.82
Non-members have on-demand access to physical and financial information	2.90	0.00	2.75	4.17	1.18	7.41	2.80	2.76
MC meeting minutes containing physical and financial matters circulated amongst members	4.15	0.00	3.92	4.17	4.71	0.00	3.50	3.77
Most MC members aware of the last meetings discussion on physical and financial matters	3.32	0.00	3.14	0.00	2.35	7.41	3.50	3.27
Latest audit report shared with Registrars of Societies	9.96	7.14	9.80	8.33	8.24	0.00	6.29	8.54
Latest audit report findings shared with all WUA members in AGM	5.81	0.00	5.49	8.33	12.94	14.81	13.29	8.29
DK	61.00	78.57	61.96	45.83	54.12	51.85	52.45	58.54

Source: Primary Survey, 2019

Almost half of the members under CD, RLI and WDS expressed their ignorance about various aspects of physical and financial transparency while the corresponding figures ranged from 61 percent for TW to 78 percent for PDW. WDS expressed their ignorance about various aspects of physical and financial transparency while the corresponding figures ranged from 61 percent for TW to 78 percent for PDW. Almost one third of the respondents under CD scheme reported proactive disclosure of physical and financial information. In terms of sharing the audit report with the Registrar of Societies or with the WUA members in meeting, relatively higher proportion of members (20 percent) under RLI scheme reported transparency. Zone wise variations in members' perception regarding transparency have also been observed. Almost 60 to 75 percent of the members belonging to the WUAs under coastal, hilly and western zones

were unaware about any physical and financial information related to the WUAs. In contrast, comparatively higher proportion of members of the WUAs of northern plateau and central zones felt positively about financial transparency of WUAs. Almost one third of the members of the WUAs of northern plateau zone reported appropriate sharing of the WUA audit reports while 25 percent of the members of WUAs of the central zone claimed to have access to relevant physical and financial information of the WUAs.

Table 3.89: Zone-wise Members' Perception regarding Transparency of WUA (in %)

Transparency of WUA	Zones				
	Central	Coastal	Hilly	Northern Plateau	Western
Proactive disclosure in place	20.83	9.84	25.00	12.50	17.60
Non-members have on-demand access to physical and financial information	4.17	4.92	0.00	0.00	3.20
MC meeting minutes containing physical and financial matters circulated amongst members	9.72	3.28	0.00	2.27	4.00
Most MC members aware of the last meetings discussion on physical and financial matters	9.72	6.56	0.00	0.00	4.00
Latest audit report shared with Registrars of Societies	1.39	6.56	0.00	28.41	1.60
Latest audit report findings shared with all WUA members in AGM	9.72	8.20	0.00	1.14	12.80
DK	44.44	60.66	75.00	55.68	56.80

Source: Primary Survey, 2019

Table 3.90: Grade-wise Members' Perception regarding Transparency of WUA (in %)

Transparency of WUA	Grade Classification				
	A+	A	B	C	D
Proactive disclosure in place	22.22	16.28	15.73	9.09	13.64
Non-members have on-demand access to physical and financial information	0.00	4.07	1.12	9.09	0.00
MC meeting minutes containing physical and financial matters circulated amongst members	5.56	4.07	4.49	0.00	9.09
Most MC members aware of the last meetings discussion on physical and financial matters	27.78	4.07	2.25	0.00	4.55
Latest audit report shared with Registrars of Societies	5.56	8.14	16.85	0.00	2.27
Latest audit report findings shared with all WUA members in AGM	5.56	12.21	3.37	0.00	6.82
DK	33.33	51.16	56.18	81.82	63.64

Source: Primary Survey, 2019

Quite expectedly, the better graded WUAs emerged as more transparent as almost 40 to 60 percent of the members under A+ and A graded WUA expressed their awareness about

disclosure and circulation of physical and financial information including the audited report. Further, the practice of financial and physical transparency seems to be more prevalent in WUAs under batch IV, V and VI. In contrast, 55 to 62 percent of the members belonging to the WUAs under batch I and II reported their ignorance about any disclosure and circulation of physical and financial information.

Table 3.91: Batch-wise Members' Perception regarding Transparency of WUA (in %)

Transparency of WUA	Batch Classification					
	I	II	III	IV	V	VI
Proactive disclosure in place	4.92	16.93	19.74	23.08	50.00	20.00
Non-members have on-demand access to physical and financial information	3.28	1.59	3.95	0.00	50.00	20.00
MC meeting minutes containing physical and financial matters circulated amongst members	3.28	5.29	2.63	15.38	0.00	0.00
Most MC members aware of the last meetings discussion on physical and financial matters	1.64	5.29	6.58	0.00	0.00	0.00
Latest audit report shared with Registrars of Societies	11.48	7.94	7.89	23.08	0.00	0.00
Latest audit report findings shared with all WUA members in AGM	13.11	7.94	3.95	7.69	0.00	20.00
DK	62.30	55.03	55.26	30.77	0.00	40.00

Source: Primary Survey, 2019

Timely collection of water charges on a regular basis is extremely crucial for generating sufficient funds required for maintenance and operations of irrigation facilities under WBADMI project. This creates a sense of ownership of the resources among the members and ensures long term sustainability of the WUAs. Members' responses regarding the default in payment of water charges reveal encouraging picture. An overwhelming majority of 94 percent of the sampled members reported that they never defaulted on payment of water charges. The

variations in responses regarding default have been marginal across three different categories of irrigation system and four ethnic groups, implying that scheme type and ethnicity did not influence the payment behaviour of the WUA members.

Table 3.92: Members' Response regarding Default in Payment of Water Charges (in %)

Default in payment of water charges	Irrigation Category			Total
	I	II	III	
Yes	1.18	4.31	0.00	1.97
Yes, more than once	1.57	2.59	5.56	2.21
Several times	1.57	2.59	0.00	1.72
Never	95.69	90.52	94.44	94.10

Source: Primary Survey, 2019

Table 3.93: Members' Response (Ethnicity-wise) regarding Default in Payment of Water Charges (in %)

	Default in payment of water charges	Irrigation Category			Total
		I	II	III	
General	Yes	2.61	0.00	0.00	1.86
	Yes, more than once	2.61	2.78	10.00	3.11
	Several times	0.00	5.56	0.00	1.24
	Never	94.78	91.67	90.00	93.79
ST/SC	Yes	0.00	7.50	0.00	2.17
	Yes, more than once	1.19	2.50	0.00	1.45
	Several times	4.76	2.50	0.00	3.62
	Never	94.05	87.50	100.00	92.75
OBC	Yes	0.00	0.00	0.00	0.00
	Yes, more than once	0.00	0.00	0.00	0.00
	Several times	0.00	0.00	0.00	0.00
	Never	100.00	100.00	0.00	100.00
Others	Yes	0.00	5.71	0.00	2.02
	Yes, more than once	0.00	2.86	8.33	2.02
	Several times	0.00	0.00	0.00	0.00
	Never	100.00	91.43	91.67	95.96

Moreover, regarding the action taken against the defaulters, half the defaulted members did not face any penal action while about 37 percent of the defaulted members were given the opportunity to clear the dues in instalments. The problem of absence of any penal action is more pronounced for category III schemes.

The worrisome fact is that little more than one third of the members were unaware about the selection of process of the MC members and decision-making processes of the WUAs. Further, about three-fifths of the members revealed their ignorance about the physical and financial information of the irrigation schemes. One might explain this in terms of such peoples' adverse perception about fruitfulness of acquiring such information as they perceived that all financial, operation and maintenance activities were carried out by few people. In fact, there are evidences that the MC members and farmers with land near the scheme are more involved in the workings of WUA. Some members are treated no better than ordinary water buyers purchasing water from the scheme. Moreover, a significant majority of the sampled members either did not report any conflict in management of water resources or expressed their ignorance about any such conflict. This could be due to the fact that either the members are satisfied with the working of the members and the distribution of water is equitable or members prefer to adhere to the customary norms and are reluctant to enter into any kind of social conflict.

In practice, under the WDADMI project, the WUA members have options to discuss their problems, to assess the progress and prospects of ongoing irrigational projects. The MC members are also expected to appraise the WUA members about different initiatives for improving agricultural productivity as well as diversification of economic activities. The process, if properly executed, would surely increase the legitimacy of the WUA as a genuine decision-making platform at local level and also create a sense of ownership of water resources and the irrigation system among the members. It is obvious that when people know the details of WUA activities and decision making processes, they can hold the MC members accountable. This, in turn, would induce the members to be involved in WUA activities with greater vigour. Participatory experiences of the better graded WUAs attests such optimism as higher proportion of members of these WUAs, being aware about the decision making processes as well as physical and financial information of the schemes, participated more frequently in the WUAs meetings. Indeed, transparency is key to systematic accountability. An important

challenge, then, is to devise as well as institute mechanisms for wider dissemination of WUA activities with a special focus to encourage disinterested members to involve in such activities and, thereby, ensuring accountability of WUA governance structures to their members. Support organizations should arrange awareness creation campaigns to acquaint all the water users with the functioning of a WUA and the rights and responsibilities of members and WUA committees. Due importance should also be given to build capacity of WUA members for facilitating their effective involvement in WUA activities.

3.7 Members' Perception of and Participation in Capacity Building and Training Programs

One of the crucial aims of the WUA is to improve the water management system by promoting self-management. Support teams facilitate the initial formation of the WUA and hand over the responsibility of irrigation management to the members. Local members may not be familiar with the nuances of participatory provisions, operation and maintenance and financial management which are required for effective functioning of the irrigation system. So, it is imperative to build capacity of the WUA members by providing them training on role and responsibilities as members; operation and maintenance of irrigation system; financial management of the WUA; redressal of water conflicts; efficient use of irrigation water and also exposure visits. The WBADMI project also encourages adoption of improved production technologies and water management practices, augmentation of community-level productive capacities and diversification of economic activities focusing on horticulture and fisheries. In particular, improvement in farmers' incomes in the project areas is to be achieved by increasing production of agriculture, horticulture, and fisheries. So, this section analyses members' responses regarding the receipt of (a) skill training for starting or developing new or old economic activities, (b) training on management and policy making, (c) training on agriculture/horticulture and (d) training on fisheries and related activities.

Table 3.94: Members' Responses regarding Receipt of Training/Support (in %)

	Yes	No
Skill training*	14.08	87.66
Management and Policy Making	2.10	97.94
Agri/horticulture	13.41	88.17
Fisheries	8.36	92.29

Note: *for starting/developing new/old economic activities

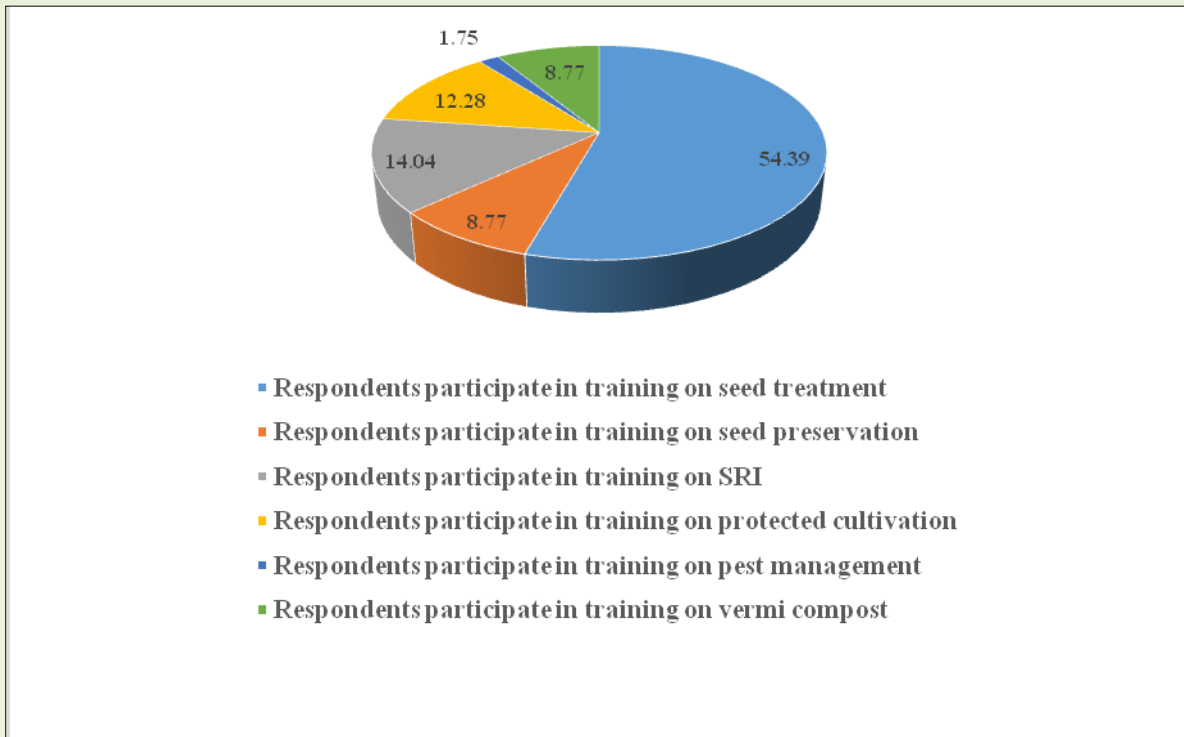
Source: Primary Survey, 2019

Almost 15 percent of the surveyed members reported receipt of skill training for starting or developing new or old activities. Regarding the type of support, WUA intervention seemed to be quite useful for the members in addressing the technical and managerial problems they faced and also such training provided them support in areas of planning and operation.

Following the demonstration effect of such training programs, it is expected that other members will be motivated to take up similar entrepreneurial activities in near future. Significant majority of the members, who received the skill training, reported that their entrepreneurial activities are productive. This further underscores the importance as well as potential of the WUAs in imparting training and improving the income earning opportunities of the farmers at the local level. Members' participation in management and policy making training seemed to be quite low with an overwhelming majority of surveyed members reported that they did not attend any management and policy making training. Members who attended any training programs reported that capacity building is concentrated more on collective irrigation management.

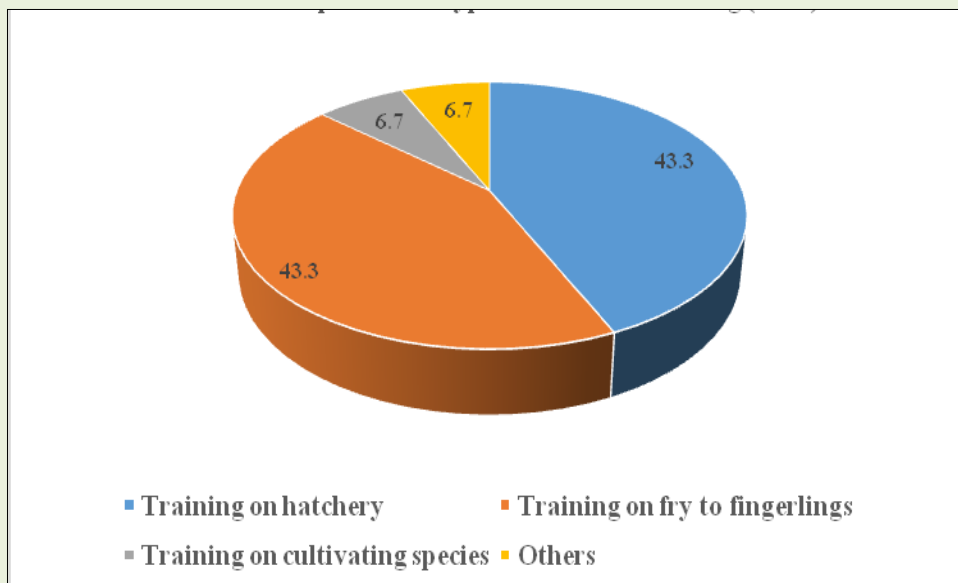
Only about 14 percent of the sampled respondents reported to attend any training on issues related to agriculture and horticulture. Among them, little more than half of the members who reported that they received training on seed treatment. About 16 percent of the members responded receiving training on aspects of seed formation and vermicompost. Moreover, 14 percent members reported to receive training on SRI while training on protected cultivation emerged as the other relatively significant aspect in which 12 percent of the sampled respondents received training.

Figure 3.1: Member’s Responses on Type of Agriculture and Horticulture (in %)



Surveyed members’ attendance in training on issues related to fisheries turned out to be low as only about 9 percent of them responded attending any such training. Majority of the WUA members responded receiving training on issues related to hatchery and fingerlings.

Figure 3.2: Member’s Responses on Type of Fisheries Training (in %)



For assessing the realization of program objectives of WBADMI, we have analyzed members' responses related to adoption of new technologies and practice following the introduction of training and support services. Only about 12 percent and 3 percent of the surveyed members reported adopting new technologies and practices in agriculture/horticulture and fisheries respectively.

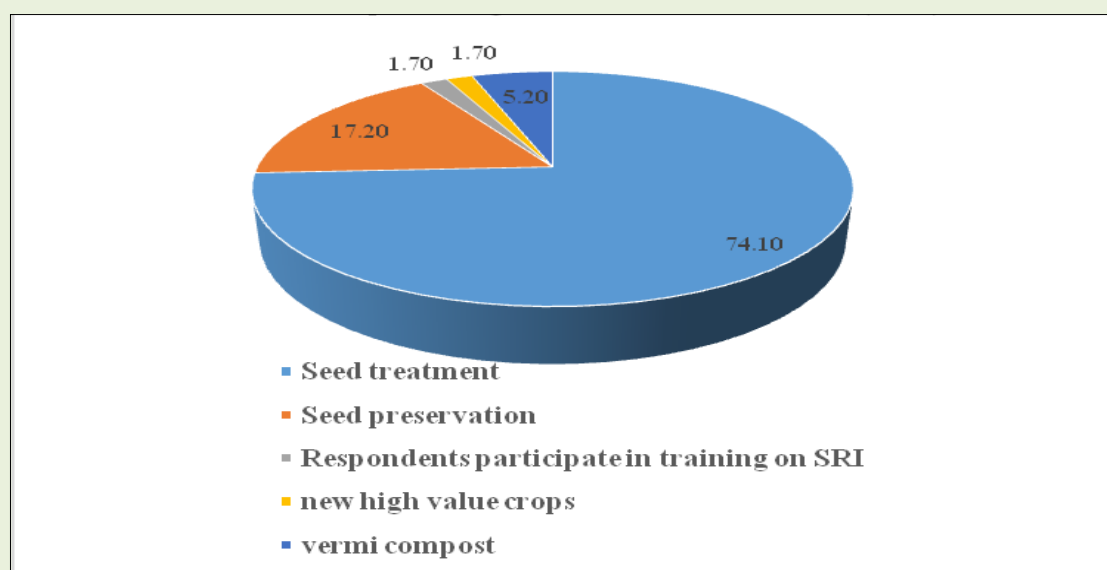
Table 3.95: Members' Responses regarding Adoption of New Technologies and Practices (in %)

	Yes	No
Agri/horticulture	11.57	88.43
Fisheries	2.31	97.69

Source: Primary Survey, 2019

Members' responses regarding the type of technologies and practices adopted have exhibited variations. 74 percent of the members adopted new technology of seed treatment while 17 percent of the members adopted new technologies for seed preservation. Since a large part of the project's command area is under paddy, training on system of rice intensification (SRI) assumes special significance. But only 2 percent of the respondents adopting new technologies actually participated in training on SRI. On other crucial aspects like use of farm machine, protected cultivation, new high value crops, pest management and organic farming, the adoption is significantly low.

Figure 3.3: Member's Responses regarding the Type of Technologies and Practices Adopted in Agriculture and Horticulture (in %)



Acknowledging the potential of the demonstration effect of any training program and support services provided by the WUAs, we have analysed category wise, batch wise and grade wise distribution of WUAs involved in such programs. As per the members' responses, half of the sampled WUAs arranged training and support services. Among them, 36 percent are TW scheme, 26 percent are RLI scheme, 20 percent are WDS scheme, 10 percent are CD scheme and 6 percent are PDW scheme. In terms of batch, 54 percent are of batch II. 46 percent of the WUAs offering training are graded A. Moreover, the members under all the WUAs giving training did not adopt new technologies and practices. The incidence of adoption among the members is higher for CD, RLI and WDS schemes. In terms of batch, higher incidence of adoption is observed for batch II and IV. Also, it seems that higher proportions of better graded WUAs are comparatively more successful in motivating members to adopt new technologies and practices.

In essence, the above analysis entails two implication. First, the institutional support in terms of providing training and capacity building fail to cover the majority of the WUA members and is addressed to select few members. This lack of capacity building program is a cause of serious concern. The need of the hour is to organize such programs on a regular basis; discuss and deliberate on the experiences of the better performing WUAs. Emphasis should be given to acquaint the farmers with latest practices in the field of horticulture and fisheries for optimum utilization of all available resources, thereby maximizing profit and minimizing risk. Second, low adoption rate of new technologies and packages by members is another matter of serious policy concern.

Table 3.96: Scheme/Category-wise Distribution of WUAs (no.)

	Skill Training/Agriculture/Horticulture	Adoption of new technologies and practices
TW	11	5
PDW	2	1
GW	13	6
CD	3	3
RLI	8	5
WDS	6	4
SW	17	12
Total	30	18

Source: Primary Survey, 2019

Table 3.97: Batch-wise Distribution of WUAs (no.)

	Skill Training/Agriculture/Horticulture	Adoption of new technologies and practices
I	6	1
II	16	12
III	7	4
IV	1	1
V		
VI		
Total	30	18

Source: Primary Survey, 2019

Table 3.98: Grade-wise Distribution of WUAs (no.)

	Skill Training/Agriculture/Horticulture	Adoption of new technologies and practices
A+	2	2
A	14	9
B	4	3
C	5	1
D	5	3
Total	30	18

Source: Primary Survey, 2019

Importantly, it was observed that start up trainings were organized, but without the necessary follow up or interval trainings. For example, members were given training on fisheries and provided with necessary inputs. But, for any difficulty at the implementation stages or intermediary stages, members found it difficult to address the problem. This actually created disincentives at two levels – members were disinterested to adopt any new method of production and also to attend any training program. Therefore, urgent interventions are needed to mobilize farmers, to appraise them of appropriateness of new technology and to formulate of locally relevant plans consistent with farmers’ needs and skills and with local market

opportunities, continuous monitoring and support at the intermediate stages and, these, in turn, would provide improved livelihood to landless and marginal farmers.

3.8 Women Participation

Despite the importance of gender in building sustainable participatory irrigation institutions, women water users' needs and interests are often not clearly understood. Women participation in water user associations is generally found to be minimal as membership in such institutions is contingent upon land ownership and women do not own land. However, quite a significant proportion of women are found to manage land and involve in making agriculturally related decisions. This has got important implications for women empowerment through their greater involvement in decision-making at home. The WBADMI project has consciously tried to involve women at all stages from inception (site selection, design and construction) to operation and management of irrigation scheme. All the executive bodies of the WUAs aims at having a quarter or more of the members as women. The project also provides for awareness creation and targeted training for women in effective committee membership and in technical subjects related to good irrigation and agricultural practices. This section attempts to examine the role of women in the WBADMI project.

Only 6 percent of our sampled members were women. This indicates that women are not recognized as direct stakeholders in irrigation system and the men becomes the WUA members. Among the women WUA members, 85 percent of them are satisfied with the MI structure.

Table 3.99: Women Members' Responses on Enjoyment with the MI Structure (in %)

	Irrigation Classification		
	Category 1	Category 2	Category 3
Yes	100.00	75.00	75.00
No	0.00	25.00	25.00

Source: Primary Survey, 2019

Among the three categories of irrigation schemes, all the women member under category I schemes expresses their satisfaction while three-quarter of them under category II and category III schemes were satisfied with the MI structure. Availability of water during kharif and rabi seasons emerged as the single most important contributor of such satisfaction. 22 percent of

the women member reported that they were satisfied with the MI structure due to adequate availability of water during the rabi season. Low water charges coupled with the good quality of water availability made about 10 percent of the women member satisfied with the MI structure.

Table 3.100: Women Members' Responses regarding the Reasons for Enjoying MI Structure (in %)

Reasons	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Water always available in Kharif	10.00	0.00	16.67	9.09
Water always available in Rabi	30.00	0.00	33.33	22.73
Response (1+2)	60.00	66.67	33.33	54.55
Response (1+2+4)	0.00	16.67	0.00	4.55
Response (2+5)	0.00	16.67	16.67	9.09

Note: 1: Water always available in kharif; 2: Water always available in Rabi

4: Low water charges

5: Good quality of water

Source: Primary Survey, 2019

On the other hand, women member who were not satisfied, either did not receive water for technical problem or due to non-payment of electric bill. Among the three categories of the irrigation schemes, 60 to 66 percent of the members under category I and category II reported that they were satisfied with the MI structure due to adequate availability of water during both kharif and rabi season.

Table 3.101: Women Members' Responses regarding the Reasons for Not Enjoying MI Structure (in %)

Reasons	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Water not available due to technical problem	0.00	0.00	50.00	25.00
Closed due to non-payment of electric bill	0.00	100.00	0.00	50.00
Others	0.00	0.00	50.00	25.00

Source: Primary Survey, 2019

Regarding the maintenance of the irrigation scheme both before season and after season, we observed more or less similar trend with almost 80 to 85 percent of the women member rating the maintenance works as excellent or good.

Table 3.102: Women Members' Perception Regarding Maintenance of MI Structure (in %) - Before Season and After Season

	Irrigation Category						Total	
	Category I		Category II		Category III			
	Before	After	Before	After	Before	After	Before	After
Excellent/Good	80.00	90.00	66.67	66.67	100.00	100.00	80.00	85.00
Average	20.00	10.00	33.33	33.33	0.00	0.00	20.00	15.00
Poor/Very Poor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: Primary Survey, 2019

Half of the women members responded that WUAs take the responsibilities of the maintenance works whereas the other half identified the benefitting farmers or the landowner, on whose land the scheme is located, is responsible for such works. Moreover, when enquired about the frequency of maintenance works, half of the women members reported only about occasional maintenance of the schemes, with the corresponding proportion being highest for schemes under category I. 22 percent of the women members reported that maintenance works were performed twice in a year.

Table 3.103: Women Members' Responses Regarding Authority/Persons Responsible for Maintenance of MI Structure (in %)

	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
A	60.00	33.33	50.00	50.00
B	30.00	50.00	33.33	36.36
C	10.00	16.67	16.67	13.64

Note: A - WUAs; B - Benefitted Farmers on their own

C - Land owner in whose land MI structure constricted

Source: Primary Survey, 2019

Table 3.104: Women Members' Responses Regarding Frequency of Maintenance of MI Structure (in %)

	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Once in a Year			16.67	4.55
Twice in a Year	20.00	33.33	16.67	22.73
Occasionally	60.00	50.00	33.33	50.00
Don't Know	20.00	16.67	33.33	22.73

Source: Primary Survey, 2019

Another 22 percent of the women members were simply unaware of any maintenance works. Regarding their involvement in the construction of MI schemes, we have observed that about 58 percent of the women members were not involved. 34 percent of the women members were aware about such construction while 8 percent of the women members were personally present at the time of construction.

Table 3.105: Women Members' Responses regarding Type of Involvement during Construction of MI Structure (in %)

	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Passive	50.00	12.50	37.50	34.62
Active	10.00	12.50	0.00	7.69
Not Involved	40.00	75.00	62.50	57.69

Note: Passive - Member was briefed about the scheme

Active: Member was personally present during construction

Source: Primary Survey, 2019

Overall, this reflects that the women members were happy with the availability of water as that more or less matched their water requirements, but they fail to comprehend the importance of proper maintenance of irrigation schemes, necessary for technical sustainability of the schemes. Regarding fixation of water charges, 45 percent of the women members indicated that MCs fix water charges after discussing with the WUA members.

Table 3.106: Women Members' Responses regarding the Committee/Personnel Responsible for Fixing Water Charges (in %)

	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Managing Committee	20.00	50.00	33.33	31.82
MC in discussion with all member	70.00	16.67	33.33	45.45
DK	10.00	33.33	33.33	22.73

Source: Primary Survey, 2019

According to 32 percent of the women members, MCs decided the water charges on their own. 23 percent of the women members were unaware about the authority deciding the charges. When we enquired further, we found that almost 39 percent of the women members did not know about how water charges are being calculated. 16 percent of the women members responded that water charges are calculated considering the energy charges of the irrigation schemes. 12 percent of women members seemed to be more aware about calculation of water charges on the basis of operation and maintenance costs of providing water.

Table 3.107: Women Members' Responses regarding the Calculation of Water Charges (in %)

	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Energy charges	40.00	0.00	0.00	15.38
future repair cost	0.00	0.00	12.50	3.85
Any Other	0.00	12.50	0.00	3.85
DK	20.00	50.00	50.00	38.46
Response (1+2+3)	0.00	25.00	12.50	11.54
Response (1+3+4)	10.00	0.00	0.00	3.85
Response (1+2+3+4)	10.00	0.00	0.00	3.85
Response (2+3+4)	0.00	0.00	12.50	3.85
Response (2+4)	10.00	12.50	0.00	7.69
Response (3+4)	10.00	0.00	12.50	7.69

Notes: 1 - Periodic Maintenance cost; 2-energy charges; 3-Operator Fees

4-Future repair cost

Source: Primary Survey, 2019

Women members' awareness and or participation in crop development plan and water mapping is crucial for their capacity building. During kharif and rabi seasons, almost 37 percent of the women members expressed their ignorance about any crop develop plan. The corresponding figure increased to 55 percent during pre-kharif season. 36 to 40 percent of the women members were aware of at least preparation of crop development plan in the kharif and rabi season. In the pre-kharif season, only 18 percent of the women members reported preparation and/or documentation of the crop plan.

Table 3.108: Women Members' Responses regarding their Participation in Crop Development in Kharif Season (in %)

	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Prepared and Documented	20.00	16.67	16.67	18.18
Prepared but not Documented	0.00	50.00	16.67	18.18
Not prepared	40.00	16.67	16.67	27.27
DK	40.00	16.67	50.00	36.36

Source: Primary Survey, 2019

Table 3.109: Women Members' Responses regarding their Participation in Crop Development in Rabi Season (in %)

	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Prepared and Documented	20.00	33.33	33.33	27.27
Prepared but not Documented	0.00	33.33	16.67	13.64
Not prepared	30.00	16.67	16.67	22.73
Don't Know	50.00	16.67	33.33	36.36

Source: Primary Survey, 2019

Table 3.110: Women Members' Responses regarding their Participation in Crop Development in Pre-Kharif Season (in %)

	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Prepared and Documented	10.00	0.00	16.67	9.09
Prepared but not Documented	0.00	16.67	16.67	9.09
Not prepared	40.00	16.67	16.67	27.27
Don't Know	50.00	66.67	50.00	54.55

Source: Primary Survey, 2019

Women members' ignorance about water mapping emerged as more serious problem as almost 95 percent of the members in all the three seasons were either found to be unaware of any water mapping or reported non-preparation of any water plan. Even women members' awareness regarding any water efficiency methods or water conservation method was poor.

Table 3.111: Women Members' Responses regarding their Participation in Water Mapping in Kharif Season (in %)

	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Mapping done and documented	10.00	0.00	0.00	4.55
Not mapped	50.00	0.00	0.00	22.73
Don't Know	40.00	100.00	100.00	72.73

Source: Primary Survey, 2019

Table 3.112: Women Members' Responses regarding their Participation in Water Mapping in Rabi Season (in %)

	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Mapping done and documented	10.00	0.00	0.00	4.55
Not mapped	40.00	16.67	0.00	22.73
Don't Know	50.00	83.33	100.00	72.73

Source: Primary Survey, 2019

Table 3.113: Women Members' Responses regarding their Participation in Water Mapping in Pre-Kharif Season (in %)

	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Mapping done and documented	10.00	0.00	0.00	4.55
Not mapped	40.00	16.67	16.67	27.27
Don't Know	50.00	83.33	83.33	68.18

Source: Primary Survey, 2019

Importantly, 77 percent of the women members reported that they attended the WUA meetings more than two times. Only about 8 percent of the women members never attended any WUA meetings. All the women members, who attended meetings, received meeting related information individually. 87.5 percent of the women members reported that they signed the attendance register every time they attended the meeting. Rest never signed any attendance register.

Table 3.114: Women Members' Responses on their Meeting Attendance (in %)

Meeting Attendance	Irrigation Category			Total
	I	II	III	
Once	0.0	0.0	12.5	3.8
Twice	10.0	25.0	0.0	11.5
More Than Twice	90.0	62.5	75.0	76.9
Never	0.0	12.5	12.5	7.7

Source: Primary Survey, 2019

Table 3.115: Women Members' Response on Meeting Intimation (in %)

	Irrigation Category			Total
	I	II	III	
Through One-on-One interaction	100.0	100.0	100.0	100.0
Others (Over Phone)	0.0	0.0	0.0	0.0
DK	0.0	0.0	0.0	0.0

Source: Primary Survey, 2019

Table 3.116: Women Members' Response on Signing the Meeting Attendance Register (in %)

	Irrigation Category			Total
	I	II	III	
Always	90.0	85.7	85.7	87.5
Sometimes	0.0	0.0	0.0	0.0
Never	10.0	14.3	14.3	12.5

Source: Primary Survey, 2019

Moreover, for 67 percent of the women members, simply sitting and listening to the proceeding of the meetings emerged as the preferred mode of participation. Only 33 percent of the women member raised some issues for discussion on their own.

Table 3.117: Members' Response on Mode of Participation in Meeting (in %)

Raised any issues	Irrigation Category			Total
	I	II	III	
Yes	50.0	28.6	14.3	33.3
No	50.0	71.4	85.7	66.7

Source: Primary Survey, 2019

On enquiring about the issues for discussion, members reported that discussion mostly held on issues related to agricultural practices, followed by issues related to fisheries. 54 percent of the women members reported that their problems were discussed and solved.

Table 3.118: Women Members' Responses regarding Major Issues Discussed in the Meetings (in %)

Major Issues	Irrigation Category			Total
	I	II	III	
Farming technology	42.9	66.7	50.0	50.0
Water charges	0	0.0	0.0	0.0
Audit report	0.0	33.3	0.0	8.3
Distribution of water	0.0	0.0	0.0	0.0
Seed distribution	0.0	0	0.0	0.0
Crop planning	14.3	0.0	0.0	8.3
Accessories	0.0	0	0	0.0
Training	14.3	0	0.0	8.3
Electricity	14.3	0	0	8.3
WUAs' operation	0.0	0.0	50	8.3
Distribution of Fertilizer	0	0	0	0.0
Fishery	28.6	0.0	0	16.7
Distribution of horticulture inputs	0	0.0	0	0.0
Distribution of fishery inputs	0	0.0	0	0.0
Operator	0.0	0	0	0.0
WUA registration	0.0	0	0	0.0
WUA membership	0	0	0	0.0
Members conflict	0	0	0	0.0

Source: Primary Survey, 2019

Table 3.119: Members' Response regarding Discussion on their Issues in Meetings (in %)

	Irrigation Category			Total
	I	II	III	
Discussed and Solved	60.0	42.9	57.1	54.2
Discussed but not solved	40.0	42.9	14.3	33.3
Not discussed	0.0	14.3	28.6	12.5

Source: Primary Survey, 2019

Moreover, 57.7 percent of the women members expressed their ignorance about selection process of members of the MC. The rest reported that members were selected in the AGM of the WUAs.

Table 3.120: Women Members' Perceptions Regarding Managing Committee Selection (in %)

	Irrigation Category			Total
	I	II	III	
Selection done through all members, AGM involving all members/ AGM involving 50% of the member	50.0	25.0	50.0	42.3
No general meetings held	0.0	0.0	0.0	0.0
Only land donors are member of managing committee	0.0	0.0	0.0	0.0
Do not know	50.0	75.0	50.0	57.7

Source: Primary Survey, 2019

Even for almost half of the women members, the actual decision making processes or processes for solving any conflict were unknown. Among the social groups, the incidence of ignorance was more severe for the SC/ST group as compared to the rest.

Table 3.121: Women Members' Perception regarding Decision Making Processes in WUA (in %)

	Irrigation Category			Total
	I	II	III	
MC makes decision on their own	10.0	0.0	0.0	3.8
MC through general meeting (involving more than 50 % members)	50.0	25.0	75.0	50.0
Decision taken by few members who controls WUA	0.0	0.0	0.0	0.0
Do not know	40.0	75.0	25.0	46.2

Source: Primary Survey, 2019

Table 3.122: Women Members' Perception regarding Solving Conflict Issues in WUA
(in %)

Knowledge of solving conflict issues in WUA	Irrigation Category			Total
	I	II	III	
Conflict resolved through MC/Sub-committees (SC) level meetings	20.0	0.0	25.0	0.0
Conflict resolved by members without MC/SC intervention	0.0	0.0	0.0	0.0
Conflict resolved through general meeting	0.0	12.5	25.0	0.0
Conflict remains unresolved	0.0	0.0	0.0	0.0
No Conflict	40.0	0.0	12.5	0.0
Do not know	40.0	87.5	37.5	53.8

Source: Primary Survey, 2019

Importantly, considering only the functional WUAs, we have observed an improvement in women participation with 90 percent women members reporting their attendance in the WUA meetings more than two times. Among the zones, higher women participation in WUA meetings is observed among the women members of northern plateau, coastal and western zones. In contrast, only 66 percent of the women members of central zone WUAs participated in the WUA meetings more than two times. In terms of mode of participation, the functional WUAs.

Table 3.123: Category-wise Women Members' Responses on their Meeting Attendance (in %)

Meeting Attendance	Irrigation Category		Total
	GW	SW	
Once	0.00	0.00	0.00
Twice	10.00	11.11	10.53
More Than Twice	90.00	88.89	89.47
Never	0.00	0.00	0.00

Source: Primary Survey, 2019

Table 3.124: Zone-wise Women Members' Responses on their Meeting Attendance (in%)

Meeting Attendance	Zones				
	Central	Coastal	Hilly	Northern Plateau	Western
Once	0.00	0.00	0.00	0.00	0.00
Twice	33.33	0.00	0.00	0.00	9.09
More Than Twice	66.67	100.00	0.00	100.00	90.91
Never	0.00	0.00	0.00	0.00	0.00

Source: Primary Survey, 2019

Table 125: Category-wise Women Members' Response on Mode of Participation in Meeting (in %)

Raised any issues	Irrigation Category		Total
	GW	SW	
Yes	46.91	56.80	50.27
No	53.09	43.20	49.73

Source: Primary Survey, 2019

Table 3.126: Zone-wise Women Members' Response on Mode of Participation in Meeting (in %)

Raised any issues	Zones				
	Central	Coastal	Hilly	Northern Plateau	Western
Yes	44.44	40.98	37.50	68.18	47.58
No	55.56	59.02	62.50	31.82	52.42

Source: Primary Survey, 2019

Zones experienced higher active participation by the women members as half of them claimed to raise issues in the meeting and took part in the ensuing discussions. Among the zones, the women members of WUAs in the northern plateau zone appeared to be more active in terms of their participation. Moreover, although we did not find any significant difference in the extent of women participation among the ground water and surface water schemes, but higher proportion of women members under surface water schemes (57 percent) as compared to the ground water schemes (47 percent) actively participated in the WUA meeting.

Decision making power in families' financial as well as non-financial issues is generally considered as the proxy indicator to understand the nature of women empowerment. Among the women members belonging to the functional WUAs of our study, almost 61 percent of them always participated in the decision making processes on financial issues. Regarding the decision on non-financial issues, the corresponding figure declined to 57percent. About 17 percent of the women member never involved in decision making processes either on financial or non-financial issues within the family. Moreover, it has been observed that comparatively higher proportion of women members belonging to the WUAs under surface water schemes always participated in the decision making processes on financial issues as well as non-financial issues of the family. Earlier, we have also noted greater active mode of participation by the women members of the WUAs under the surface water schemes. In general, these exploratory indicators entail some qualitative changes in the lives of women members with their increasing prominence in the family decision making processes.

Table 3.127: Category-wise Women Members' Responses Regarding their Participation Family Decisions (in %)

	GW		SW		Total	
	Financial	Non-financial	Financial	Non-financial	Financial	Non-financial
A	50.00	50.00	69.23	61.54	60.87	56.52
B	10.00	0.00	7.69	7.69	8.70	4.35
C	20.00	20.00	7.69	7.69	13.04	13.04
D	0.00	10.00	0.00	7.69	0.00	8.70
E	20.00	20.00	15.38	15.38	17.39	17.39

Note: A - Always; B - most of cases; C - according to importance; D - few cases; E never

Source: Primary Survey, 2019

Women members' general ignorance about participatory practices can be attributed to their social position. At the very onset, one member from each beneficiary household, usually the landowner or household head, becomes the member of the WUAs. Even when women members attend the meeting, they feel that their voices may get overshadowed by the men members or they may simply be not allowed to speak in public forum, or they may lack knowledge and confidence to speak on irrigation matters. They may also perceive that most of the decisions are made by men informally and they lose interest to gather information on participatory practices.

Nevertheless, there is little doubt that women's participation in community irrigation management institutions is critical to both effective functioning of the WUAs as well as the sustainability of the irrigation system. For example, we have found that none of the women members in the survey ever defaulted to pay water charges and this is, indeed, crucial for financial sustainability of the system. Even their passive participation can be considered as an important beginning because women members are at least getting access to some information from attending these meetings and are slowly acquainted with the rules and their rights and responsibilities as the stakeholders. Moreover, women may not have the knowledge to act as water distributors or perform the task of financial audit, but they can certainly be trained and entrusted with the monitoring responsibilities for such works. So, women need to be encouraged to participate in these institutions, particularly in a decision-making capacity and for that support organization should provide targeted training and social extension activities on technical issues and social awareness including parallel gender sensitisation efforts with men in the community. This would also empower them to manage and control their own livelihood.

3.9 Members' Satisfaction with the Implementation of WBADMI and Responses for Strengthening the WUAs

3.9.1 Members' responses on changes achieved through WUAs

Apart from the ultimate objective of improving productivity, production, and income of farmers in the project area, the WBADMI project seeks to promote the culture of collective action through strengthening of the WUAs and enabling them to assume responsibilities for management, operation, and maintenance of the minor irrigation schemes to be constructed under the project. In this section, based on members' responses, we assess how far the project in general has been successful in achieving the targeted changes.

Almost 44 percent of the members opined that WUAs were successful in instituting and nurturing the culture of collective decision making. The change appeared to be most significant for the members under category I schemes with almost half of the members perceived improvement in social cohesion. Because of individualistic nature of operation and management of category III schemes, only one-fifth of the members under category III perceived any such improvement. Moreover, 16 percent of the members reported that participation of women in decision making processes related to economic activities increased following the activities of the WUAs. Quite expectedly, such improvement in perception was

greater among the members under category I. Almost 29 percent of the member failed to comprehend any significant social changes achieved through WUAs, with the figure being highest for category III (59.41 percent).

Table 3.128: Members' Responses regarding Social Changes due to WUAs (in %)

	Irrigation Category			Total
	I	II	III	
Knowledge Sharing	4.6	4.6	4.0	4.5
Increased participation of women members in decision making processes	18.7	13.0	7.9	15.6
Improved maintenance of MI structure	0.9	1.9	3.0	1.5
Improved social cohesion	49.7	42.1	20.8	43.6
Stronger collective voices	3.2	2.3	4.0	3.1
Improved self-esteem of members	3.46	4.63	0.99	3.47
DK	19.40	31.48	59.41	28.27

Source: Primary Survey, 2019

This is consistent with our earlier discussion. We have noted an apparently contradictory scenario, where a significant majority of the members reported their attendance in the WUA meetings, although most of them were unaware of the selection of MC members, mode of decision making on physical and financial matters related to irrigational activities. Attending meeting and experiencing deliberations, *albeit* limited, in public forum are itself new to the members. More they would participate, more would be their capacity and better would be the effectiveness of the WUAs in mediating and managing water resources for irrigation and this, perhaps, has shaped the members' optimism about improved social cohesion through the WUAs.

Regarding the change in income, about 38 percent of the respondents seemed to be very satisfied with their significant increase in income. Among the three categories of irrigation system.

Table 3.129: Members' Responses Regarding Change in income due to WUAs (in %)

Change of income	Irrigation Category			Total
	I	II	III	
Significant increase	44.31	35.34	8.33	38.57
Increased but insignificant	41.18	43.10	44.44	42.01
Same as before	6.27	6.90	5.56	6.39
DK	8.24	14.66	41.67	13.02

Source: Primary Survey, 2019

A comparatively higher proportion of members under category I system experienced high increase in income. In terms of social group, the proportion of member is highest for the 'other' category (44.4 percent) followed by general category (39.1 percent) and SC/ST category (34.8 percent). 42 percent of the respondents reported that although their income increased from agriculture/horticulture/other activities, but such an increase remained more or less insignificant. No inter category variations have been observed in respect of proportion of member reporting insignificant increase in income. 7 percent of the respondents seemed to be indifferent to any change in income.

Table 3.130: Members' Responses Ethnicity-wise Regarding Change in income due to WUAs (in %)

	Change in income	Irrigation Category			Total
		I	II	III	
General	Significant increase	44.35	33.33	0.00	39.13
	Increased but insignificant	37.39	55.56	70.00	43.48
	Same as before	6.96	8.33	10.00	7.45
	DK	11.30	2.78	20.00	9.94
ST/SC	Significant increase	38.10	32.50	21.43	34.78
	Increased but insignificant	50.00	55.00	64.29	52.90
	Same as before	5.95	2.50	7.14	5.07
	DK	5.95	10.00	7.14	7.25
OBC	Significant increase	25.00	20.00	0.00	22.22
	Increased but insignificant	25.00	60.00	0.00	44.44
	Same as before	50.00	20.00	0.00	33.33
	DK	0.00	0.00	0.00	0.00
Others	Significant increase	55.77	42.86	0.00	44.44
	Increased but insignificant	36.54	14.29	0.00	24.24
	Same as before	1.92	8.57	0.00	4.04
	DK	5.77	34.29	100.00	27.27

Source: Primary Survey, 2019

A comparatively higher proportion of members reporting increase in their income under category I schemes could be due to the fact that many TW and PDWs have been introduced in areas with very little previous source of irrigation. Better water availability after their introduction increased both the proportion of cultivable land and cropping intensity and led to improvement in farmers' income. In contrast, many of the, SFMIS and WDS mainly involved rejuvenation of already existing facilities with limited irrigation potentials. So, the associated improvement in income is comparatively less significant.

3.9.2 Members' Satisfaction with the Implementation of WBADMI Project

We have collected members' responses regarding their satisfaction with overall scheme implementation including process adopted for identification of scheme, timeliness, appropriateness and quality of inputs received and also compensation/assistances received for donating land for the scheme. 14 percent of members were very satisfied with the overall implementation of the scheme while 62 percent of the members were satisfied with the scheme implementation. Only about 16 percent of the members expressed their dissatisfaction with the overall implementation of the scheme. Among the three categories, comparatively higher proportion of members under category I and category II schemes expressed their satisfaction with overall implementation of WBADMI project.

Table 3.131: Members' Responses regarding Satisfaction with Implementation of WBADMI Project (in %)

Satisfaction Level	Irrigation Category			Total
	I	II	III	
Extremely dissatisfied	0.78	6.03	0.00	2.21
Dissatisfied	10.98	12.07	44.44	14.25
Neither satisfied nor dissatisfied	7.84	9.48	5.56	8.11
Satisfied	65.10	61.21	41.67	61.92
Very satisfied	15.29	11.21	8.33	13.51

Source: Primary Survey, 2019

Considering only the functional WUAs, we have further analysed scheme wise members' satisfaction with the implementation of WBADMI project. Incidence of dissatisfaction with the overall scheme implementation has been lower as only about 4 percent of the members

expressed their dissatisfaction. Marginally higher proportion of members of underground water schemes (72 percent) as compared to the surface water schemes (68 percent) were satisfied with the overall implementation of the WBADMI project. 90 percent of the members under the PDW schemes were satisfied whereas the corresponding figure for TW was almost 72 percent. Among the surface water schemes, proportion of satisfied members was highest for CD. Among the zones, WUAs belonging to northern plateau zone emerged as better performers with 96 percent members expressing their satisfaction with overall scheme implementation. In the coastal, hilly and western zones, almost 20 to 25 percent of the members were either found to be dissatisfied or indifferent with the scheme implementation. Further, satisfaction levels were quite high among the members belonging to better graded WUAs (A+, A and B), with the corresponding figures hovering between 90 to 100 percent. On the other hand, 20 to 30 percent of the members under grade C and grade D were dissatisfied or indifferent with the scheme implementation. The batch wise analysis of members' satisfaction reveals higher incidence of satisfaction for WUAs under batch III, IV and V. On the other hand, 15 to 20 percent of the members of the WUAs under batch I and VI were dissatisfied with the program implementation.

Table 3.132: (Scheme/Category-wise) Members' Responses regarding Satisfaction with Implementation of WBADMI Project (in %)

	Irrigation Scheme/Category							
	TW	PDW	GW	CD	RLI	WDS	SW	Total
Extremely dissatisfied	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dissatisfied	3.93	0.00	3.77	0.00	6.35	5.88	5.15	4.17
Neither satisfied nor dissatisfied	8.30	10.00	8.37	5.88	15.87	5.88	12.37	9.52
Satisfied	71.62	90.00	72.38	88.24	63.49	64.71	68.04	71.13
Very satisfied	16.16	0.00	15.48	5.88	14.29	23.53	14.43	15.18

Source: Primary Survey, 2019

Table 3.133: (Zone-wise) Members' Responses regarding Satisfaction with Implementation of WBADMI Project (in %)

Satisfaction Level	Zone				
	Central	Coastal	Hilly	Northern Plateau	Western
Extremely dissatisfied	0.00	0.00	0.00	0.00	0.00
Dissatisfied	6.94	3.28	0.00	0.00	5.60
Neither satisfied nor dissatisfied	2.78	13.11	25.00	4.55	13.60
Satisfied	72.22	70.49	62.50	86.36	60.80
Very satisfied	18.06	13.11	12.50	9.09	20.00

Source: Primary Survey, 2019

Table 3.134: (Grade-wise) Members' Responses regarding Satisfaction with Implementation of WBADMI Project (in %)

	Grade Classification				
	A+	A	B	C	D
Extremely dissatisfied	0.00	0.00	0.00	0.00	0.00
Dissatisfied	0.00	2.91	5.62	9.09	4.55
Neither satisfied nor dissatisfied	0.00	9.88	3.37	22.73	15.91
Satisfied	66.67	72.67	74.16	68.18	63.64
Very satisfied	33.33	14.53	16.85	0.00	15.91

Source: Primary Survey, 2019

Table 3.135: (Batch-wise) Members' Responses regarding Satisfaction with Implementation of WBADMI Project (in %)

	Batch Classification					
	I	II	III	IV	V	VI
Extremely dissatisfied	0.00	0.00	0.00	0.00	0.00	0.00
Dissatisfied	14.75	1.59	1.32	0.00	0.00	20.00
Neither satisfied nor dissatisfied	9.84	10.58	6.58	0.00	0.00	20.00
Satisfied	68.85	74.07	71.05	53.85	100.00	40.00
Very satisfied	6.56	13.76	21.05	46.15	0.00	20.00

Source: Primary Survey, 2019

We have also observed district wise variations in the proportion of members expressing satisfaction/dissatisfaction with the overall scheme implementation (Table Appendix 3.1). Almost all the members from seven districts –Bankura, Jalpaiguri, Nadia, Paschim Medinipur, Purba Medinipur, South Dinajpur and Uttar Dinajpur – were either very satisfied or satisfied with the implementation. More than 90 percent of the members of Birbhum, Purulia, Murshidabad and Jhargram also expressed their satisfaction. The incidence of dissatisfied members was highest in Darjeeling (50 percent) followed by Cooch Behar (46 percent) and South 24 Parganas (52 percent). Moreover, 35 to 40 percent of the members from two districts – Howrah and Malda - were dissatisfied with the scheme implementation. Regarding the members' satisfaction with process adopted for identification of scheme, we have observed similar overall trend as well as that of district wise variations.

Members' satisfaction with the timeliness, appropriateness and quality of inputs received is another crucial indicator to judge the usefulness of the project. The level of satisfaction for this indicator was found to be marginally higher compared with that for overall implementation of the scheme. 12 percent of the members reported that they were very satisfied with the timeliness, appropriateness and quality of inputs received under the scheme. About 65 percent of the members expressed their satisfaction with the same. Similar district wise variations, as discussed, characterized the members' satisfaction with the timeliness, appropriateness and quality of inputs received.

Table 3.136: Members' Responses regarding the Receipt of Inputs (in %)

Satisfaction Level	Irrigation Category			Total
	I	II	III	
Extremely dissatisfied	0.78	0.86	8.33	1.47
Dissatisfied	9.80	17.24	36.11	14.25
Neither satisfied nor dissatisfied	7.06	8.62	11.11	7.86
Satisfied	70.20	60.34	38.89	64.62
Very satisfied	12.16	12.93	5.56	11.79

Source: Primary Survey, 2019

Earlier we have seen that some of the members donated their land for construction of irrigation structure. When enquired about their satisfaction with the compensation/support they received in lieu of donation, 71 percent of the members expressed their satisfaction with same.

Table 3.137: Members' Satisfaction with the Assistance/Compensation Received against Land Donation (in %)

Satisfaction Level	Irrigation Category			Total
	I	II	III	
Extremely dissatisfied	2.7	6.9	0	3.7
Dissatisfied	7.8	9.5	13.9	8.8
Neither satisfied nor dissatisfied	16.1	10.3	36.1	16.2
Satisfied	62.7	59.5	47.2	60.4
Very satisfied	10.6	13.8	2.8	10.8

Source: Primary Survey, 2019

Among the three categories of irrigation schemes, the incidence of satisfied member was highest for category I schemes followed by category II schemes. Comparatively lower proportion of satisfied members for this indicator could be due to the fact that none of members, who donated land, received any extra benefit in terms of, e.g., free water, preference in water schedule. We have also observed district wise variations in the proportion of members expressing satisfaction/dissatisfaction with the compensation/support (Table A2). In four districts – Bankura, Nadia, Uttar Dinajpur and South Dinajpur, all the members were satisfied

with the compensation/support. In Birbhum, Jhargram, Paschim Medinipur, Purulia, Murshidabad and Jalpaiguri, proportion of members ranging from 75 percent to 92 percent expressed their satisfaction. The proportions of dissatisfied members were found to be quite high for Darjeeling, Cooch Behar and Howrah. Moreover, in some districts, e.g., Bardhaman, South 24 Parganas and Purba Medinipur, a significant proportion of members, ranging from 27 percent to 37 percent, were indifferent to any compensation/support.

Members were also enquired about their perception on improvement of crop/fish production after project intervention. 42 percent of the members reported significant improvement in the same. Among the three categories of the respondents, the proportion was highest for category I schemes.

Table 3.138: Members' Responses regarding their Perception of Improvement in Crop/Fish Production

Perception Level	Irrigation Category			Total
	I	II	III	
Deteriorated a lot	0.39	0.86	0.00	0.49
Deteriorated a little	2.75	2.59	0.00	2.46
Unchanged	5.10	10.34	11.11	7.13
Improved a little	34.90	35.34	33.33	34.89
Improved a lot	48.63	36.21	13.89	42.01
Not Sure	8.24	14.66	41.67	13.02

Source: Primary Survey, 2019

There were inter district variations with comparatively greater proportion of members from Nadia (88 percent), South Dinajpur (66 percent), Jalpaiguri (59 percent) and Birbhum (58 percent) reported significant improvement in the crop/fish production (Table A3). In some of the districts, e.g., Darjeeling, Jhargram, Howrah, Cooch Behar and South 24 Parganas, only 18 to 28 percent of the members perceived improvement in crop/fish production. Among them, about half of the members from South 24 Parganas, Darjeeling and Cooch Behar even failed to comprehend any changes. Moreover, 35 percent of the members reported insignificant improvement in the fish/crop production. The corresponding percentage figures were higher

for Bardhaman, Birbhum, Jalpaiguri, Jhargram, Murshidabad, Paschim Medinipur, Purba Medinipur and Purulia. Performance of Cooch Behar, Darjeeling, Howrah and South 24 Parganas continued to be poor with lower incidence of member reporting even small improvement in the crop/fish production.

3.9.3 Role of WUAs in Water Management: Members' Responses

When enquired about their expectation from WUAs regarding water management, almost 60 percent of the members demanded honesty and responsiveness of the WUAs. With almost half of the members being unaware of crop development plan, water mapping, determination of water charges and physical and financial details of the schemes, members' demand for transparency seems to be justified. Members' responses were more or less similar across the three categories of the irrigation schemes.

Table 3.139: Members' Responses regarding the Role of the WUAs (in %)

Expected role of WUAs	Irrigation Classification			Total
	Category 1	Category 2	Category 3	
Honest and responsive WUA	64.31	60.34	25.00	59.71
Maintenance of MI structure	6.67	0.86	2.78	4.67
Collection of water dues	1.57	1.72	0.00	1.47
Establishing market linkages	1.18	2.59	2.78	1.72
Providing loan to farmers	3.53	1.72	2.78	2.95
Establishing linkage with other line departments	0.78	1.72	2.78	1.23
Active engagement with line department	9.41	15.52	41.67	14.00
Any Others	3.14	9.48	0.00	4.67
Response (1+2)	1.18	2.59	2.78	1.72
Response (1+3)	1.57	1.72	11.11	2.46
Response (1+2+3)	0.00	0.86	2.78	0.49
Response (1+6+8)	1.18	0.00	0.00	0.74
Response (1+5)	0.39	0.00	5.56	0.74
Response (1+6)	1.57	0.86	0.00	1.23
Response (1+5+6)	0.39	0.00	0.00	0.25
Response (4+5)	0.39	0.00	0.00	0.25
Response (5+8)	1.96	0.00	0.00	1.23
Response (5+7)	0.39	0.00	0.00	0.25
Response (5+6)	0.39	0.00	0.00	0.25

Notes: 1 - Honest and responsive WUAs; 2-Maintenance of MI structure

3-Collection of water dues; 4-Establishing market linkages; 5-Providing loan to farmers

6-Establishing links with other line departments; 7-active engagement with line department

8-Any other

Source: Primary Survey, 2019

Category III is an exception as almost 42 percent members demanded greater involvement of line departments. Non-centrality of operation of schemes under this category could be the explanatory factor as members under these schemes access water in terms of their individual

capacity to pump and distance of cultivable land from irrigation source. Thus, there is a greater possibility of mismatches between demand and supply of water, warranting greater involvement of support organizations in preparing crop development plans and water mapping.

3.9.4 Strengthening the WUAs: Members' Responses

The WDADMI project, through the formation of the WUAs, institutionalizes a decentralized setting where the main beneficiaries can play an active role in planning, managing, and sustaining project interventions. So, the members were asked to give their suggestions for strengthening the WUAs. Interestingly, almost 82 percent of the members opined that the WUAs should have a clear vision, although they seemed to be unclear about the specifics of such vision. This is evident as too few members suggested that WUAs could be strengthened through their active role in several crucial aspects including the linking institutions between farmers and markets; in the capacity building activities; in construction of micro MI schemes; in construction of vermicompost; in developing nurseries and agri-equipment hub; linking with other government departments to help members accessing livelihood benefits and so on. Leadership is considered as a strong contextual factor shaping and sustaining the organisational efforts of the WUAs. Only, 3 percent of the members suggested that WUA should focus on leadership development. This may be considered either as a reflection of members' satisfaction with the present functioning of the WUAs or members' poor awareness and commitment for the strengthening of the WUAs.

Table 3.140: Members' Suggestions for Strengthening the WUAs (in %)

Suggestions	Irrigation Category			Total
	I	II	III	
A clear vision	82.35	79.31	83.33	81.57
Specific action plans	8.24	12.07	8.33	9.34
Leadership development	3.14	4.31	0.00	3.19
Linking institution between farmers and market	1.96	0.00	5.56	1.72
Capacity building	0.00	1.72	0.00	0.49
Construction of micro MI schemes	0.00	0.00	2.78	0.25
Construction of vermicompost pit	1.57	0.00	0.00	0.98
Nursery raising activities	0.39	0.00	0.00	0.25
Develop agri-equipment hub	0.39	2.59	0.00	0.98
Establishment of link with other line departments	0.00	0.00	0.00	0.00
Information hub with all rights, services and entitlements related information	1.18	0.00	0.00	0.74
Any others (Specify)	0.78	0.00	0.00	0.49

Source: Primary Survey, 2019

3.10 Members' Responses Regarding the Readiness of the WUAs to Carry Forward the WBADMI Project

Following the completion of the WBADMI project duration in December 2019, the WUAs are expected to assume the full responsibility of operation and management of the irrigation schemes. So, we asked the members about their perception regarding their readiness to assume the responsibility, the problems they are likely to face and the steps they think would be useful to carry out their new responsibilities. Almost one-third of the members were confident about the smooth running of the project in future. 30 percent of the members envisaged some problems in the smooth functioning of the scheme. Rest, i.e., 37 percent of the respondents expressed their inability to assume the responsibilities of irrigation management. Among the three categories of schemes, comparatively greater proportion of members under category I were confident while more than half of the members under category III were not confident to carry out the task of irrigation management.

Table 3.141: Members' Responses regarding their Readiness to Run WUAs (in %)

	Irrigation Category			Total
	I	II	III	
Yes	38.0	28.4	19.4	33.7
Yes, but will face problems	29.8	29.3	25.0	29.2
No	23.9	27.6	13.9	24.1
DK	8.2	14.7	41.7	13.0

Source: Primary Survey, 2019

Considering only the functional WUAs, we have observed some improvement in members' confidence in running the schemes. 40 percent of the members expressed their readiness to assume the responsibility of running WUAs, with the corresponding figures being higher for ground water schemes. Among the ground water schemes, almost three fourths of the members under TW schemes were willing to take up the responsibilities irrespective of any problems. Zone wise analysis of members' responses reveals greater confidence of the members of WUAs in northern plateau and coastal region in running the WUAs. On the other hand, comparatively higher proportion of members of WUAs in central and western region seemed to lack confidence for running the WUAs smoothly. Grade wise analysis of members' responses indicates greater unpreparedness among the members of lower graded WUAs. 70 to 80 percent of the members of WUAs graded as A+, A and B were interested to take the challenges of running the WUAs. In term of batch wise classification, greater proportion of members of batch I and II WUAs expressed their inability to run the WUAs.

Table 3.142: Scheme/Category-wise Members' Responses regarding their Readiness to Run WUAs (in %)

	Irrigation Scheme/Category							Total
	TW	PDW	GW	CD	RLI	WDS	SW	
Yes	41.82	35.71	41.45	16.67	41.18	41.67	34.23	39.13
Yes, but will face problems	33.18	21.43	32.48	54.17	26.47	41.67	35.14	33.33
No	25.00	42.86	26.07	29.17	32.35	16.67	30.63	27.54
DK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: Primary Survey, 2019

**Table 3.143: Zone-wise Members' Responses regarding their Readiness to Run WUAs
(in %)**

	Zone				
	Central	Coastal	Hilly	Northern Plateau	Western
Yes	33.33	57.38	100.00	40.91	27.20
Yes, but will face problems	25.00	21.31	0.00	42.05	40.80
No	41.67	21.31	0.00	17.05	32.00
DK	0.00	0.00	0.00	0.00	0.00

Source: Primary Survey,
2019

**Table 3.144: Grade-wise Members' Responses regarding their Readiness to Run
WUAs (in %)**

	Grade Classification				
	A+	A	B	C	D
Yes	22.22	36.63	49.44	27.27	34.09
Yes, but will face problems	50.00	34.30	30.34	36.36	27.27
No	27.78	29.07	20.22	36.36	38.64
DK	0.00	0.00	0.00	0.00	0.00

Source: Primary Survey, 2019

**Table 3.145: Batch-wise Members' Responses regarding their Readiness to Run WUAs
(in %)**

	Batch Classification					
	I	II	III	IV	V	VI
Yes	47.54	30.69	50.00	30.77	0.00	60.00
Yes, but will face problems	26.23	33.33	32.89	69.23	100.00	20.00
No	26.23	35.98	17.11	0.00	0.00	20.00
DK	0.00	0.00	0.00	0.00	0.00	0.00

Source: Primary Survey, 2019

We have observed significant district wise variations in their perception regarding readiness to assume new roles (Table A4). In some districts, e.g., Jhargram, Jalpaiguri, Paschim Medinipur, Purba Medinipur, South Dinajpur, Uttar Dinajpur, Nadia and Purulia, considerably higher proportion of members, ranging between 64 percent (Nadia) to 94 percent (Jhargram), were positive and confident that they would be able to assume responsibilities and solve problems coming into their ways of scheme management. Quite a significant proportion of members from Darjeeling, Howrah and Malda were apprehensive about their new roles. Importantly, in some districts, e.g. Bankura and Birbhum, with higher level of members' satisfaction with overall scheme implementation, members hesitated to assume new responsibilities. This implies that although strong institutional support resulted in better irrigational facilities, but inadequate attention was paid to the capacity building of the members. On the other hand, there are districts, e.g. South 24 Parganas, where a significant proportion of members were not satisfied with the scheme implementation, but still they expressed their confidence in taking up the challenge of participatory irrigation management. This further underscores the supreme importance of capacity building as well as awareness raising activities for the members to ensure and encourage their participation in irrigation management practices through WUAs in greater numbers.

Regarding members' responses about their likely problems in near future, 26 percent of the members could not specifically identify any problem. Among the problems identified by the members, problems related to handling numerous documents, non-availability of support from the line departments, lack of training on technical issues and problems related to financial management topped the list. We did not observe any significant variations in terms this indicator across the different irrigation schemes.

Table 3.146: Members' Responses regarding Future Problems in WUA Functioning (in %)

Type of problems	Irrigation Category			Total
	I	II	III	
No Problem	25.52	25.69	36.00	26.38
Handling different documents	22.40	26.61	20.00	23.62
Lack of technical support	15.63	14.68	4.00	14.42
Maintenance of bank account	10.94	16.51	8.00	12.58
Loosing opportunities currently available	8.33	3.67	12.00	7.06
Lack of communicate with departments	17.19	12.84	20.00	15.95

Source: Primary Survey, 2019

Table 3.147: Scheme/Category-wise Members' Responses regarding Future Problems in WUA Functioning (in %)

	Irrigation Scheme/Category							Total
	TW	PDW	GW	CD	RLI	WDS	SW	
No Problem	25.45	35.71	26.07	20.83	30.88	33.33	27.93	26.67
Handling different documents	24.55	21.43	24.36	29.17	25.00	33.33	26.13	24.93
Lack of technical support	12.73	14.29	12.82	12.50	11.76	8.33	12.61	12.75
Maintenance of bank account	10.00	0.00	9.40	8.33	17.65	8.33	16.22	11.59
Losing opportunities currently available	7.73	0.00	7.26	4.17	2.94	0.00	2.70	5.80
Lack of communication with departments	19.55	28.57	20.09	25.00	11.76	16.67	14.41	18.26

Source: Primary Survey, 2019

**Table 3.148: Zone-wise Members' Responses regarding Future Problems in WUA
Functioning (in %)**

Type of problems	Zone				
	Central	Coastal	Hilly	Northern Plateau	Western
No Problem	34.72	24.59	25.00	23.86	25.60
Handling different documents	19.44	16.39	0.00	36.36	24.00
Lack of technical support	11.11	18.03	0.00	6.82	15.20
Maintenance of bank account	12.50	13.11	0.00	3.41	16.00
Loosing opportunities currently available	9.72	16.39	25.00	2.27	1.60
Lack of communicate with departments	12.50	11.48	50.00	27.27	17.60

Source: Primary Survey, 2019

Table 3.149: Grade-wise Members' Responses regarding Future Problems in WUA Functioning
(in %)

	Grade Classification				
	A+	A	B	C	D
No Problem	16.67	31.40	26.97	13.64	22.73
Handling different documents	16.67	20.93	24.72	40.91	27.27
Lack of technical support	5.56	11.63	13.48	13.64	15.91
Maintenance of bank account	16.67	11.63	8.99	9.09	15.91
Loosing opportunities currently available	16.67	9.30	3.37	0.00	2.27
Lack of communicate with departments	27.78	15.12	22.47	22.73	15.91

Source: Primary Survey, 2019

Table 3.150: Batch-wise Members' Responses regarding Future Problems in WUA Functioning
(in %)

	Batch Classification					
	I	II	III	IV	V	VI
No Problem	32.79	24.87	32.89	0.00	0.00	40.00
Handling different documents	24.59	22.75	23.68	30.77	0.00	40.00
Lack of technical support	9.84	14.29	5.26	38.46	0.00	20.00
Maintenance of bank account	8.20	14.29	10.53	0.00	0.00	0.00
Loosing opportunities currently available	4.92	7.41	5.26	15.38	0.00	0.00
Lack of communicate with departments	19.67	16.40	22.37	15.38	100.00	0.00

Source: Primary Survey, 2019

Grade-wise and batch-wise analysis of members' responses also identified the above problems. Moreover, no district specific pattern is discernible (Appendix Table 3.5. In some district, e.g. Jalpaiguri, Jhargram, Purulia and South 24 Parganas, handling of numerous documents appeared as the biggest problems. Non-availability or likely discontinuation of support from the line department was perceived as a serious problem by the members from Birbhum, Darjeeling and Paschim Medinipur. 40 to 44 percent of the members from Bankura and Murshidabad reported lack of training on technical issues and financial management as one of the major problems. As some of the districts also performed satisfactorily in terms of members' perception on overall scheme implementation, simplification of documents maintenance procedures along with capacity building of the member could better WUAs' efforts and schemes' performance in meeting members' water needs and interests.

On being asked about the suitable steps needed for sustainability of the WBADMI project, 35 percent of the member opined in favour of continuing with the present mode of functioning of the WUAs. Importantly, 35 percent of the member were in favour making the WUA activities more participatory in nature. About 18 percent of the member thought that they require government support for irrigation management.

Table 3.151: Members' Responses regarding Future Plan of Action (in %)

Type of plans	Irrigation Category			Total
	I	II	III	
Increasing participation in WUA activities	34.90	43.97	13.89	35.63
Seeking government support	14.90	16.38	44.44	17.94
Continuing with the current mode of functioning	40.78	24.14	33.33	35.38
Increasing agricultural productivity	1.96	2.59	0.00	1.97
Preparing a separate plan	2.35	3.45	5.56	2.95
Not Sure	5.10	9.48	2.78	6.14

Source: Primary Survey, 2019

About 6 percent of the members did not offer any suggestions. Quite expectedly, the proportion of members in favour of taking government support was higher for the schemes under category III as compared to the other categories. In some of the poor performing districts in terms of members' perception of scheme implementation— e.g., Howrah, Malda and Darjeeling, more than half of the members, either sought government support or did not offer any suggestion (Appendix Table 3.6). Moreover, in some of the better performing districts –e.g., Nadia, Jalpaiguri, Birbhum, Jhargram, Paschim Medinipur, South Dinajpur and Uttar Dinajpur, majority of the members were interested to continue with the present system of irrigation management. Overall, this indicates a significant majority of the members either sought government support or do not have any suggestions for improving the performance of the WUAs and make them sustainable in future. This is indicative of poor awareness and commitment of the farmers on one hand and weak institutional structure in terms of social capital on the other. In other words, members continue to think of themselves as beneficiaries not as partners in irrigation management under WBADMI program. However, the opportunity is not totally lost as almost 35 percent of the members acknowledged the importance of participatory practices. Among the three categories of irrigation schemes, the corresponding figure ranged from 35 percent for category I to 44 percent for category II. Four districts – Murshidabad, Purulia, Bardhaman and Bankura –experienced higher proportion of members relying on the merits of participatory practices. Importantly, almost all the members in these districts used irrigation water from schemes under category I or category II. As mentioned earlier, because of their smaller group and clustered implementation approach, the scope of participation was higher and, partly owing to their bio physical characteristics, members under these schemes reported adequate availability of water. In other words, these districts' relatively satisfactory scheme implementation performances could have motivated the members to value participatory practices. In fact, members' experience of deliberating in WUA meeting on issues related to management of irrigation water can expand their skills. Given majority of the members' passive mode of participation in the WUA meetings, as discussed earlier, members badly need skills along with motivation to take the full advantage of participatory possibilities provided by the decentralized setup. More the members get benefits from irrigation scheme, more will be their skills and motivation to attend and actively take part in the WUA activities. Moreover, positive experiences are likely to induce other members to participate in such public forums.

3.11 Comparison of WBADMIP with non-WBADMI schemes

Based on the farmers' responses, we have used selected economic indicators to compare the performance between schemes under WBADMI project and non-WBADMI schemes. The schemes mainly differ on account of agricultural and institutional supports. In particular, the WBADMI project has created Water User Associations for operation and maintenance of the schemes and also has provided agricultural support services to help farmers reaping the full benefits of increased availability of irrigation. Data have been collected from 43 sampled farmers under non-WBADMI schemes which included TW (DPTW, MDTW, STDW), RLI, WDS and CD.

In terms of average land cultivated, farmers under WBADMI reported to use greater amount of land under in all the three seasons. Most significant differences have been observed in rabi and pre-kharif seasons. The farmers under non-WBADMI schemes in the pre-kharif season, did not utilize any land for cultivation purpose whereas the farmers under WBADMI schemes utilized some portion of their land for cultivation. In rabi season, the use of average land for cultivation under non-WBADMI schemes was 0.25 bigha. In contrast, the amount of land used by the farmers under WBADMI project, was found to be almost 9 times higher in the rabi season. The significant increase in cultivated land in three seasons reflects that properly designed irrigation schemes with the involvement of the end users and provision of agricultural support is crucial for enhancing the economic opportunities of the farmers.

Table 3.152: (Average) Land Cultivated (in Bigha) - WBADMI schemes and non-WBADMI Schemes

	WBADMI	Non-WBADMI
Kharif	3.90	2.72
Rabi	2.23	0.25
Pre-Kharif	0.56	0.00

Source: Primary Survey, 2019

We have also compared the cropping intensity of schemes under non-WBADMI and WBADMI project. Cropping intensity of the schemes under WBADMI project (184.66%) was significantly higher compared to the same for the non-WBADMI schemes (106.18 %).

Table 3. 153: Cropping Intensity - WBADMI schemes and non-WBADMI Schemes

	CI
WBADMI	184.66
Non-WBADMI	106.18

Source: Primary Survey, 2019

The beneficial effect of WBADMI schemes is also reported through the differences in average monthly income of the sampled farmers between two schemes. Monthly income of the farmers under the WBADMI schemes were significantly higher for different farmer categories. Average monthly income of the marginal farmers and small farmers under the schemes of WBADMI project was almost 3.5 times of that under the non-WBADMI schemes. For the semi medium farmers, the same multiplicative factor was little less of 3.2 times.

Table 3.154: Median Monthly Income of Respondents: WBADMI schemes and non-WBADMI scheme

	WBADMI	Non-WBADMI
Marginal Farmers	6924.44	2050.00
Small Farmers	7256.98	1975.00
Semi Medium Farmers	9114.50	2792.00

Notes: Marginal Farmers <=1 hectare; Small Farmers 1 - 2 hectares; Semi Medium Farmers: 2 - 4hectres

Source: Primary Survey, 2019

3.12 Summing Up

Literature on irrigation management acknowledges that the problem of growing water stress is not due to absolute shortage of water, but due to the absence of appropriate institutional arrangements involving farmers and other stakeholders in the process of sustainable water resource management. The WBADMI project with one of its focus on forming the WUAs with clear set of official rules and procedures has sought to institutionalize water governance to manage and govern resources in a systematic and efficient way. Based on the sampled members' responses, some benefits in terms of increased area under irrigation, increased diversification of economic activities, increase in income and improvement in economic condition of the members is evident, although with inter district and inter category variations.

Among the different irrigation schemes, CD, TW and RLI recorded higher cropping intensities. The batch wise cropping intensity reveals the better performances of the WUAs belonging to batch II and batch III, closely followed by the cropping intensity of batch I. Members have reported increase in the number of crops and proportion of area under them, especially in the rabi and pre-kharif seasons. These indicate productive harnessing of water resources following introduction of WBADMI project that enhanced the employment opportunities and income for the beneficiaries.

Availability of water was found to be better for the TW, PDW, CD and RLI schemes. Among the zones, availability of water as per the requirement or schedule is higher for the WUAs of northern plateau, central and coastal zones. Moreover, schemes under batch V, IV and II are found to better match the water requirement of the members. Bio-physical characteristics of the schemes (e.g., high sub-surface storage and flowing rivers with large catchment areas under TW, PDW and RLI) and operation and management processes (e.g., A+ and A graded WUAs with availability of adequate water as per the schedule) contribute to the better availability of water under WBADMI. Imposition of differential water charges - as evident from higher water charges for schemes like TW, PDW and RLI owing to their high electricity charges for operation and lower water charges for schemes like WDS due to their non-centralized water distribution system – showcases WUAs attempt to determine water charges on the basis of cost recovery principle and, so, could strengthen the financial sustainability of the project.

In terms of participatory outcomes, it has been observed that WUA meetings were held on regular basis with higher as well as more frequent participation of member under TW, CD and RLI schemes, schemes belonging to batch IV, VI, III and II, northern plateau and central zones and better graded schemes. Although, surface and groundwater schemes should not be compared directly due to differences in their inherent bio-physical characteristics but the centralized mode of operation of TW, PDW and RLI for distribution of water seem to provide greater scope of participation in these schemes. Comparatively better availability of water might also incentivise the members to participate.

However, in general, the awareness about the preparation and/or documentation of crop plan as well as the water mapping exercises of the members can, at best, be described as low. Scheme, batch and grade wise analysis of members' participation reveals comparatively higher participation under TW, RLI and CD and better graded WUAs. Distribution of water through

centralized pump house and attendant infrastructure under TW and RLI might encourage the members in developing crop and water distribution plans.

Moreover, significant majority of the members' ignorance about the rules and procedures of functioning of the WUAs, physical and financial details of the schemes and passive mode of participation has created serious policy discomfort and, in turn, could make the sustainability of the other positive benefits rather uncertain. Related indicators also exhibited scheme, zone, batch and grade wise variations with TW, RLI and CD schemes, schemes under northern plateau and central zones, WUAs under batch IV, V and VI and better graded WUAs experienced moderately higher proportion of members being aware the process and functioning of the WUAs. Further, about 15 percent of the surveyed members reported receipt of skill training for starting or developing new or old activities or training in agriculture/horticulture. Not all the members who received training actually started new economic activities. CD, RLI and WDS schemes, WUAs under batch II and IV and better graded WUAs are found to be comparatively more successful in motivating members to adopt new technologies and practices. As the impacts of such training and capacity buildings programs are largely demonstrative, it is expected that other members will also feel motivated to take up similar entrepreneurial activities in near future.

In essence, it appears that the WBADMI project has provided the farmers a huge opportunity to build a stronger and sustainable irrigation institutions. Institutional development for irrigation needs should be tailored to the needs of the individual project and stakeholders involved or associated with the WUAs should be seen as partners rather than beneficiaries. Greater effort should be made in the direction of capacity building and that too for the entire season with effective monitoring of implementation or use of newly built capacities of the members. These would build the commitment to participation in irrigation management, ensure that participation to be effective and ensure that the process of institutional development is embedded in the community rather than being externally driven. The usefulness of such efforts is reinforced by the acknowledgement of the importance of participatory practices and confidence in carrying out the new responsibilities of irrigation management through the WUAs by at least one third of the surveyed members in the study.

Appendix Table 3.1: Members' Responses (District wise) regarding Satisfaction with Implementation of WBADMI Project (in %)

District	Satisfaction Level	Irrigation Category			Total
		I	II	III	
Bankura	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	0.00	0.00	0.00	0.00
	Neither satisfied nor dissatisfied	0.00	0.00	0.00	0.00
	Satisfied	0.00	88.89	0.00	88.89
	Very satisfied	0.00	11.11	0.00	11.11
	Total	0.00	100.00	0.00	100.00
Bardhaman	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	9.09	18.18	0.00	10.91
	Neither satisfied nor dissatisfied	15.91	54.55	0.00	23.64
	Satisfied	50.00	27.27	0.00	45.45
	Very satisfied	25.00	0.00	0.00	20.00
	Total	100.00	100.00	0.00	100.00
Birbhum	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	0.00	0.00	0.00	0.00
	Neither satisfied nor dissatisfied	20.00	0.00	0.00	8.33
	Satisfied	80.00	100.00	0.00	91.67
	Very satisfied	0.00	0.00	0.00	0.00
	Total	100.00	100.00	0.00	100.00
Cooch Behar	Extremely dissatisfied	5.56	25.00	0.00	11.54
	Dissatisfied	44.44	12.50	0.00	34.62
	Neither satisfied nor dissatisfied	0.00	50.00	0.00	15.38
	Satisfied	44.44	0.00	0.00	30.77
	Very satisfied	5.56	12.50	0.00	7.69
	Total	100.00	100.00	0.00	100.00
Darjeeling	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	50.00	0.00	0.00	50.00
	Neither satisfied nor dissatisfied	12.50	0.00	0.00	12.50
	Satisfied	31.25	0.00	0.00	31.25
	Very satisfied	6.25	0.00	0.00	6.25
	Total	100.00	0.00	0.00	100.00
Howrah	Extremely dissatisfied	0.00	19.23	0.00	11.11
	Dissatisfied	16.67	34.62	0.00	24.44
	Neither satisfied nor dissatisfied	16.67	0.00	0.00	4.44
	Satisfied	58.33	38.46	71.43	48.89
	Very satisfied	8.33	7.69	28.57	11.11
	Total	100.00	100.00	100.00	100.00
Jalpaiguri	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	0.00	0.00	0.00	0.00
	Neither satisfied nor dissatisfied	0.00	0.00	0.00	0.00
	Satisfied	80.00	100.00	0.00	81.25
	Very satisfied	20.00	0.00	0.00	18.75
	Total	100.00	100.00	0.00	100.00
Jhargram	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	0.00	0.00	11.11	5.26
	Neither satisfied nor dissatisfied	0.00	0.00	22.22	10.53

District	Satisfaction Level	Irrigation Category			Total
		I	II	III	
	Satisfied	0.00	70.00	55.56	63.16
	Very satisfied	0.00	30.00	11.11	21.05
	Total	0.00	100.00	100.00	100.00
Malda	Extremely dissatisfied	11.11	0.00	0.00	6.67
	Dissatisfied	33.33	33.33	0.00	33.33
	Neither satisfied nor dissatisfied	0.00	0.00	0.00	0.00
	Satisfied	55.56	66.67	0.00	60.00
	Very satisfied	0.00	0.00	0.00	0.00
	Total	100.00	100.00	0.00	100.00
Murshidabad	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	16.67	0.00	0.00	7.69
	Neither satisfied nor dissatisfied	0.00	0.00	0.00	0.00
	Satisfied	83.33	100.00	0.00	92.31
	Very satisfied	0.00	0.00	0.00	0.00
	Total	100.00	100.00	0.00	100.00
Nadia	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	0.00	0.00	0.00	0.00
	Neither satisfied nor dissatisfied	0.00	0.00	0.00	0.00
	Satisfied	50.00	57.14	0.00	52.94
	Very satisfied	50.00	42.86	0.00	47.06
	Total	100.00	100.00	0.00	100.00
Paschim Medinipur	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	0.00	0.00	0.00	0.00
	Neither satisfied nor dissatisfied	0.00	0.00	0.00	0.00
	Satisfied	56.25	0.00	0.00	56.25
	Very satisfied	43.75	0.00	0.00	43.75
	Total	100.00	0.00	0.00	100.00
Purba Medinipur	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	4.26	0.00	50.00	6.12
	Neither satisfied nor dissatisfied	17.02	0.00	0.00	16.33
	Satisfied	63.83	0.00	50.00	63.27
	Very satisfied	14.89	0.00	0.00	14.29
	Total	100.00	0.00	100.00	100.00
Purulia	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	0.00	0.00	0.00	0.00
	Neither satisfied nor dissatisfied	0.00	10.00	0.00	7.14
	Satisfied	0.00	70.00	100.00	78.57
	Very satisfied	0.00	20.00	0.00	14.29
	Total	0.00	100.00	100.00	100.00
South 24 Parganas	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	0.00	0.00	100.00	51.85
	Neither satisfied nor dissatisfied	0.00	0.00	0.00	0.00
	Satisfied	0.00	92.31	0.00	44.44
	Very satisfied	0.00	7.69	0.00	3.70
	Total	0.00	100.00	100.00	100.00
South Dinajpur	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	0.00	0.00	0.00	0.00
	Neither satisfied nor dissatisfied	0.00	0.00	0.00	0.00
	Satisfied	100.00	0.00	0.00	100.00
	Very satisfied	0.00	0.00	0.00	0.00
	Total	100.00	0.00	0.00	100.00
Uttar Dinajpur	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	0.00	0.00	0.00	0.00
	Neither satisfied nor dissatisfied	0.00	0.00	0.00	0.00
	Satisfied	100.00	0.00	0.00	100.00
	Very satisfied	0.00	0.00	0.00	0.00
	Total	100.00	0.00	0.00	100.00

Source: Primary Survey,
2019

Appendix Table 3.2: Members' Satisfaction (District Wise) with the Assistance/Compensation Received against Land Donation (in %)

District	Satisfaction Level	Irrigation Category			Total
		I	II	III	
Bankura	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	0.00	0.00	0.00	0.00
	Neither satisfied nor dissatisfied	0.00	0.00	0.00	0.00
	Satisfied	0.00	88.89	0.00	88.89
	Very satisfied	0.00	11.11	0.00	11.11
	Total	0.00	100.00	0.00	100.00
Bardhaman	Extremely dissatisfied	9.09	0.00	0.00	7.27
	Dissatisfied	0.00	18.18	0.00	3.64
	Neither satisfied nor dissatisfied	22.73	45.45	0.00	27.27
	Satisfied	45.45	36.36	0.00	43.64
	Very satisfied	22.73	0.00	0.00	18.18
	Total	100.00	100.00	0.00	100.00
Birbhum	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	0.00	0.00	0.00	0.00
	Neither satisfied nor dissatisfied	20.00	0.00	0.00	8.33
	Satisfied	80.00	100.00	0.00	91.67
	Very satisfied	0.00	0.00	0.00	0.00
	Total	100.00	100.00	0.00	100.00
Cooch Behar	Extremely dissatisfied	5.56	0.00	0.00	3.85
	Dissatisfied	44.44	37.50	0.00	42.31
	Neither satisfied nor dissatisfied	0.00	50.00	0.00	15.38
	Satisfied	44.44	0.00	0.00	30.77
	Very satisfied	5.56	12.50	0.00	7.69
	Total	100.00	100.00	0.00	100.00
Darjeeling	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	50.00	0.00	0.00	50.00
	Neither satisfied nor dissatisfied	18.75	0.00	0.00	18.75
	Satisfied	31.25	0.00	0.00	31.25
	Very satisfied	0.00	0.00	0.00	0.00
	Total	100.00	0.00	0.00	100.00
Howrah	Extremely dissatisfied	0.00	30.77	0.00	17.78
	Dissatisfied	0.00	23.08	0.00	13.33

District	Satisfaction Level	Irrigation Category			Total
		I	II	III	
	Neither satisfied nor dissatisfied	16.67	0.00	0.00	4.44
	Satisfied	83.33	26.92	85.71	51.11
	Very satisfied	0.00	19.23	14.29	13.33
	Total	100.00	100.00	100.00	100.00
Jalpaiguri	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	0.00	0.00	0.00	0.00
	Neither satisfied nor dissatisfied	26.67	0.00	0.00	25.00
	Satisfied	63.33	100.00	0.00	65.63
	Very satisfied	10.00	0.00	0.00	9.38
	Total	100.00	100.00	0.00	100.00
Jhargram	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	0.00	0.00	0.00	0.00
	Neither satisfied nor dissatisfied	0.00	0.00	22.22	10.53
	Satisfied	0.00	70.00	77.78	73.68
	Very satisfied	0.00	30.00	0.00	15.79
	Total	0.00	100.00	100.00	100.00
Malda	Extremely dissatisfied	22.22	0.00	0.00	13.33
	Dissatisfied	22.22	0.00	0.00	13.33
	Neither satisfied nor dissatisfied	0.00	33.33	0.00	13.33
	Satisfied	55.56	50.00	0.00	53.33
	Very satisfied	0.00	16.67	0.00	6.67
	Total	100.00	100.00	0.00	100.00
Murshidabad	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	16.67	0.00	0.00	7.69
	Neither satisfied nor dissatisfied	16.67	0.00	0.00	7.69
	Satisfied	66.67	100.00	0.00	84.62
	Very satisfied	0.00	0.00	0.00	0.00
	Total	100.00	100.00	0.00	100.00
Nadia	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	0.00	0.00	0.00	0.00
	Neither satisfied nor dissatisfied	0.00	0.00	0.00	0.00
	Satisfied	50.00	71.43	0.00	58.82
	Very satisfied	50.00	28.57	0.00	41.18

District	Satisfaction Level	Irrigation Category			Total
		I	II	III	
	Total	100.00	100.00	0.00	100.00
Paschim Medinipur	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	0.00	0.00	0.00	0.00
	Neither satisfied nor dissatisfied	12.50	0.00	0.00	12.50
	Satisfied	50.00	0.00	0.00	50.00
	Very satisfied	37.50	0.00	0.00	37.50
	Total	100.00	0.00	0.00	100.00
Purba Medinipur	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	2.13	0.00	50.00	4.08
	Neither satisfied nor dissatisfied	29.79	0.00	0.00	28.57
	Satisfied	63.83	0.00	50.00	63.27
	Very satisfied	4.26	0.00	0.00	4.08
	Total	100.00	0.00	100.00	100.00
Purulia	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	0.00	0.00	0.00	0.00
	Neither satisfied nor dissatisfied	0.00	10.00	25.00	14.29
	Satisfied	0.00	70.00	75.00	71.43
	Very satisfied	0.00	20.00	0.00	14.29
	Total	0.00	100.00	100.00	100.00
South 24 Parganas	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	0.00	0.00	28.57	14.81
	Neither satisfied nor dissatisfied	0.00	0.00	71.43	37.04
	Satisfied	0.00	92.31	0.00	44.44
	Very satisfied	0.00	7.69	0.00	3.70
	Total	0.00	100.00	100.00	100.00
South Dinajpur	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	0.00	0.00	0.00	0.00
	Neither satisfied nor dissatisfied	0.00	0.00	0.00	0.00
	Satisfied	100.00	0.00	0.00	100.00
	Very satisfied	0.00	0.00	0.00	0.00
	Total	100.00	0.00	0.00	100.00
Uttar Dinajpur	Extremely dissatisfied	0.00	0.00	0.00	0.00
	Dissatisfied	0.00	0.00	0.00	0.00
	Neither satisfied nor dissatisfied	0.00	0.00	0.00	0.00
	Satisfied	100.00	0.00	0.00	100.00
	Very satisfied	0.00	0.00	0.00	0.00

District	Satisfaction Level	Irrigation Category			Total
		I	II	III	
	Total	100.00	0.00	0.00	100.00

Source: Primary Survey,
2019

Appendix Table 3.3: Members' Responses regarding their Perception of Improvement in Crop/Fish Production

District	Perception Level	Irrigation Category			Total
		I	II	III	
Bankura	Deteriorated a lot	0.00	0.00	0.00	0.00
	Deteriorated a little	0.00	0.00	0.00	0.00
	Unchanged	0.00	33.33	0.00	33.33
	Improved a little	0.00	33.33	0.00	33.33
	Improved a lot	0.00	33.33	0.00	33.33
	Not Applicable	0.00	0.00	0.00	0.00
Bardhaman	Deteriorated a lot	0.00	0.00	0.00	0.00
	Deteriorated a little	4.55	0.00	0.00	3.64
	Unchanged	6.82	9.09	0.00	7.27
	Improved a little	43.18	90.91	0.00	52.73
	Improved a lot	45.45	0.00	0.00	36.36
	Not Applicable	0.00	0.00	0.00	0.00
Birbhum	Deteriorated a lot	0.00	0.00	0.00	0.00
	Deteriorated a little	0.00	0.00	0.00	0.00
	Unchanged	0.00	0.00	0.00	0.00
	Improved a little	80.00	14.29	0.00	41.67
	Improved a lot	20.00	85.71	0.00	58.33
	Not Applicable	0.00	0.00	0.00	0.00
Cooch Behar	Deteriorated a lot	0.00	12.50	0.00	3.85
	Deteriorated a little	0.00	0.00	0.00	0.00
	Unchanged	0.00	50.00	0.00	15.38
	Improved a little	5.56	0.00	0.00	3.85
	Improved a lot	44.44	0.00	0.00	30.77
	Not Applicable	50.00	37.50	0.00	46.15
Darjeeling	Deteriorated a lot	0.00	0.00	0.00	0.00
	Deteriorated a little	0.00	0.00	0.00	0.00
	Unchanged	0.00	0.00	0.00	0.00
	Improved a little	31.25	0.00	0.00	31.25
	Improved a lot	18.75	0.00	0.00	18.75
	Not Applicable	50.00	0.00	0.00	50.00
Howrah	Deteriorated a lot	0.00	0.00	0.00	0.00

District	Perception Level	Irrigation Category			Total
		I	II	III	
	Deteriorated a little	0.00	0.00	0.00	0.00
	Unchanged	33.33	0.00	0.00	8.89
	Improved a little	58.33	7.69	71.43	31.11
	Improved a lot	8.33	38.46	28.57	28.89
	Not Applicable	0.00	53.85	0.00	31.11
	Jalpaiguri	Deteriorated a lot	0.00	0.00	0.00
Deteriorated a little		3.33	0.00	0.00	3.13
Unchanged		0.00	0.00	0.00	0.00
Improved a little		40.00	0.00	0.00	37.50
Improved a lot		56.67	100.00	0.00	59.38
Not Applicable		0.00	0.00	0.00	0.00
Jhargram	Deteriorated a lot	0.00	0.00	0.00	0.00
	Deteriorated a little	0.00	10.00	0.00	5.26
	Unchanged	0.00	20.00	33.33	26.32
	Improved a little	0.00	40.00	55.56	47.37
	Improved a lot	0.00	30.00	11.11	21.05
	Not Applicable	0.00	0.00	0.00	0.00
Malda	Deteriorated a lot	0.00	0.00	0.00	0.00
	Deteriorated a little	0.00	33.33	0.00	13.33
	Unchanged	0.00	16.67	0.00	6.67
	Improved a little	0.00	33.33	0.00	13.33
	Improved a lot	55.56	16.67	0.00	40.00
	Not Applicable	44.44	0.00	0.00	26.67
Murshidabad	Deteriorated a lot	0.00	0.00	0.00	0.00
	Deteriorated a little	0.00	0.00	0.00	0.00
	Unchanged	16.67	0.00	0.00	7.69
	Improved a little	33.33	85.71	0.00	61.54
	Improved a lot	50.00	14.29	0.00	30.77
	Not Applicable	0.00	0.00	0.00	0.00
Nadia	Deteriorated a lot	0.00	0.00	0.00	0.00
	Deteriorated a little	0.00	0.00	0.00	0.00
	Unchanged	0.00	0.00	0.00	0.00
	Improved a little	10.00	14.29	0.00	11.76
	Improved a lot	90.00	85.71	0.00	88.24
	Not Applicable	0.00	0.00	0.00	0.00
Paschim Medinipur	Deteriorated a lot	0.00	0.00	0.00	0.00
	Deteriorated a little	12.50	0.00	0.00	12.50
	Unchanged	0.00	0.00	0.00	0.00
	Improved a little	56.25	0.00	0.00	56.25
	Improved a lot	31.25	0.00	0.00	31.25

District	Perception Level	Irrigation Category			Total
		I	II	III	
	Not Applicable	0.00	0.00	0.00	0.00
Purba Medinipur	Deteriorated a lot	2.13	0.00	0.00	2.04
	Deteriorated a little	4.26	0.00	0.00	4.08
	Unchanged	10.64	0.00	0.00	10.20
	Improved a little	51.06	0.00	0.00	48.98
	Improved a lot	31.91	0.00	50.00	32.65
	Not Applicable	0.00	0.00	50.00	2.04
Purulia	Deteriorated a lot	0.00	0.00	0.00	0.00
	Deteriorated a little	0.00	0.00	0.00	0.00
	Unchanged	0.00	0.00	25.00	7.14
	Improved a little	0.00	60.00	50.00	57.14
	Improved a lot	0.00	40.00	25.00	35.71
	Not Applicable	0.00	0.00	0.00	0.00
South 24 Parganas	Deteriorated a lot	0.00	0.00	0.00	0.00
	Deteriorated a little	0.00	0.00	0.00	0.00
	Unchanged	0.00	7.69	0.00	3.70
	Improved a little	0.00	46.15	0.00	22.22
	Improved a lot	0.00	46.15	0.00	22.22
	Not Applicable	0.00	0.00	100.00	51.85
South Dinajpur	Deteriorated a lot	0.00	0.00	0.00	0.00
	Deteriorated a little	0.00	0.00	0.00	0.00
	Unchanged	0.00	0.00	0.00	0.00
	Improved a little	33.33	0.00	0.00	33.33
	Improved a lot	66.67	0.00	0.00	66.67
	Not Applicable	0.00	0.00	0.00	0.00
Uttar Dinajpur	Deteriorated a lot	0.00	0.00	0.00	0.00
	Deteriorated a little	0.00	0.00	0.00	0.00
	Unchanged	0.00	0.00	0.00	0.00
	Improved a little	0.00	0.00	0.00	0.00
	Improved a lot	100.00	0.00	0.00	100.00
	Not Applicable	0.00	0.00	0.00	0.00

Source: Primary Survey, 2019

Appendix Table 3.4: Members' Responses (District wise) regarding their Readiness to Run WUAs (in %)

District	Response	Irrigation Category			Total
		I	II	III	
Bankura	Yes	0.00	0.00	0.00	0.00

District	Response	Irrigation Category			Total
		I	II	III	
	Yes, but will face problems	0.00	22.22	0.00	22.22
	No	0.00	77.78	0.00	77.78
	DK	0.00	0.00	0.00	0.00
	Total	0.00	100.00	0.00	100.00
Bardhaman	Yes	34.09	27.27	0.00	32.73
	Yes, but will face problems	34.09	54.55	0.00	38.18
	No	31.82	18.18	0.00	29.09
	DK	0.00	0.00	0.00	0.00
	Total	100.00	100.00	0.00	100.00
Birbhum	Yes	20.00	0.00	0.00	8.33
	Yes, but will face problems	0.00	42.86	0.00	25.00
	No	80.00	57.14	0.00	66.67
	DK	0.00	0.00	0.00	0.00
	Total	100.00	100.00	0.00	100.00
Cooch Behar	Yes	22.22	62.50	0.00	34.62
	Yes, but will face problems	27.78	0.00	0.00	19.23
	No	0.00	0.00	0.00	0.00
	DK	50.00	37.50	0.00	46.15
	Total	100.00	100.00	0.00	100.00
Darjeeling	Yes	50.00	0.00	0.00	50.00
	Yes, but will face problems	0.00	0.00	0.00	0.00
	No	0.00	0.00	0.00	0.00
	DK	50.00	0.00	0.00	50.00
	Total	100.00	0.00	0.00	100.00
Howrah	Yes	58.33	15.38	28.57	28.89
	Yes, but will face problems	8.33	11.54	28.57	13.33
	No	33.33	19.23	42.86	26.67
	DK	0.00	53.85	0.00	31.11
	Total	100.00	100.00	100.00	100.00
Jalpaiguri	Yes	46.67	0.00	0.00	43.75
	Yes, but will face problems	40.00	100.00	0.00	43.75
	No	13.33	0.00	0.00	12.50
	DK	0.00	0.00	0.00	0.00
	Total	100.00	100.00	0.00	100.00

District	Response	Irrigation Category			Total
		I	II	III	
Jhargram	Yes	0.00	40.00	44.44	42.11
	Yes, but will face problems	0.00	60.00	44.44	52.63
	No	0.00	0.00	11.11	5.26
	DK	0.00	0.00	0.00	0.00
	Total	0.00	100.00	100.00	100.00
Malda	Yes	33.33	66.67	0.00	46.67
	Yes, but will face problems	0.00	16.67	0.00	6.67
	No	22.22	16.67	0.00	20.00
	DK	44.44	0.00	0.00	26.67
	Total	100.00	100.00	100.00	100.00
Murshidabad	Yes	0.00	0.00	0.00	0.00
	Yes, but will face problems	33.33	14.29	0.00	23.08
	No	66.67	85.71	0.00	76.92
	DK	0.00	0.00	0.00	0.00
	Total	100.00	100.00	0.00	100.00
Nadia	Yes	20.00	28.57	0.00	23.53
	Yes, but will face problems	60.00	28.57	0.00	47.06
	No	20.00	42.86	0.00	29.41
	DK	0.00	0.00	0.00	0.00
	Total	100.00	100.00	0.00	100.00
Paschim Medinipur	Yes	31.25	0.00	0.00	31.25
	Yes, but will face problems	50.00	0.00	0.00	50.00
	No	18.75	0.00	0.00	18.75
	DK	0.00	0.00	0.00	0.00
	Total	100.00	0.00	0.00	100.00
Purba Medinipur	Yes	53.19	0.00	0.00	51.02
	Yes, but will face problems	19.15	0.00	50.00	20.41
	No	27.66	0.00	0.00	26.53
	DK	0.00	0.00	50.00	2.04
	Total	100.00	0.00	100.00	100.00
Purulia	Yes	0.00	10.00	25.00	14.29
	Yes, but will face problems	0.00	50.00	50.00	50.00

District	Response	Irrigation Category			Total
		I	II	III	
	No	0.00	40.00	25.00	35.71
	DK	0.00	0.00	0.00	0.00
	Total	0.00	100.00	100.00	100.00
	Yes	0.00	76.92	0.00	37.04
South 24 Parganas	Yes, but will face problems	0.00	23.08	0.00	11.11
	No	0.00	0.00	0.00	0.00
	DK	0.00	0.00	100.00	51.85
	Total	0.00	100.00	100.00	100.00
	Yes	0.00	0.00	0.00	0.00
South Dinajpur	Yes, but will face problems	73.33	0.00	0.00	73.33
	No	26.67	0.00	0.00	26.67
	DK	0.00	0.00	0.00	0.00
	Total	100.00	0.00	0.00	100.00
	Yes	48.15	0.00	0.00	48.15
Uttar Dinajpur	Yes, but will face problems	25.93	0.00	0.00	25.93
	No	25.93	0.00	0.00	25.93
	DK	0.00	0.00	0.00	0.00
	Total	100.00	0.00	0.00	100.00

Source: Primary Survey, 2019

Appendix Table 3.5: Members' Responses (District wise) regarding Future Problems in WUA Functioning (in %)

District	Type of problems	Irrigation Category			Total
		I	II	III	
Bankura	No Problem	0.00	22.22	0.00	22.22
	Handling different documents	0.00	22.22	0.00	22.22
	Lack of technical support	0.00	11.11	0.00	11.11
	Maintenance of bank account	0.00	44.44	0.00	44.44
	Loosing opportunities currently available	0.00	0.00	0.00	0.00
	Lack of communicate with departments	0.00	0.00	0.00	0.00

District	Type of problems	Irrigation Category			Total
		I	II	III	
	Total	0.00	100.00	0.00	100.00
Bardhaman	No Problem	31.82	18.18	0.00	29.09
	Handling different documents	20.45	27.27	0.00	21.82
	Lack of technical support	18.18	18.18	0.00	18.18
	Maintenance of bank account	18.18	27.27	0.00	20.00
	Loosing opportunities currently available	0.00	0.00	0.00	0.00
	Lack of communicate with departments	11.36	9.09	0.00	10.91
	Total	100.00	100.00	0.00	100.00
Birbhum	No Problem	40.00	57.14	0.00	50.00
	Handling different documents	0.00	0.00	0.00	0.00
	Lack of technical support	20.00	0.00	0.00	8.33
	Maintenance of bank account	0.00	0.00	0.00	0.00
	Loosing opportunities currently available	0.00	0.00	0.00	0.00
	Lack of communicate with departments	40.00	42.86	0.00	41.67
	Total	100.00	100.00	0.00	100.00
Cooch Behar	No Problem	22.22	80.00	0.00	42.86
	Handling different documents	33.33	20.00	0.00	28.57
	Lack of technical support	0.00	0.00	0.00	0.00
	Maintenance of bank account	22.22	0.00	0.00	14.29
	Loosing opportunities currently available	0.00	0.00	0.00	0.00
	Lack of communicate with departments	22.22	0.00	0.00	14.29
	Total	100.00	100.00	0.00	100.00

District	Type of problems	Irrigation Category			Total
		I	II	III	
Darjeeling	No Problem	25.00	0.00	0.00	25.00
	Handling different documents	0.00	0.00	0.00	0.00
	Lack of technical support	0.00	0.00	0.00	0.00
	Maintenance of bank account	0.00	0.00	0.00	0.00
	Loosing opportunities currently available	25.00	0.00	0.00	25.00
	Lack of communicate with departments	50.00	0.00	0.00	50.00
	Total	100.00	0.00	0.00	100.00
Howrah	No Problem	50.00	33.33	42.86	41.94
	Handling different documents	8.33	16.67	0.00	9.68
	Lack of technical support	16.67	8.33	0.00	9.68
	Maintenance of bank account	16.67	16.67	0.00	12.90
	Loosing opportunities currently available	8.33	8.33	28.57	12.90
	Lack of communicate with departments	0.00	16.67	28.57	12.90
	Total	100.00	100.00	100.00	100.00
Jalpaiguri	No Problem	10.00	0.00	0.00	9.38
	Handling different documents	46.67	0.00	0.00	43.75
	Lack of technical support	20.00	0.00	0.00	18.75
	Maintenance of bank account	0.00	0.00	0.00	0.00
	Loosing opportunities currently available	3.33	0.00	0.00	3.13
	Lack of communicate with departments	20.00	100.00	0.00	25.00
	Total	100.00	100.00	0.00	100.00
Jhargram	No Problem	0.00	10.00	22.22	15.79

District	Type of problems	Irrigation Category			Total
		I	II	III	
	Handling different documents	0.00	40.00	33.33	36.84
	Lack of technical support	0.00	10.00	11.11	10.53
	Maintenance of bank account	0.00	10.00	0.00	5.26
	Loosing opportunities currently available	0.00	0.00	11.11	5.26
	Lack of communicate with departments	0.00	30.00	22.22	26.32
	Total	0.00	100.00	100.00	100.00
Malda	No Problem	60.00	16.67	0.00	36.36
	Handling different documents	0.00	66.67	0.00	36.36
	Lack of technical support	0.00	0.00	0.00	0.00
	Maintenance of bank account	0.00	0.00	0.00	0.00
	Loosing opportunities currently available	40.00	16.67	0.00	27.27
	Lack of communicate with departments	0.00	0.00	0.00	0.00
	Total	100.00	100.00	0.00	100.00
Murshidabad	No Problem	16.67	14.29	0.00	15.38
	Handling different documents	33.33	14.29	0.00	23.08
	Lack of technical support	33.33	42.86	0.00	38.46
	Maintenance of bank account	0.00	28.57	0.00	15.38
	Loosing opportunities currently available	0.00	0.00	0.00	0.00
	Lack of communicate with departments	16.67	0.00	0.00	7.69
	Total	100.00	100.00	0.00	100.00
Nadia	No Problem	40.00	28.57	0.00	35.29
	Handling different documents	30.00	14.29	0.00	23.53

District	Type of problems	Irrigation Category			Total
		I	II	III	
	Lack of technical support	0.00	0.00	0.00	0.00
	Maintenance of bank account	0.00	42.86	0.00	17.65
	Loosing opportunities currently available	0.00	0.00	0.00	0.00
	Lack of communicate with departments	30.00	14.29	0.00	23.53
	Total	100.00	100.00	0.00	100.00
	Paschim Medinipur	No Problem	12.50	0.00	0.00
Handling different documents		25.00	0.00	0.00	25.00
Lack of technical support		12.50	0.00	0.00	12.50
Maintenance of bank account		12.50	0.00	0.00	12.50
Loosing opportunities currently available		0.00	0.00	0.00	0.00
Lack of communicate with departments		37.50	0.00	0.00	37.50
Total		100.00	0.00	0.00	100.00
Purba Medinipur	No Problem	21.28	0.00	0.00	20.83
	Handling different documents	14.89	0.00	0.00	14.58
	Lack of technical support	19.15	0.00	0.00	18.75
	Maintenance of bank account	14.89	0.00	0.00	14.58
	Loosing opportunities currently available	21.28	0.00	0.00	20.83
	Lack of communicate with departments	8.51	0.00	100.00	10.42
	Total	100.00	0.00	100.00	100.00
Purulia	No Problem	0.00	10.00	50.00	21.43
	Handling different documents	0.00	40.00	25.00	35.71

District	Type of problems	Irrigation Category			Total
		I	II	III	
	Lack of technical support	0.00	30.00	0.00	21.43
	Maintenance of bank account	0.00	10.00	25.00	14.29
	Loosing opportunities currently available	0.00	10.00	0.00	7.14
	Lack of communicate with departments	0.00	0.00	0.00	0.00
	Total	0.00	100.00	100.00	100.00
South 24 Parganas	No Problem	0.00	10.00	50.00	21.43
	Handling different documents	0.00	40.00	25.00	35.71
	Lack of technical support	0.00	30.00	0.00	21.43
	Maintenance of bank account	0.00	10.00	25.00	14.29
	Loosing opportunities currently available	0.00	10.00	0.00	7.14
	Lack of communication with departments	0.00	0.00	0.00	0.00
	Total	0.00	100.00	100.00	100.00
South Dinajpur	No Problem	0.00	38.46	0.00	38.46
	Handling different documents	0.00	23.08	0.00	23.08
	Lack of technical support	0.00	15.38	0.00	15.38
	Maintenance of bank account	0.00	7.69	0.00	7.69
	Loosing opportunities currently available	0.00	0.00	0.00	0.00
	Lack of communicate with departments	0.00	15.38	0.00	15.38
	Total	0.00	100.00	0.00	100.00

Source: Primary Survey, 2019

Appendix Table 3.6: Members' Responses (District wise) regarding Future Plan of Action (in %)

District	Type of Plan	Irrigation Category			Total
		I	II	III	
Bankura	Increasing participation in WUA activities	0.00	66.67	0.00	66.67
	Seeking government support	0.00	0.00	0.00	0.00
	Continuing with the current mode of functioning	0.00	11.11	0.00	11.11
	Increasing agricultural productivity	0.00	0.00	0.00	0.00
	Preparing a separate plan	0.00	22.22	0.00	22.22
	Not Sure	0.00	0.00	0.00	0.00
Bardhaman	Increasing participation in WUA activities	47.73	90.91	0.00	56.36
	Seeking government support	6.82	0.00	0.00	5.45
	Continuing with the current mode of functioning	27.27	9.09	0.00	23.64
	Increasing agricultural productivity	0.00	0.00	0.00	0.00
	Preparing a separate plan	2.27	0.00	0.00	1.82
	Not Sure	15.91	0.00	0.00	12.73
Birbhum	Increasing participation in WUA activities	40.00	28.57	0.00	33.33
	Seeking government support	0.00	14.29	0.00	8.33
	Continuing with the current mode of functioning	60.00	42.86	0.00	50.00
	Increasing agricultural productivity	0.00	0.00	0.00	0.00
	Preparing a separate plan	0.00	0.00	0.00	0.00
	Not Sure	0.00	14.29	0.00	8.33

District	Type of Plan	Irrigation Category			Total
		I	II	III	
Cooch Behar	Increasing participation in WUA activities	27.78	0.00	0.00	19.23
	Seeking government support	50.00	37.50	0.00	46.15
	Continuing with the current mode of functioning	22.22	12.50	0.00	19.23
	Increasing agricultural productivity	0.00	0.00	0.00	0.00
	Preparing a separate plan	0.00	0.00	0.00	0.00
	Not Sure	0.00	50.00	0.00	15.38
Darjeeling	Increasing participation in WUA activities	37.50	0.00	0.00	37.50
	Seeking government support	50.00	0.00	0.00	50.00
	Continuing with the current mode of functioning	12.50	0.00	0.00	12.50
	Increasing agricultural productivity	0.00	0.00	0.00	0.00
	Preparing a separate plan	0.00	0.00	0.00	0.00
	Not Sure	0.00	0.00	0.00	0.00
Howrah	Increasing participation in WUA activities	100.00	7.69	14.29	33.33
	Seeking government support	0.00	53.85	0.00	31.11
	Continuing with the current mode of functioning	0.00	30.77	71.43	28.89
	Increasing agricultural productivity	0.00	3.85	0.00	2.22
	Preparing a separate plan	0.00	3.85	14.29	4.44

District	Type of Plan	Irrigation Category			Total
		I	II	III	
	Not Sure	0.00	0.00	0.00	0.00
Jalpaiguri	Increasing participation in WUA activities	33.33	100.00	0.00	37.50
	Seeking government support	6.67	0.00	0.00	6.25
	Continuing with the current mode of functioning	46.67	0.00	0.00	43.75
	Increasing agricultural productivity	3.33	0.00	0.00	3.13
	Preparing a separate plan	6.67	0.00	0.00	6.25
	Not Sure	3.33	0.00	0.00	3.13
Jhargram	Increasing participation in WUA activities	0.00	10.00	33.33	21.05
	Seeking government support	0.00	10.00	0.00	5.26
	Continuing with the current mode of functioning	0.00	70.00	55.56	63.16
	Increasing agricultural productivity	0.00	10.00	0.00	5.26
	Preparing a separate plan	0.00	0.00	11.11	5.26
	Not Sure	0.00	0.00	0.00	0.00
Malda	Increasing participation in WUA activities	0.00	50.00	0.00	20.00
	Seeking government support	44.44	0.00	0.00	26.67
	Continuing with the current mode of functioning	33.33	0.00	0.00	20.00
	Increasing agricultural productivity	0.00	0.00	0.00	0.00
	Preparing a separate plan	0.00	0.00	0.00	0.00
	Not Sure	22.22	50.00	0.00	33.33
Murshidabad	Increasing participation in WUA activities	50.00	85.71	0.00	69.23

District	Type of Plan	Irrigation Category			Total
		I	II	III	
	Seeking government support	16.67	0.00	0.00	7.69
	Continuing with the current mode of functioning	16.67	14.29	0.00	15.38
	Increasing agricultural productivity	16.67	0.00	0.00	7.69
	Preparing a separate plan	0.00	0.00	0.00	0.00
	Not Sure	0.00	0.00	0.00	0.00
Nadia	Increasing participation in WUA activities	20.00	42.86	0.00	29.41
	Seeking government support	10.00	0.00	0.00	5.88
	Continuing with the current mode of functioning	70.00	28.57	0.00	52.94
	Increasing agricultural productivity	0.00	0.00	0.00	0.00
	Preparing a separate plan	0.00	14.29	0.00	5.88
	Not Sure	0.00	14.29	0.00	5.88
Paschim Medinipur	Increasing participation in WUA activities	18.75	0.00	0.00	18.75
	Seeking government support	0.00	0.00	0.00	0.00
	Continuing with the current mode of functioning	81.25	0.00	0.00	81.25
	Increasing agricultural productivity	0.00	0.00	0.00	0.00
	Preparing a separate plan	0.00	0.00	0.00	0.00
	Not Sure	0.00	0.00	0.00	0.00

District	Type of Plan	Irrigation Category			Total
		I	II	III	
Purba Medinipur	Increasing participation in WUA activities	40.43	0.00	50.00	40.82
	Seeking government support	10.64	0.00	50.00	12.24
	Continuing with the current mode of functioning	42.55	0.00	0.00	40.82
	Increasing agricultural productivity	4.26	0.00	0.00	4.08
	Preparing a separate plan	2.13	0.00	0.00	2.04
	Not Sure	0.00	0.00	0.00	0.00
Purulia	Increasing participation in WUA activities	0.00	80.00	0.00	57.14
	Seeking government support	0.00	0.00	25.00	7.14
	Continuing with the current mode of functioning	0.00	10.00	50.00	21.43
	Increasing agricultural productivity	0.00	0.00	0.00	0.00
	Preparing a separate plan	0.00	0.00	0.00	0.00
	Not Sure	0.00	10.00	25.00	14.29
South 24 Parganas	Increasing participation in WUA activities	0.00	61.54	0.00	29.63
	Seeking government support	0.00	0.00	100.00	51.85
	Continuing with the current mode of functioning	0.00	23.08	0.00	11.11
	Increasing agricultural productivity	0.00	7.69	0.00	3.70
	Preparing a separate plan	0.00	0.00	0.00	0.00
	Not Sure	0.00	7.69	0.00	3.70

District	Type of Plan	Irrigation Category			Total
		I	II	III	
South Dinajpur	Increasing participation in WUA activities	6.67	0.00	0.00	6.67
	Seeking government support	0.00	0.00	0.00	0.00
	Continuing with the current mode of functioning	73.33	0.00	0.00	73.33
	Increasing agricultural productivity	6.67	0.00	0.00	6.67
	Preparing a separate plan	0.00	0.00	0.00	0.00
	Not Sure	13.33	0.00	0.00	13.33
Uttar Dinajpur	Increasing participation in WUA activities	18.52	0.00	0.00	18.52
	Seeking government support	18.52	0.00	0.00	18.52
	Continuing with the current mode of functioning	51.85	0.00	0.00	51.85
	Increasing agricultural productivity	0.00	0.00	0.00	0.00
	Preparing a separate plan	7.41	0.00	0.00	7.41
	Not Sure	3.70	0.00	0.00	3.70

Source: Primary Survey, 2019

CHAPTER 4:

DECISION MAKING AND

FUNCTIONING OF WUAs

4.1 Introduction

This chapter deals with different aspects of functioning of the WUAs. Given the inequality among villagers in key socio-economic indicators like land holding, level of education, etc. it remains a challenge to uphold the democratic nature of decision making in WUAs. Water users' response in their involvement in the context of election of management committee is covered in the study. This would reveal not only the democratic or autocratic style of functioning with respect to election, but also indicative of nature of associations' governance in all affairs.

Apart from day-to-day activities, it is also important to assess how the WUAs handle issues of conflicts on which also the study has sought users' responses. One of the critical dealings in WUA would be the protocol of handling those who default on paying user charges. This will indicate the incentive of users' to be regular in payment. It also reflects the level of discipline in the association.

It is also imperative to note that one of the barriers between haves and have-nots is information. Transparency is a key element to sustain members' confidence with the association. This present study looks into the level of understanding of transparency among the users.

Some of these aspects of the functioning of WUAs as expressed by the members not only reflect the involvement of members in different affairs, but overall governance mechanisms practised in these associations. They are also indicative of leadership's character in the associations.

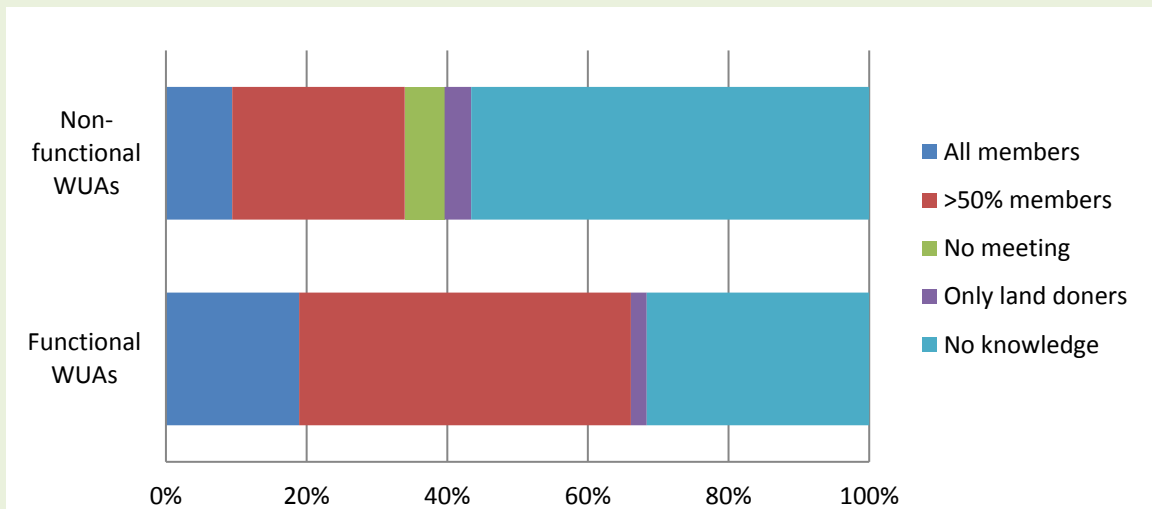
Since this study includes both the functioning and non-functioning WUAs, a comparison of these factors across these WUAs can reveal some correlations between these factors and longevity of the WUAs.

We have also undertaken grade-wise and batch-wise analyses to understand change in the different governance parameters with newer batch or higher grade schemes.

4.2 Democratic nature of decision making

One of the key aspects of the decision making is election of the management committee. Figure 4.1 gives the proportion of respondents responding the levels of involvement of members in election of management committee.

Figure 4.1 Selection process of management committee in functional and non-functional WUAs

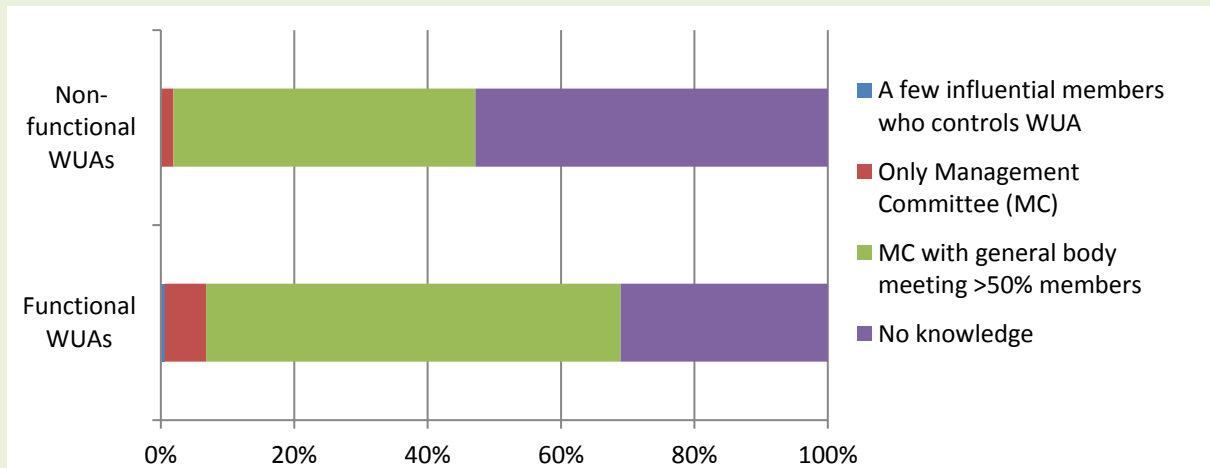


As evident in the figure 4.1, in the functional WUAs approximately two-thirds (66%) respondents opined that all or greater than 50% members are consulted in meeting in the process of selection of management committee, whereas the corresponding figure for non-functional WUAs is one-third (34%). This indicates democratic nature of decision making increases the longevity of the association.

From the responses of the survey, one can conclude the nature of decision making in WUAs are largely democratic. Six out of every 10 respondents opined that the management committees of WUAs took decisions on issues of the associations through general meeting that involved more than 50% members' participation. This nature of decision making is expected to influence the members to be more democratic in their general behaviour in activities of both WUA and beyond.

A comparison in decision making in those WUAs which are functional and those which are not is done in following figure (4.2).

Figure 4.2 Decision making process in the functional and non-functional WUAs

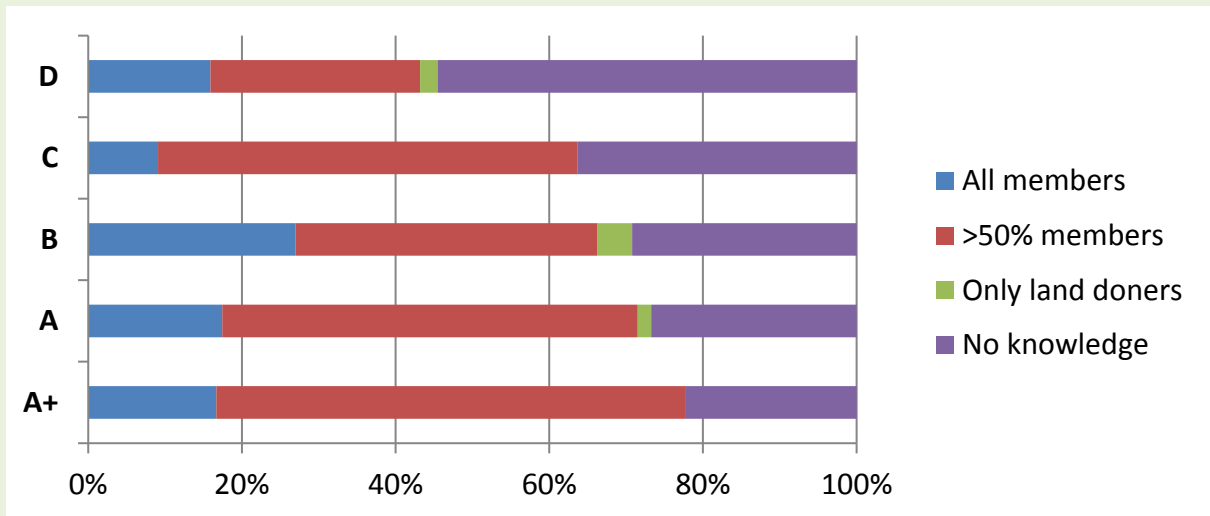


As the figure depicts, for the functional WUAs more than 60% of respondents vouched for democratic decision making in their associations, whereas for the non-functional WUAs less than half of respondents hold the same view.

The democratic nature of decision making is also evident from the fact that when the members were asked ‘what should be done after completion of project?’, more than one-third of the members impromptu answered that all the members opinion needs to considered while deciding future course of WUAs post completion of project. Though this question was asked seeking individual opinion, a substantial portion of the respondents preferring to discuss this issue with the members might indicate that the association with WUAs have instilled the democratic spirit in decision making among the members.

We did a grade-wise analysis of selection process of management committee. The responses of the members are given in the following figure 4.3.

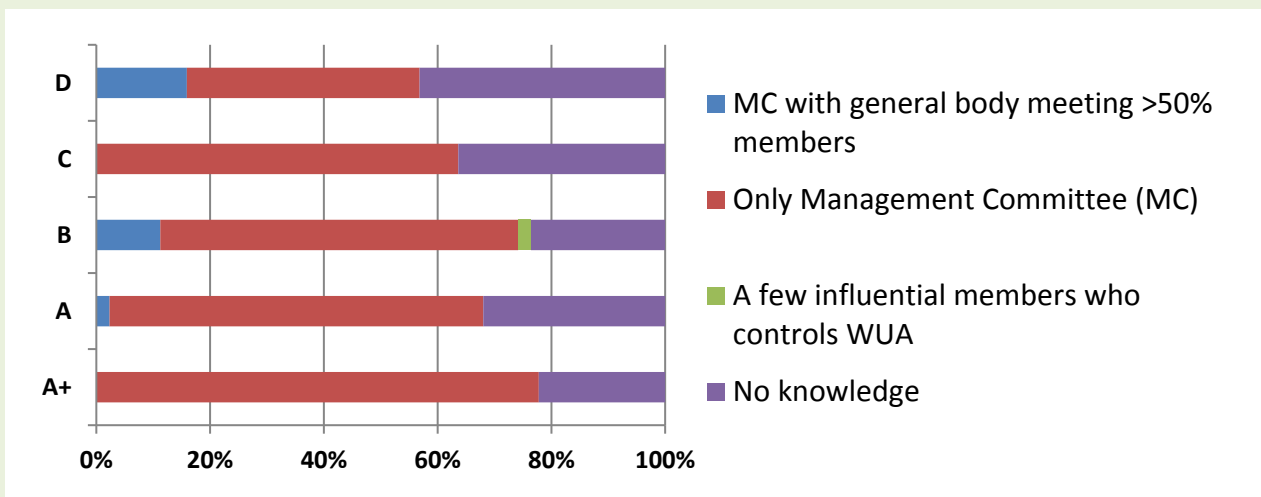
Figure 4.3 Selection of management committee for different grade WUAs



The figure 4.3 indicates that as the grade goes inferior, the democratic nature in selection of management committee declines. Also, the figure shows that with inferior grades the proportion of members having no knowledge on the selection of the management committee increases.

We also did a grade-wise analysis of decision making in the WUAs. The responses of the members are given in the following figure 4.4.

Figure 4.4 Decision making process in different grade WUAs

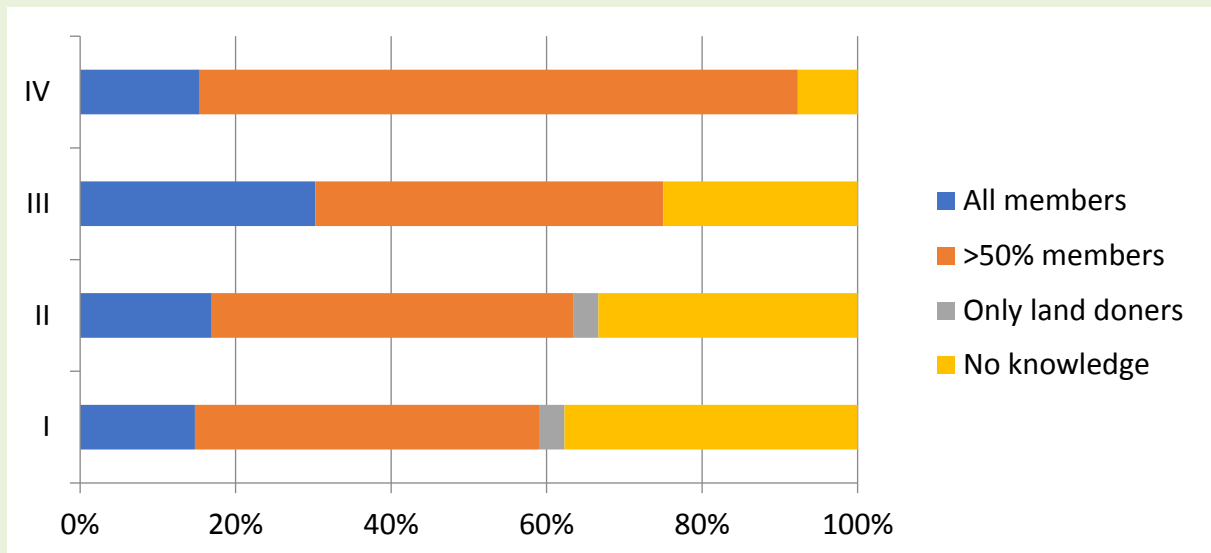


The figure 4.4 indicates, as the grade goes inferior, the decision making through management committee with or without involvement members declines. Also, the figure shows that with

inferior grades the proportion of members having no knowledge on the decision-making increases.

The batch-wise analysis of selection process of management committee given in the figure 4.5. We have not shown here the batches V and VI, because of their very small number.

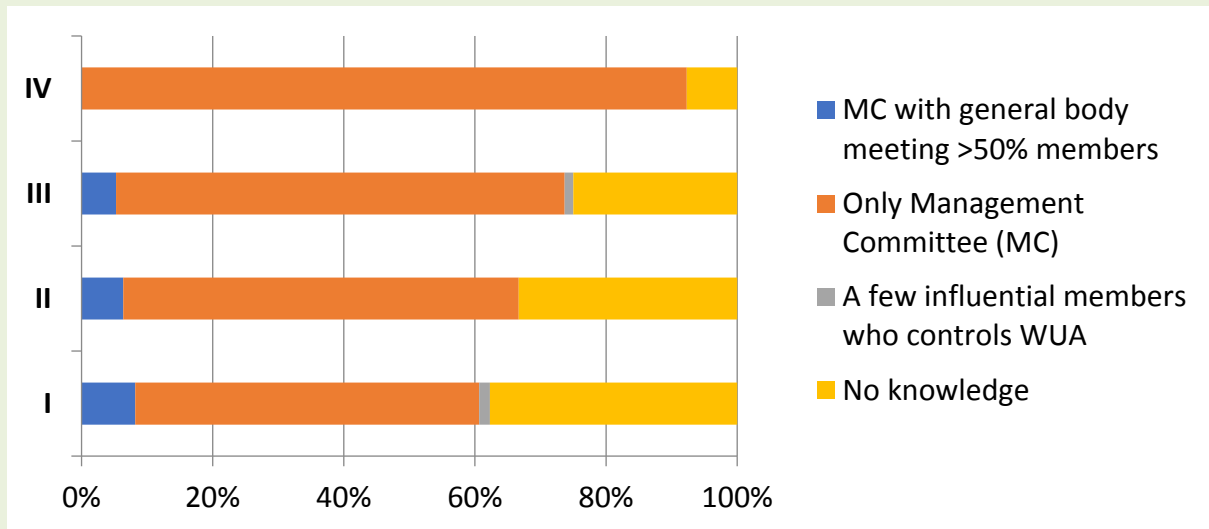
Figure 4.5 Selection of management committee for different batch WUAs



As we move to the later batches (from I to IV) the proportion of WUAs where all or more members involved decreases thereby indicating the fall in the democratic element in the selection process.

The batch-wise analysis of decision making in the WUAs is given in the figure 4.6. The batch V and VI we did not show as their numbers are very less in our sample.

Figure 4.6 Decision making process in different batch WUAs

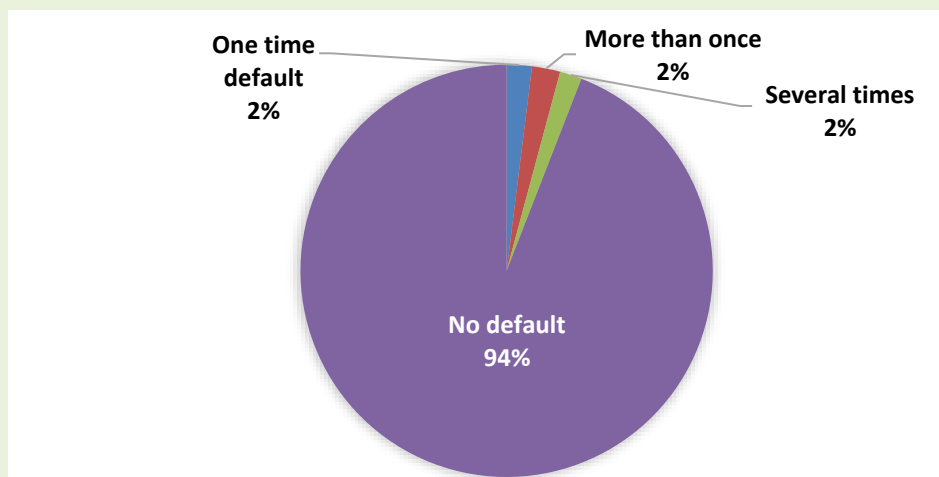


The figure indicates, as we move to later batches, the decision making through management committee with or without involvement members increases. Also, the figure shows that with later batches the proportion of members having no knowledge on the decision-making declines.

4.3 Handling of defaulters

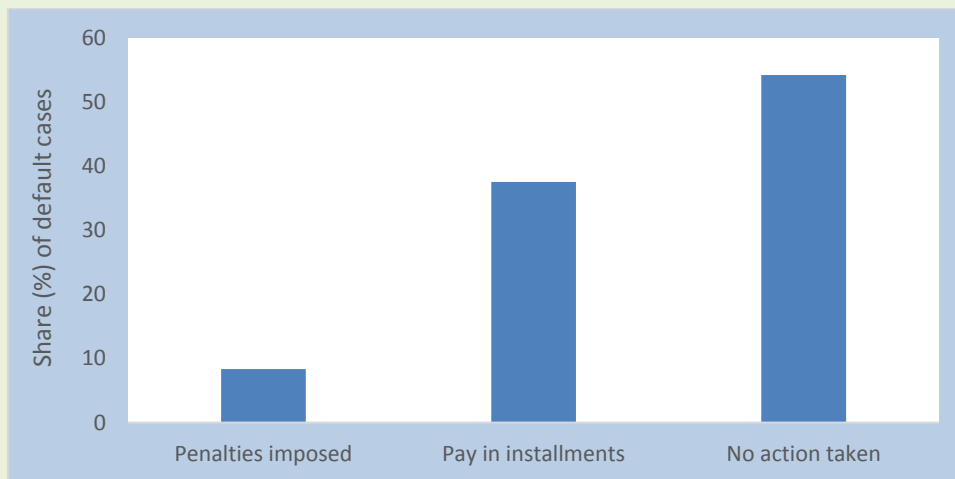
The case of defaulters in WUAs is few and far. Only less than 6% respondents have reported any sort of default. Figure 4.7 gives the distribution of defaulters under different categories (once, more than once, and several times) including non-defaulters.

Figure 4.7 Defaulters of water charges in WUAs



One of the key aspects to minimizing defaulters in an association like WUA depends on the management the defaulters. Figure 4.8 gives the different types of actions taken on defaulters.

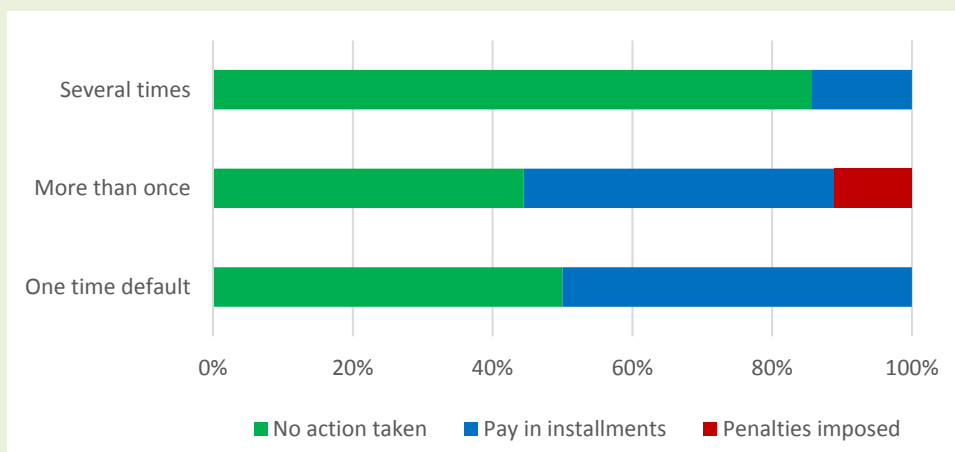
Figure 4.8 Measures taken on the defaulters



As the figure depicts, in more than 50% of the cases no action has been taken on the defaulter. Of the cases where no action has been taken, in three-fourths of the cases the defaulters have defaulted twice or more. In such cases, non-action is not a sustainable idea as it would adversely impact the other members who are paying the charges without default. Lack of penalty in the long run might result in more defaulters as there would not be any incentive to comply.

Figure 4.9 gives the types of penalty for different level of defaulters. As depicted no action has been taken on a large proportion (>80%) of several time defaulters.

Figure 4.9 Measures taken on defaulters of different category



As highlighted in the previous point, non-action in case of the ones who have defaulted several times is not a healthy trend for long term functioning of WUA.

In case of one-time defaulters, quite rightly, either no action has been taken or the member concerned is asked to pay in instalments. Such flexibility is a good sign to maintain cordiality among the members. However, for those who misuse the flexibility, penalties can be introduced and implemented.

There is hardly any culture of penalty in the WUAs. What is in practice is a late payment through instalment. This is a good practice considering non-regularity of farmers' income. From the current survey, it is evident that the same practice has been applied for both one-time and more than once defaulters. Some penalty can be introduced in the scheme of late payment so as to incentivise regular payment.

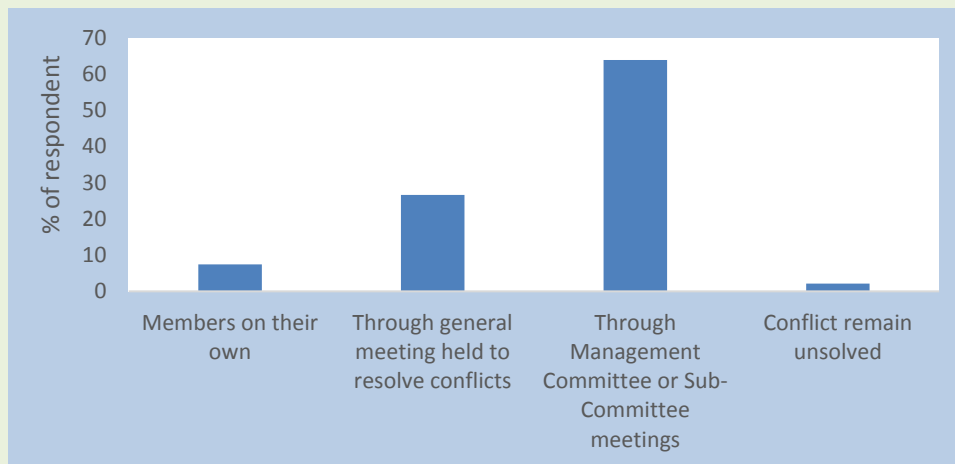
4.4 Conflict resolutions in WUAs

On the issue of conflict resolution, first and foremost, one-third (33%) of the total respondents have indicated that there is no conflict in the association. Absence of conflict situation can indicate two opposing possibilities. The favourable possibility is a situation of greater understanding and fellow feeling among the villagers resulting in a just distribution of benefits of WUAs, hence no conflicts. The unfavourable possibility can be inequality in power structure within WUAs are making unjust recipients of WUA benefits remain voiceless. Between the two possibilities, in the current study, the former is more likely, as the share of such respondents among the members who were affiliated to non-functioning WUAs is 11%.

Like in other aspects of functioning of WUAs, in conflict resolution too, a substantial portion of respondents, i.e., 44% have reported that they do not know how the issues of conflict are solved in the WUAs. This issue cannot be brushed aside given the large share reporting of lack of knowledge.

Of the respondents who acknowledged that there are conflicts in the association, the following figure 4.10 gives different mechanism employed in WUAs for resolution of such conflicts.

Figure 4.10 Conflict resolution mechanism in WUAs

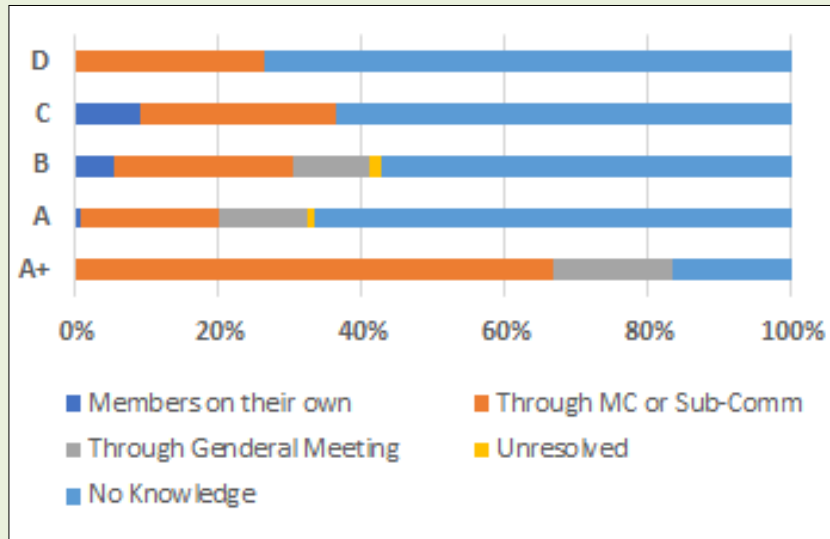


From the above figure it is evident that in more than 90% of cases of conflict, collective interventions were required to resolve the conflict. In more than 70% of such collective intervention, management committee or sub-committee played the key role in resolution of the conflict.

There are a few cases (seven out of 94) members themselves could resolve the conflict. This might indicate a greater autonomy in the cases of such members or may be indicative of minor nature of conflict which did not require interventions from management committee or sub-committee. In rare cases (two out of the 407), the respondent has reported that the conflict has not been resolved.

The grade-wise analysis for conflict resolution is shown in the figure 4.11.

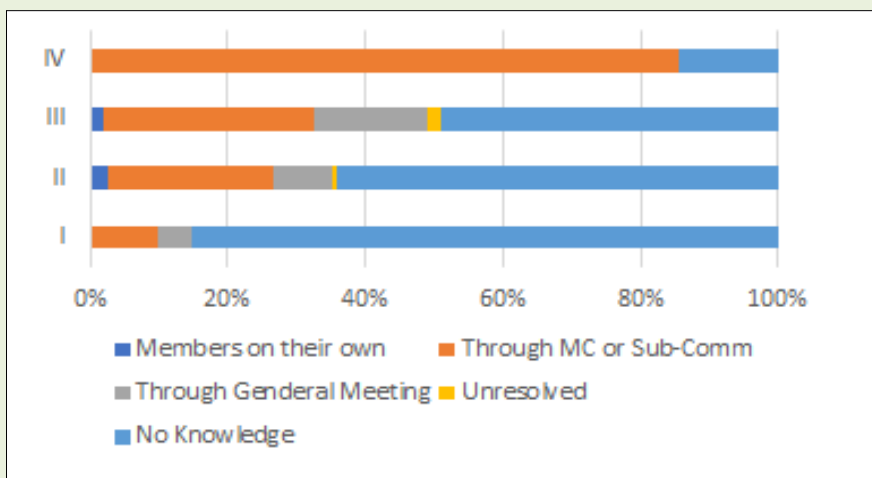
Figure 4.11 Conflict resolution mechanism in WUAs grade-wise



As the grade declines, the resolution rate of conflicts decline. Also, with lower grade, the ignorance or lack of knowledge of conflict resolution increases.

The batch-wise analysis for conflict resolution is shown in the figure 4.12.

Figure 4.12 Conflict resolution mechanism in WUAs batch-wise



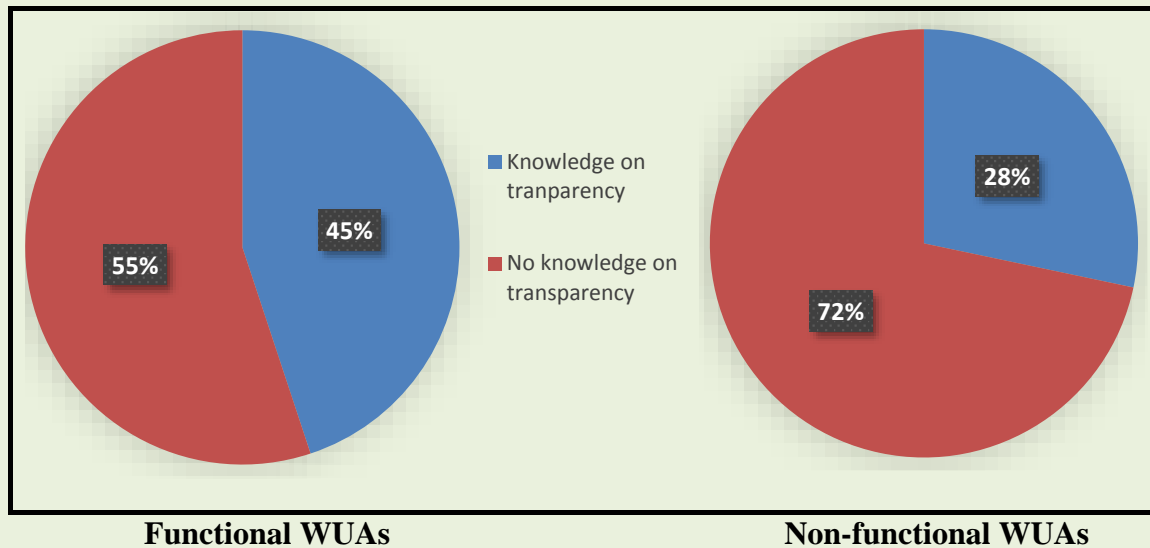
For the later batches, the resolution rate of conflicts improves, indicating better functioning. Also, in later batches, the ignorance on conflict resolution decreases reflecting better awareness level.

4.5 Level of transparency in WUAs

The most striking feature of query on transparency reveals that large portion of the respondents are not aware about transparency. Overall, 44% of respondents have expressed lack of

knowledge on transparency. As expected, this share is different for functioning and non-functioning WUAs, as depicted in the figure 4.13.

Figure 4.13 Knowledge of transparency among water users



The users having knowledge on transparency among the functional users is 45% whereas the corresponding figure for non-functional WUAs is 28%.

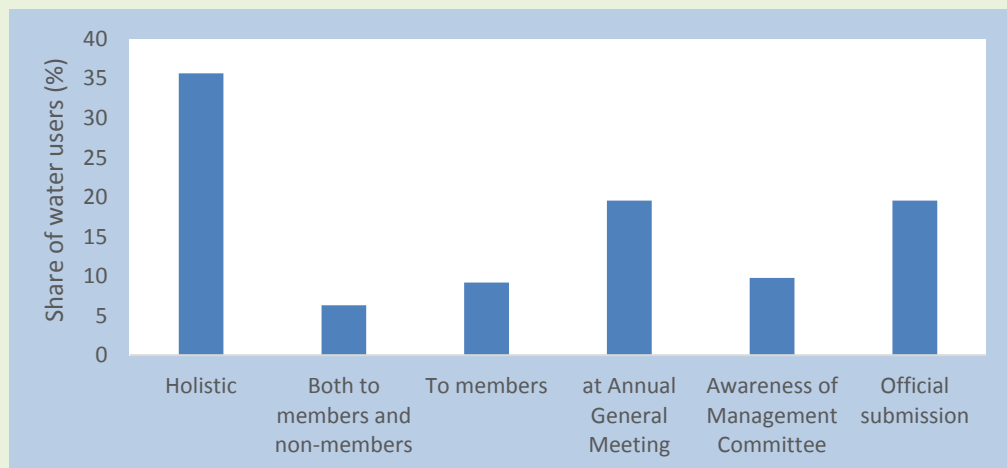
On level of transparency, it was asked to the respondents how they interpret transparency. Based on the top-of-the-mind response, we have categorised the transparency in six levels (, Table 4.1). The levels can vary from a broad level of holistic transparency to a very limited level of submission of documents at the registration office.

Table 4.1 Transparency as interpreted by water users

Transparency interpretation	Level of understanding of transparency
Proactive disclosure is in place	Holistic
Non-members on demands have access to physical and financial information	Both to members and non-members
Management committee (MC) meeting minutes containing physical and financial matters circulated amongst members	To members
Last audit report findings shared with all WUA members in Annual General Meeting	At Annual General Meeting
Most of the MC members aware of the last meetings discussion on physical and financial matters	Awareness of Management Committee
Last audit report shared with Registrars of Societies	Official submission

Among the people who have knowledge on transparency, the share of users at different understanding levels of transparency is given in the figure 4.14.

Figure 4.14 Level of understanding of transparency among water users

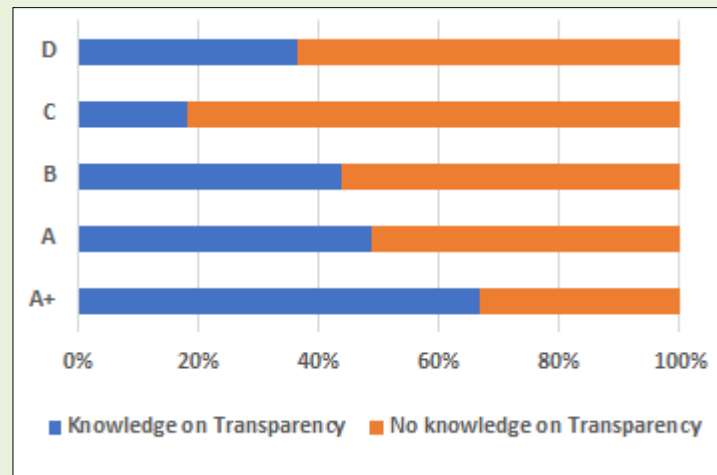


It shows that more than 70% of the water users understands transparency as individual level, whereas approximately 10% of the water users understands the same as a knowledge affair at

the management committee. Approximately 20% of the water users considers the same to be institutional ritual of submission of document to the state department.

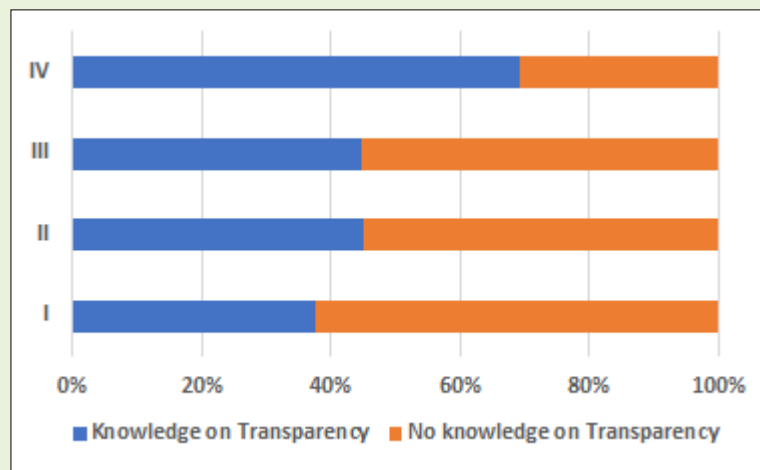
The grade-wise analysis on knowledge on transparency indicates that with decline of grades, the knowledge of transparency falls (Figure 4.15).

Figure 4.15 Knowledge of transparency among water users for different grade WUAs



The batch-wise analysis on knowledge on transparency (Figure 4.16) indicates that with latter batches, the ignorance or lack of knowledge of transparency falls.

Figure 4.16 Knowledge of transparency among water users for different batches

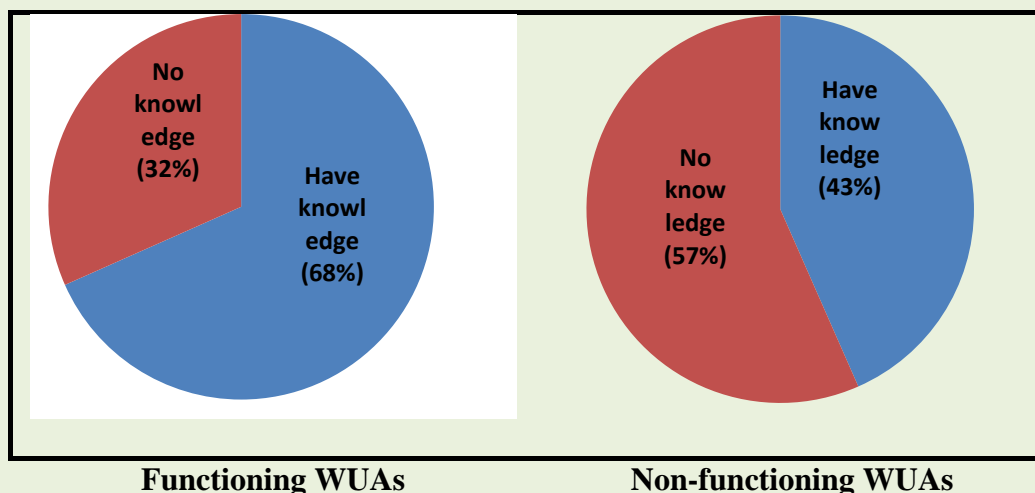


4.6 Awareness on the functioning of WUAs

The current study reveals that one of the key aspects of these WUAs is the awareness among the members on different functioning aspects of the associations. For instance, the Figure 4.17

gives the share of the members having knowledge and not having knowledge on process of formation of management committee.

Figure 4.17 Knowledge regarding selection process of management committee



It is evident from the above figure that in the non-functioning WUAs, approximately six out of 10 members are unaware about selection process of management committee, whereas the corresponding figure for the functioning WUAs are is approximately three out of 10.

This trend of difference in awareness level in functional and non-functional is seen in almost all other aspects of governance, such as issues of decision making, handling of conflicts, or understanding of transparency. This is not trivial, as a comparison among the functioning and non-functioning WUAs indicates a substantial difference in lack of awareness, with the latter ones showing consistently greater shares (Table 4.2).

Table 4.2 Comparison of share of respondents between functioning and non-functioning WUAs who lack knowledge in various aspects

Aspects	Functioning WUAs	Non-functioning WUAs
Formation of management committee	32%	57%
Decision making on issues in WUAs	31%	53%
Disclosure of physical and financial information	55%	72%
Conflict resolution mechanism	40%	72%

Therefore, this study strongly recommends a regular awareness drive among the users on different aspects of WUA functioning. This has a direct bearing on the longevity of the WUAs.

4.7 Conclusion

This chapter deals with different aspects of functioning and governance of the WUAs. A comparative analysis between the functional and non-functional WUAs showed the latter ones are less democratic in terms of members' participation in election of management committee and decision making in their associations. In this sense one can conclude democratic nature of decision making is correlated with the longevity of the association.

Also, the democratic nature of governance is reflected in members' collective faith in decision making, and they have reposed faith on other members when asked what the future of their association should be.

In the grade and batch-wise analysis we found that as the grades go superior and batches are more recent, there is an improvement in democratic nature of functioning of the association. Also, the lack of knowledge on the functioning of the WUAs increases as one goes to inferior grades and earlier batches.

In these associations the defaulters in terms of payment of the water charges are very less (~6%). There is a lack of action on the defaulters, which may lead to more non-compliance in future.

One third of the associations did not report any conflict. The conflict resolutions in the associations do happen through collective action. Unresolved conflicts are too few and far in these associations. However, 44% of respondents have indicated lack of knowledge on conflict resolutions.

The batch and grade-wise analysis show with superior grades and later batches, the knowledge level of members in conflict resolution improves.

Lack of knowledge on transparency among members is also a striking feature of the WUAs with 44% reporting such ignorance. The grade and batch wise analysis shows with inferior grades and earlier batches such ignorance level increases.

Since lack of knowledge in various issues of governance is prevalent in these WUAs, we strongly recommends awareness programmes among the users on different aspects of WUA functioning as the same has a direct bearing on the longevity of the WUAs.

CHAPTER 5: CASE STUDIES OF WUAs

CASE STUDY - ADDITIONAL WUAs COVERED UNDER PRIMARY SURVEY

5.1 Introduction

Case studies of 10 well performing WUAs have been conducted to understand their activities, including water management and cropping practices. The impact of WUAs on the income, and life of members have also been investigated in detail. These WUAs have been identified by the WBADMIP officials as better performers. As per recommendation of WBADMIP scheme district level officials', we have selected 10 WUAs for the case study.

The studies have been conducted through interviews and Focused Group Discussions (FGDs) with MC members and general members. The members of the WUAs were enquired about their operation, finance, impact on income and empowerment, governance structure and transparency, and future plans. The summary of attributes of the WUAs are given in Table 5.1. The detail results of the discussion are discussed below.

Table 5.1: Case Study- Common Features of WUAs

WUAs' Name (code)	1	2	3	4	5	6	7	8	9	10
WUA Name	Nichangeditel Sabulpala	Thaneswar Uttarpara	Uttar Matiali Krishi Darshan	Uttar Matiali Udayan	Botuli	Barachanga II, Nirmal Dhara	Bhagarhat Jatileswar Krishnunnayan	Dakshin Kalamati Janakalyan	Amtore Mini RLI	Purbabalia WDS WUA
Agro-Climate zone	Terai	Terai	Terai	Terai	Vindhyan	Hilly	Terai	Terai	Undulating	Gangetic
Scheme type	STW	MDTW	STW	STW	STW	STW	MDTW	STW	RLI	RLI
Registration (year)	2018	2015	2018	2018	2013	2017	2013	2018	2016	2014
Hand over (year)	2017	2014	2018	2018	2018	2018	2015	2018	2016	2015
Number of Sources under scheme	3	1	4	4	6	3	1	5	1	1
Number of sources malfunctioning	0	0	0	0	1	0	0	0	0	0

WUAs' Name (code)	1	2	3	4	5	6	7	8	9	10
Members	54	46	45	40	70	51	56	40	56	125
MC members	9	9	11	11	11	7	11	9	7	9
Female member in MC	2	1	4	3	3	3	0	2	3	3
Monthly membership	30/-	50/-	10/-	20/-	10/-	30/-	10/-	20/-	20/-	10/-
Water Charges for member	80/- hr.	120/-hr. for Rabi, 200/-Bigha for pre-kharif	50/- hr.	50/- hr.	120/- hr.	40/- hr.	100/- hr.	100/- hr.	50/- hr	1400/- Bigha
Water Charges for outsider	100/-hr.	N/A	N/A	N/A	150/- hr.	N/A	N/A	N/A	N/A	
Operator Charges	30/-hr.	15/- hr.	10/- hr.	10/- hr.		15/- hr.	25/- hr.	20/- hr.	13500/- in 3 month	0
Percentage of meeting with quorum (in last 3 meeting)	66.00%	66.00%	0.00%	100.00%	Data not provided	0.00%	33.00%	0.00%	0.00%	0.00%
Female participant rate in meeting (in last 3 meetings)	0.00%	30.00%	23.00%	21.00%	Data not provided	37.8%	21.00%	17.00%	26%	20.60%
Designed command area	135 Bigha	150 Bigha	180 Bigha	180 Bigha	270 Bigha	140 Bigha	150 Bigha	235 Bigha	140 Bigha	300 Bigha
Actual catering area	150 Bigha	200 Bigha	192 Bigha	180 Bigha	270 Bigha	140 Bigha	150 Bigha	235 Bigha	218 Bigha	300 Bigha
Whether SHG involve in WUA activities	No	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes

WUAs' Name (code)	1	2	3	4	5	6	7	8	9	10
Additional land used in Rabi seasons compare with pre-scheme	85 Bigha	60 Bigha	15 Bigha	60 Bigha	220 Bigha	50 Bigha	100 Bigha	65 Bigha	170 Bigha	239 Bigha
Additional land used in Kharif compare with pre-scheme	0 Bigha	0 Bigha	0 Bigha	0 Bigha	100 Bigha	40 Bigha	60 Bigha	0 Bigha	30 Bigha	0 Bigha
Additional land used in Pre-Kharif compare with pre-scheme	80 Bigha	50 Bigha	41 Bigha	50 Bigha	250 Bigha	70 Bigha	100 Bigha	40 Bigha	120 Bigha	15 Bigha
Whether WUA is doing fishery	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Pond being used	1	14	2	19	9	5	11	7	12	Only canal
How many members in MC engaged in fishery activity (as %)	0.00%	0.00%	0.00%	27.00%	45.00%	86.0%	36.00%	77.00%	57%	100.00%
How many general members engaged in fishery activity (as %)	1.80%	30.00%	31.00%	55.00%	42.00%	98.0%	15%	0.00%	8%	100.00%
Whether any SHG involve in fishery	No	No	Yes	No	Yes	No	No	Yes	Yes	Yes

WUAs' Name (code)	1	2	3	4	5	6	7	8	9	10
Whether Scheme support Polly house (if yes, No)	No	Yes	No	No	No	No	No	No	No	Yes
Whether Scheme support Horticulture inputs (if yes, No)	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Benefited MC members (as%)	56.00%	22.00%	100.00%	82.00%	0.00%	43.0%	100.00%	55.00%	100.00%	44.40%
Benefited General members (as%)	37.00%	100.00%	62.00%	83.00%	0.00%	33.0%	93.00%	68.00%	62.00%	100.00%
Whether Scheme support Vermicompost inputs (if yes, No)	No	Yes	Yes	No	No	No	Yes	Yes	No	Yes
Benefited MC members (%)	0.00%	0.00%	45.00%	0.00%	0.00%	0.00%	18.00%	33.00%	0.00%	11.10%
Benefited General members (%)	0.00%	30.00%	0.00%	0.00%	0.00%	0.00%	11.00%	13.00%	0.00%	17.20%
Cash at Bank (during survey)	27447/-	32971/-	500/-	5030/-	Data not provided	4982/-	48402/-	143451/-	17266/-	45086/-
Cash in Hand (during survey)	0	0	1770/-	1570/-	Data not provided	0	265/-	988/-	5440/-	3000/-



5.1.1 Nichangeditel Sabujpala WUA in Darjeeling {Scheme type-STW} –

Crop Diversification: It is reported that the members possess larger land outside the command area. Most of the WUAs have shifted their cropping pattern from paddy (Boro) to Maize and follow inter-cropping method with respect to Potato and Brinjal. Owing to the availability of water,

most of the land in the command area has been used thrice for sowing. Besides, a small share of land is sown four times to grow vegetables. It is also reported that beneficiaries are using the land outside the command area for tea cultivation with the help of their personal shallow.

A Step towards Organic Farming: Farmers are also practicing organic farming in some portion of their land. They have used around 5 per cent of the total land for this purpose and keep the produce for their personal consumption. Chemical fertilizers have been applied on the land used for commercial farming.

Training and Capacity Building: Through exploratory visits, farmers were acquainted and encouraged towards adopting innovative technology and modern methodology of farming. Some of the farmers have participated at *Krishimela* and also received prizes from the Government's Agriculture Department for their achievements. Farmers who possess land outside the command area are motivated towards modern farming but due to the scarcity of water, the results are not satisfactory.

Water Charges: Water charges are determined by considering the electric charge and operator charge. The WUA was advised by WBADMIP officials to take a 'failed borewell insurance' but they have not taken it till the time of this survey.

Vision: In future, the WUA wants to purchase a tractor from its own funds which in turn will lead to an increase in its own surplus funds and make the WUA financially more sustainable. The WUA is also lending money to members against normal interest rate, which is lower than the money-lender's interest rates.

Economic Benefits: The farmers who performed Boro paddy farming have made considerable profits in the previous season as they received government support price. They have also followed the SRI farming method that yielded better profits.

The approximate profit margin, excluding all expenses, is about Rs.6000/- per bigha for a season. For potato and mustard, the approximate profit margin is Rs.3000/- and Rs.4000/- per bigha respectively. Around 37 cultivators received profit of about Rs. 4 lakh from vegetable farming in last season.

Assessment Issues: The Audit report or Income-Expenditure Statement is absent, and it has affected a proper financial assessment.

Social Benefits: With the increase in income, beneficiaries are able to procure school bags for children. Earlier, farmers couldn't afford higher education but after the project, everyone can reach high school for further education. The number of private tutors has increased at the village level.

Migration: Migration for work has remained the same as migrants are a particular section of farmers with marginal landholdings (below 3 bighas). However, while considering the overall scenario of migration, a marginal downward trend is observed.

5.1.2 Thaneswar Uttarpara WUA in Coochbehar {Scheme type-MDTW}-

Water Management: In the recent past, the WUA has procured water distribution pipes for covering additional areas. Water charges vary in Boro cultivation as they are based on the distribution system viz., if a single member wants water from one spout, the charge will be Rs. 120/- per hour, but if multiple users want water from one spout, the charge will be Rs. 75/- per hour, as the expenditure and water wastage are optimized. Hourly water charges save wastage of water. The WUA has started to follow a systematic procedure of water distribution. They give a receipt to members along with a specific serial number that confirms distribution time schedule. During the Boro season (Rabi), WUA supplies water through surface channels, but in other seasons, it is supplied via a distribution pipe.



Transformation of Village and curb in Migration Rate:

The village has undergone a transformation due to the scheme. The village includes a group of individuals who used to work as migrant agriculture labourers outside the village in the past, but at the time of the survey, it was observed that they have work opportunities in the village itself. Prior to the launch of the scheme, majority of the village was *kuccha* but at the time of the survey, 80% of it was converted to pucca. Earlier, the cost of water consumption for farmers by their private shallow pumps was as high as Rs. 400/- per bigha for potato. Now, it is just half. Prior, the coverage area of water distribution from one shallow tube well was small. Therefore, certain portions of land remained under-utilized. But at the time of the survey, it was brought under cultivation.



Capacity Building and Women Empowerment: The WUA enjoys two parallel schemes. One is ‘WBADMIP’ and the other one is the ‘Agriculture Technology Management Agency (ATMA).’ From WBADMIP, the WUA got inputs for vermicompost, Pollyhouse farming, hatchery, etc. From ATMA they got inputs for fishery. It has been reported that the WUA has demanded 4 Pollyhouse

but WBADMIP has provided only one. For operational and maintenance of the Pollyhouse, the WUA has formed a group of 10 female members. WBADMIP has also shared a booklet containing information on the subject of agriculture. Select members from the WUA have visited other WUA with the aim of gathering experience on how to develop the WUA’s performance and how to maintain essential documents. WUA visits the electricity office every month for depositing the electricity bill.

Payment Mechanism: According to the WUAs’ norms, 80% of the profit is distributed among the group members and 20% goes to the WUA. Landowner of the Pollyhouse is given the benefit of free water for 2 bighas of land. For fish farming, altogether 13 ponds are being used in the village. The profit is shared as follows; 10% of total profit is shared with the WUA while 90% goes to the beneficiary committee.

Social Benefits and Vision: The WUA has planned to lend money to beneficiaries for the formation of a team meant for marketing of agricultural produce in the near future, which will lead to a boost in its profits. Overall performance of the WUA is excellent. With regard to income generation, it was observed at the time of the survey that the farmers are capable of keeping sufficient food stock for livestock. The beneficiaries are very happy as they can now support their children's higher education.

5.1.3 Uttar Matiali Krishi Darshan WUA in Jalpaiguri {Scheme type-STW}-

General Information: The formation of this WUA is influenced by the Constructed Wetlands (CW) located nearby. The whole procedure – from the submission of documents to installation of Shallow Tube Well (STW) - took two years.



Support to the WUA: It was reported that apart from the WBADMIP scheme, the Additional Director of Food provided 2 quintals of paddy seeds to the WUA separately. The WBADMIP once arranged training sessions on agriculture through the Krishi Vigyan Kendras (KVKs) but the farmers could not attend it as it clashed with the weekly market

(Hatbar).

Water Management: The farmers who donated their land (land donors) for establishing the STW are receiving Rs.10/- per hour as operator's remuneration from the scheduled water charges of Rs.50/- per hour. Out of 46 members, 20 members have delayed payment of water charges for more than a year.

The WUA lacks information on their command area as they do not have its map. This information may help the WUA for further planning. Currently, most of the land in its command area is being used thrice in a year.

Issues: It was also reported that due to the establishment of solar energy systems, the members couldn't perform Boro farming. This resulted in negligible earnings for the farmers.

Payment Mechanism: As per the contract, the distribution of profits from fish farming will be as follows; 10% to pond owner, 20% to the WUA, and 70% to the SHG members.

Mission and Vision: The WUA has also been awarded for supplying fish seeds to other WUAs.

The WUA members are seeking cultivation loans from WBADMIP for the initial stage of plantation, as banks require authentic land documents, which are not available with the farmers since most of the farmers are share-croppers and they do not possess such documents. After the withdrawal of the scheme, the WUA will increase the membership fee marginally. Furthermore, the WUA members are planning to contact the Agriculture and Fishery Department for inputs. In near future, the WUA will buy diesel motor from its own funds.

Social Benefits: The outcomes of the scheme remain appreciative as farmers are encouraging their children for higher studies. The saving habits of women have also improved, and it is likely to empower them. Higher savings provide several benefits to households including meeting planned and unplanned expenditures.

Reduction in Migration: Prior to the implementation of the scheme, 90 per cent families had at least one member migrating for work. But after the commencement of the project, it has decreased to around 70 per cent.

5.1.4 Uttar Matiali Udayan WUA in Jalpaiguri {Scheme type-STW}-

This is a solar irrigation scheme.



Women Participation: The managing committee of the current scheme includes 11 members, among whom 3 female members are very active. The Managing Committee (MC members) are educated and are appreciated by the villagers. In the course of the WUA formation, all the members contributed Rs. 50/- per head for opening the bank account, and for other initial expenditure.

Water Management: In the case of water distribution, the operator distributes water according to the priority of requirements. Maintenance of machinery is the key issue behind determination of water charges.

Capacity Building: Apart from agriculture, the WUA is also engaged in fish farming. The WUA has received fish kits from the WBADMIP. Although the WUA has not received the agriculture training by WBADMIP, a few WUA members have conducted fishery training sessions. Later, the WBADMIP appointed the WUA for providing fishery training session as a facilitator, with the contract value of Rs. 29000/-. However, the amount was still due at WBADMIP's end at the time of the survey. The members are undertaking fish farming in 22 ponds owned by the WUA. Those who have not received support for fishery, have received support from WUA for horticulture.

Problem: Most of the fish seeds supplied by the WBADMIP were beyond expiry date.

Economic Benefits and Crop Diversification: The complete profit from fish farming is enjoyed by the pond owner/fisherman, although they get all inputs from WBADMIP. All the farmers with high-level land are cultivating vegetables, which are more profitable than paddy, although the initial investment is quite high in vegetable farming. The initial investment for vegetables is Rs. 50000/- per bigha, whereas for paddy it is Rs. 20000/- per bigha.

Entrepreneurial Aspect: In future, the WUA wants to take over some ponds to facilitate SHG members.

5.1.5 Botuli WUA in Maldah {Scheme type-STW}-

General Information: It was reported that 6 STWs were established, out of which one is malfunctioning since its installation. In 2013, the concerned departments completed the boring work for the STW, but it was handed over after a gap of 5 years on account of delay in electric power connection.

Involvement: During 2013 to 2018, three members worked very actively. They interacted with



different departments several times and spent a lot of their own money and time.

Transparency: After the handover, the WUA started meeting on the pre-scheduled date – on 25th of every month. The WUA meeting venue is fixed at the Panchayat members' resident, who is also a MC

member.

Water Management: The water charges are Rs.120/hour for members and Rs. 150/hour for non-members. The WUA has also formulated guidelines for new members, wherein a new member has to pay the entire membership fees - accumulated from 2013 - to enjoy the benefits of the scheme. Most of the members usually pay membership fee once a year, and the WUA issues printed membership receipt for the same.

Issues: Due to delay in implementation of the scheme, 9 out of the initial 70 members have left the group. Further, scheduled meetings records were not maintained for the period 2013-2018 as meetings were conducted according to needs/exigency.

It may be also noted that out of the initial 70 members, 46 members were not paying their membership fees when the irrigation system was not operating. However, at the time of the survey, all members were paying membership fees on regular basis.

The major problem for the WUA is issuance of electricity bills by the electric supply office for the units not functioning. The members whose land is covered by malfunctioning shallow use private shallow, are paying Rs.160/- per hour.

The WUA didn't get the distribution pipe from WBADMIO. As an alternative, a few members contributed towards delivery pipe; the cost of which was being adjusted with water charge.

Economic and Social Benefits: In 2019, the corpus of the WUA almost doubled to Rs.1,33,000/- as against Rs. 70,000/- in 2018. Due to depredation from cows and goats, farmers cannot cultivate vegetables in command area. Members can easily accrue loans from the banks as they are members of the WUA.

Due to the scheme, farmers who have 7-8 bigha land, earned at least Rs. 1 lakh in the last year. As such, their attitude towards borrowing has weakened, and savings have increased, which will be helpful for the next farming season. The overall increase in farm surplus has helped the farmers in spending money for their children's education (including private tuition), procuring accessories, dresses, traveling, medical and other daily expenses. There is no change in seasonal migration of labours. Agricultural labourers are being taken from village level. The Audit report or Income-Expenditure Statement is not maintained.

5.1.6 Barchanga-II Nirmaldhara-II WUA in Darjeeling {Scheme type- STW}-



General Information:

This project supplies both irrigation and drinking water. There are eight WUAs under the WBADMIP scheme, in and around the scheme area. These WUAs are administered in collaboration with the Gorkhaland Territorial Administration (GTA). The GTA-led administration body comprises of sixteen members from eight WUAs who are the decision-makers on any issue. The Secretary and President of seven

WUAs are taken in the GTA administration.

The area is dominated by the Nepali community who are not familiar with the Bengali language. The STW scheme is operated at three locations, covering eighteen hectares of land.

Women Empowerment: Most (67) of the male members stay either abroad or are employed in the Army. Therefore, female members of the family are actively engaged in trading, petty business and other economic activities. Even though the registered members of the WUA are males, the meeting sessions are mostly attended by the female members of their families.

Other Scenarios: Exchange of labour in farming is a well-established practice in the region. Policy of labour force in farming is noticed. Therefore, unlike other villages of the case study, labour hired from outside the village for seeding, planting, harvesting, threshing and other supporting work is absolutely absent.

Water charges for drinking are equally shared by all beneficiaries. The irrigation water charge is Rs 40/- per hour. The committee is yet to determine the operator charge. One year ago, the committee received Rs. 200/- from one STW only.

Integrated Farming: The major crops in the area are paddy, mustard, potato and maize. Some land is used thrice a year. In early 2018, seven beneficiaries started fishing activity, but as of 2019, only three beneficiaries have continued with it. The fall in membership is attributable to the supply of damaged accessories and tools (polyethene) by WBADMIP. Further, the five additional beneficiaries also initiated to restart it. Everybody is trained by the WBADMIP scheme. There are two Farmer Interest Groups (FIGs) in eight WUAs under the GTA, which are monitoring fishing activities.

Benefit Sharing Mechanism: According to the guidelines of the WUA, two percent of the profit margin goes to the Panchayat, five percent to the FIG, ten percent to the WUA, while the rest goes to the pond owner. Two-thirds of the beneficiaries who received fishery inputs and training, didn't pursue it further.

Training and Capacity Building: The GTA organises meetings with members of eight WUAs every two months. The GTA encourages some progressive farmers to participate in agri-mela to showcase their products. They also urge the Government to promote solar panels to save electricity. The GTA committee distributed 2250 plants among 90 beneficiaries of eight WUAs. Out of 90 beneficiaries, 10 beneficiaries are MC members, three of whom have been benefited through inputs for vermicompost.

Economic Benefits: The tentative profit margin of potato farming - excluding all expenses - is about Rs. 4000/bigha and it's Rs.1600/bigha for maize. Most of the beneficiaries reinvested their profit in livestock.

5.1.7 Bhangarhat/Jatileswarkrishiunnayan WUA in Jalpaiguri, {Scheme-MDTW}-

General Information: This WUA was formed in the year 2012 but the MI structure was handed over in 2015-2016. The membership fees was Rs.5/- per month, which has not changed since inception. There are a total of 62 beneficiaries of the scheme, including six female members. About 50 per cent farmers under the scheme are marginal with landholdings between one to three bighas. These farmers take additional land on lease for farming. Out of the total

land, around 20%-25% is located inside the command area. The MC members became aware of the cumbersome protocol of the scheme proposed by WBADMIP representative only after it was handed over to them. They maintain that they never would have agreed with the proposal if they knew of it earlier. But at the time of the survey, it was found that they have become skilled in documentation, along with close supervision of the CW. Before the handover of the scheme, MC members a joint bank account in favour of the three signatory authorities (Cashier, Secretary, and President).



Transparency: Generally, meetings are conducted in late evenings to facilitate the presence of the WUA members. Leadership by a panchayat member has played an important role in ushering participatory process. The panchayat member is a familiar face to villagers and at the same time, he is also associated with WUA.

Committee Structure: There are four sub-committees, comprising 16 members altogether. Duties of these four subcommittees are as follows; one committee for monitoring and supervising the spouts, and another is concerned with the water charges and monthly subscription. The remaining two committees are inactive. The subcommittees do not maintain any kind of performance documents. Usually, the members (62) attend the meeting before the season starts.

Water Management: The water distribution system is controlled through eight spouts, following a circular systematic distribution method. WUA can run four spouts at a time, depending on the velocity of the water discharge. Preference is given on first-come-first-serve basis. The WUA usually prepares a beneficiary list before pre-kharif season.

Cropping Pattern: The beneficiaries don't farm Boro paddy as it consumes excessive water. During the Rabi season, most of the beneficiaries prefer farming vegetables, as they make more profit than paddy. In Rabi season, they cultivate potato, cucumber, ash gourd etc.

Training and Capacity-Building: Beneficiaries got trained on intercrop farming and a few beneficiaries were promoted for exploration visits, which are very useful. Beneficiaries registered their phone numbers in Krishi Kotha Scheme starting the present year.

With the assistance of the Somobai Samiti and the WBADMIP office, farmers have become aware about the Kit Spray operation. Recently, two MC members have been removed from the committee as they did not spend sufficient time in it. At the time of the survey, farmers can enjoy the entire land in Rabi season. For outsider, the WUA charges Rs.10/- extra water. A group of farmers have personal shallow in and around the command area. At times, when the scheme provides insufficient water, beneficiaries have to resort to personal shallow tube well. The WUA wants an additional scheme to cover the entire village. A few members got fishery inputs and training but have not started fishery activity till date. This may be because of the sharing rules, whereby 3% of the profit has to be given back to the WUA. In future, the WUA is considering buying a tractor from their WUA funds.

Beneficiaries' earnings have increased, which is an encouragement for saving practices. It has also resulted in supporting higher education for their children.

Social Benefits and Migration: As far as sustainability is concerned, the WUA can proceed with their activities in future without outside intervention. A huge drop in the rate of migration has been observed; from an approximate 60% in 2015, it has reduced to 10% by the end of 2019. The reduction in migration is attributable to increased irrigation.

5.1.8 Dakhinkalimati Janakalyan WUA in Jalpaiguri, {Scheme – STW} –



The WUA was formed in the year 2016 with 50 members, but presently it has 40 members, including 2 female members. One of the females is the President of the WUA. The WUA has disqualified the membership of 10 members because of inactivity. But these members continue to purchase water from the WUA. They also participate in training programmes. The Secretary of the WUA is engaged in social activities.

The WUA got seed drill equipment free-of-cost and received subsidies on jute seeds at Rs.24/- per kg from the Jute Corporation of India, while the market price of Jute seeds is about Rs.100/- per kg. The Jute Corporation of India also provided chemicals for jute preservation free-of-cost.

With the support of the WBADMIP, the WUA got training from Krishi Vigyan Kendra (KVK) on modern farming technology. Experts from KVK usually visit monthly to evaluate the training impact. Beneficiaries have never lodged any kind of problems related to water crisis. Land donors nothing more than operator charges. Beneficiaries got training on modern technology of paddy cultivation and horticulture from WBADMIP. The fruits of training were observed through progressive attitude shown by a group of farmers towards experiential farming. As the electricity bill is issued in the name of individuals, they are responsible to pay in time but as a whole, the WUA supervises entire activities. A few members are doing fishery. The members share a marginal profit with the WUA if they take fish seeds from the WUA. There is no active FIG in the WUA. Five members, who have land at a higher surface level, have been supported by the WUA for fruit cultivation. They were providing various types of plants like jackfruit, papaya etc. The WUA also got vermicompost inputs from the WBADMIP and it was distributed among 7 members. However, the major income source of the WUA is water-charge and membership. In future, the WUA may introduce hatchery, if the WBADMIP supports. If the WBADMIP withdraws the support, the WUA can continue on its own. They have good contact with the GP office, Block office and other government departments.

Economic and Social Benefits: The impact of the WBADMIP is appreciated in terms of income generation. Farmers have become financially sound and can support their children for higher education. They can spend money for private tuition as well. They can afford healthier food. Female members are becoming more empowered in economic activities, especially supporting in farming. Seven members, who received input of vermicompost, earned Rs. 1,23000/- in the last season. Migration of beneficiaries has reduced from 90% to 50% after the implementation of the scheme.

5.1.9 Amtore Mini River Lift Irrigation (RLI) WUA in Purulia, {Scheme-RLI} -

Women Empowerment: Both the Assistant Secretary as well as the Assistant President are females. The MC members are knowledgeable about their official work and perform it accordingly.

Transparency: The MC committee meeting happens once a month with all the members of committee.



General Information: Initially, the designed command area was 140 bigha belonging to 34 members. Later, it was increased up to 218 bigha with 56 members. The beneficiaries reported that they did not face problems of scarcity of water, as there are sufficient distribution spouts (20), spread across the command area. All beneficiaries have technical knowledge on pump operation and thus the WUA operates

pumps as per their requirement. Total members of the WUA are 56 who are also paying the membership fee on time. According to the capacity of the motor, the WUA can run 2 spouts simultaneously. Operator fees, electricity bill, and maintenance charges are the key determinants of water charges. The WUA maintains a register book for water users. The beneficiaries always pay their dues of water charges within a couple of months.

Cropping, Additional Activities and Training: Major crops in the area are paddy and wheat. However, recently 9 of the beneficiaries who got training have introduced different types of pulses by applying modern techniques. From the WBADMIP scheme, 9 male farmers got training on the *poira* procedure of farming. Vegetable farming has also seen an upstart.

12 villagers have taken the initiative to develop fishery activity by leasing one pond. All 12 beneficiaries got inputs from the WBADMIP once. According to the contract, 40 percent of the profit amount will go to 12 members and the remaining amount will be retained by the WUA. Most of the female members are engaged as daily labourers. Four beneficiaries have also started mango plantation through the WBADMIP scheme. Eight other members produce inter-crops (vegetables) in the same field and 15% of the profit from such farming goes to the WUA. Few members of the group have received training on seed treatment, seed protection, SRI, and vermicompost through the WBADMIP scheme. Land donors do not get any extra benefits.

Vision: As far as sustainability is concerned, the WUA can continue with their operation and try for improvement. Also, they will introduce new source to cover more land.

Social Benefits: The impact of the WBADMIP is appreciated as all children are going to school with improved scope for higher studies as well as private tuition. Before the WBADMIP, the migration rate was as high as 40%, but at the time of the survey, the percentage is negligible.

5.1.10 Purbabalia WUA in 24 Parganas(south), {Scheme-RLI}-

Cropping Pattern: Before the implementation of the scheme, most of the command area was unutilized, especially in Rabi season, due to scarcity of water. However, at the time of the survey, half of the command area is being used for paddy farming, while the rest of the land is being used for mustard, sunflower and vegetables.



Water Mechanism: About 17-18 beneficiaries are using their own diesel pump sets for lifting water from the canal. Beneficiaries who enjoy RLI facilities usually pay Rs.100/- per bigha in Rabi as water charges.

Aids and Capacity Building: In 2018, 3 FIG comprising, of 40 male beneficiaries, were benefited by fish seeds (1500 pics) from the WBADMIP. It may be noted that recently, the groups have earned Rs.24,000/- against 2.5

quintal unit sold.

The FIG has hired a night guard at Rs. 400/- day. As per the contract between WUA and FIG, FIG will give one percent of profit share from fishery to the WUA. About 50 members received fishery training from WBADMIP.

The WUA has also supported 90 members with inputs for fishery. Further, some selective progressive farmers (7 in number) took training in agriculture from Nimpit Mission, and 25 members were trained by the WBADMIP. 70 members were helped through crops' seeds, while 3 general members got vermicompost inputs. Two MC members have been benefited by Pollyhouse inputs, controlled by 2 groups comprising of 12 and 14 female SHG members. Profit sharing is in the proportion of 2%, 10% and 15% between the panchayat, the WUA and the land donor respectively, while rest of the amount is to be distributed among SHGs. All Female members in the SHG have been trained by the WBADMIP. The WUA also render social services like enrolment of drop-out students and arrange for social functions.

Holding Size: Land-holding pattern of beneficiaries is as follows: 88 members (70%) have land measuring below 3 bighas, 24 beneficiaries (19%) hold below 7 bighas but more than 4 bighas and 11 percent of members hold 9 bighas of cultivable land on an average.

5.2 Benefited Accessories and Tools

To strengthen the funds, the WBADMIP supported necessary tools and accessories for agriculture and fishery activities but during the field survey, it was noticed that some WUAs did not collect hiring charges. Also, some tools were found to be useless. Therefore, the research team tried to assess if WUAs actually utilize the accessories and if it is helpful to enhance funding for the same or not. The consolidated scenario has been framed as under. The WUA wise detailed description is in Annexure:

Table 5.2: Agricultural Accessories Received by the WUAs

Type of accessories	Number of WUAs received	Nos. of WUA rendering the accessories with service charges	Nos. of WUA rendering without service charges	Nos. of WUA keep it as unutilized
Power tiller	7	2	4	1
Paddy thrashing machine	3	1	1	1
Seed drill	2	0	1	1
SRI marker	1	0	0	1
Spray machine	5	0	0	5
Paddy Reaper	1	0	0	1
Easy lantern	1	0	0	1
Planting Machine	2	0	2	0
Paddy sheller	2	0	2	0
Wider	2	0	2	0
Maize sheller	2	0	2	0
Grass cutting machine	1	0	0	1

The above table shows that a considerable number of accessories such as power-tiller, spray machine, paddy thrashing machine and seed-drills were provided by the WBADMIP. 70% of the 10 WUAs got a power-tiller but only one-third WUAs earned rental charges. 14% of the WUAs did not use the power-tiller kept in unutilized stock. Only power-tiller and paddy thrashing equipment are found to have potential utility. On the other hand, equipment like spray machine, SRI maker, paddy reaper, and easy lantern are absolutely unutilized.

Estimated Labour Days Generated due to WBADMIP

We have estimated the direct and indirect employment generated due to the schemes in these 10 WUAs. The requirement of labour workdays in different crops is estimated in Table 5.3.

Table 5.3: Labour Workdays required for Different Crops

Cropping Pattern	Unit of Land (Bigha)	Requirement of labour workdays
Paddy Amon	1	14
Paddy Boro	1	10
Potato	1	16
Jute	1	15
Mustard	1	3
Maize	1	8
Vegetables	1	5

In the Rabi season, maximum labour workdays are generated through potato cultivation and minimum through mustard cultivation. In Kharif, workforce is generated through cultivation of Amon Paddy. In pre-Kharif, workforce is generated through vegetable cultivation. We have calculated the maximum and minimum workforce generated due to the WBADMIP. The minimum workforce generation is estimated when we have assumed only mustard is cultivated in Rabi and the maximum is generated when only potato is cultivated in Rabi. We have assumed that only Amon Paddy is cultivated in Kharif and only vegetables are cultivated in pre-Kharif. Table 5.4 provides estimate of additional workforce generation. Taking all 10 WUAs together, additional workforce generated due to schemes introduced in the WBADMIP is minimum 10,492 labour days and maximum 24,324 labour days.

Table 5.4: Estimated Additional Workforce Generation due to WBADMIP

Name of WUAs	Additional land used in Rabi seasons compare with pre-scheme (Bigha)	Additional land used in Kharif seasons compare with pre-scheme (Bigha)	Additional land used in Pre-Kharif seasons compare with pre-scheme (Bigha)	Estimated Additional Employment Generation					
				Rabi (Mustard)	Rabi (Potato)	Kharif (Amon Paddy)	Pre-Kharif (Vegetables)	Minimum Labour days	Maximum Labour Days
Nichangeditel	85	0	80	255	1360	0	400	655	1760
Barachanga II,	50	40	70	150	800	560	350	1060	1710
Thaneswar Uttarpara-	60	0	50	180	960	0	250	430	1210
Uttar M. Krishi Darsan	15	0	41	45	240	0	205	250	445
Uttar Matiali Udayan	60	0	50	180	960	0	250	430	1210
Bhagarhat Jatileswar	100	60	100	300	1600	840	500	1640	2940
Dakshin Kalamati	65	0	40	195	1040	0	200	395	1240
Botuli	220	100	250	660	3520	1400	1250	3310	6170
Amtore Mini RLI	170	30	120	510	2720	420	600	1530	3740
Purba Belia WDS	239	0	15	717	3824	0	75	792	3899
Total	1064	230	816	3192	17024	3220	4080	10492	24324

5.3 Strengthening Income due to additional Land used

We have tried to understand the land being utilized and cropping pattern in the command area after the implementation of the scheme to strengthen the economic backbone of the beneficiaries.

In this connection, we have interacted with a few members to estimate pre and post scheme income Gap in 10 WUAs, which is as in Table 5.5.

Table 5.5: Additional Land Use of Selected Beneficiaries

1. Name of WUA	Nichangeditel Sabujpala WUA	
Name of Beneficiaries	Dharani Kanta Singha	Paresh Ch. Roy
Additional land use in Rabi	3 Bigha	3 Bigha
Cropping Pattern	Brinjal, Ginger, Potato, Shak	Brinjal, Ginger, Potato, Shak
Net Income in last year	Rs. 10000/-	Rs. 10000/-
2. Name of WUA	Thaneswar Uttarpa WUA	
Name of Beneficiaries	Ajay Mallick	Karen Roy
Additional land use in Rabi	1 Bigha	4 Bigha
Cropping Pattern	Potato, Ladies finger, Cucumber	Mustard, Ladies finger, Corn
Net Income in last year	Rs. 2000/-	Rs. 8000/-
3. Name of WUA	Uttar Matiali Krishi Darshan WUA	
Name of Beneficiaries	Jatin Roy	Subhas Roy
Additional land use in Rabi	9 Bigha	10 Bigha
Cropping Pattern	Paddy, Corn	Paddy, Potato, Tomato
Net Income in last year	Rs. 20000/-	Rs. 15000/-
4. Name of WUA	Uttar Matiali Udayan WUA	
Name of Beneficiaries	Abdul Latib	Alo Begum
Additional land use in Rabi	10 Bigha	1 Bigha
Cropping Pattern	Brinjal, Potato, Cabbage, Gourd	Brinjal, Cabbage, Mooli, Shak
Net Income in last year	Rs. 5000/-	Rs. 1500/-
5. Name of WUA	Botuli WUA	
Name of Beneficiaries	Bipul Pahan	Sonamoni Murmu
Additional land use in Rabi	3 Bigha	3 Bigha
Cropping Pattern	Mustard, Wheat	Potato
Net Income in last year	Rs. 12000/-	Rs. 21000/-
6. Name of WUA	Barchanga-II Nirmaldhara-II	
Name of Beneficiaries	Umesh Pradhan	Sumitra Chettri

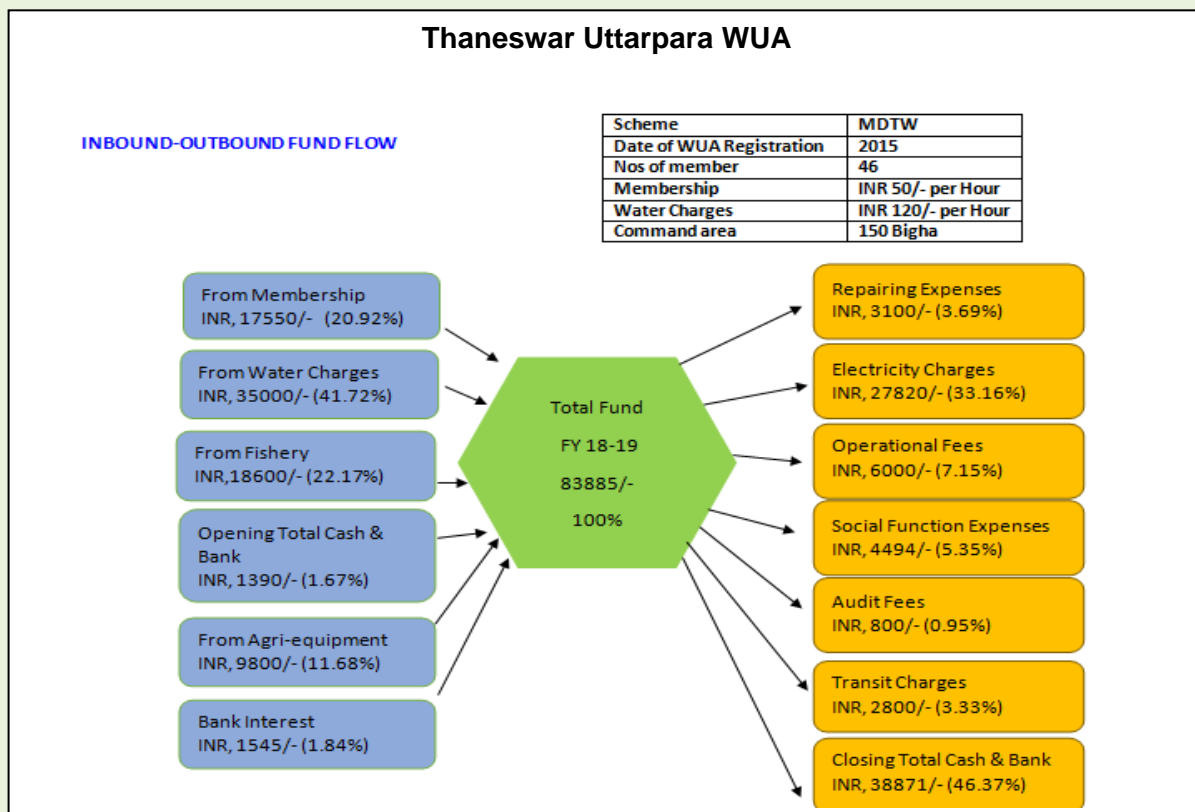
Additional land use in Rabi	3.5 Bigha	1 Bigha
Cropping Pattern	Potato, Cauliflower, Tomato, Chilli	Potato, Cauliflower, Tomato, Chilli
Net Income in last year	Rs. 5500/-	Rs. 2400/-
7. Name of WUA	Bhangarhat/Jatileswarkrishiunnayan WUA	
Name of Beneficiaries	Haridhan Adhikari	Ratan Sarkar
Additional land use in Rabi	1 Bigha	1 Bigha
Cropping Pattern	Potato, Pumpkin	Potato, Pumpkin, Bitter gourd
Net Income in last year	Rs. 40000/-	Rs. 10000/-
8. Name of WUA	Dakhinkalimati Janakalyan WUA	
Name of Beneficiaries	Tapan Adhikari	Anil Adhikari
Additional land use in Rabi	8 Bigha	4 Bigha
Cropping Pattern	Potato, Cauliflower, Cabbage, Broccoli, Tomato	Potato, Brinjal, Mustard, Cabbage
Net Income in last year	Rs. 50000/-	Rs. 50000/-
9. Name of WUA	Amtore Mini RLI WUA	
Name of Beneficiaries	Sonayashi Jele	Anup Patra
Additional land use in Rabi	2 Bigha	3 bigha
Cropping Pattern	Paddy, Brinjal	Paddy, Brinjal, Spinach, Tomato
Net Income in last year	Rs. 4000/-	Rs. 6000/-
10. Name of WUA	Purbabalia WUA	
Name of Beneficiaries	Mostafa Mollah	Momina Mollah
Additional land use in Rabi	1.5	2 Bigha
Cropping Pattern	Paddy, Vegetables	Paddy, Vegetables
Net Income in last year	Rs. 2000/-	Rs. 900/-

5.4 Financial Assessment

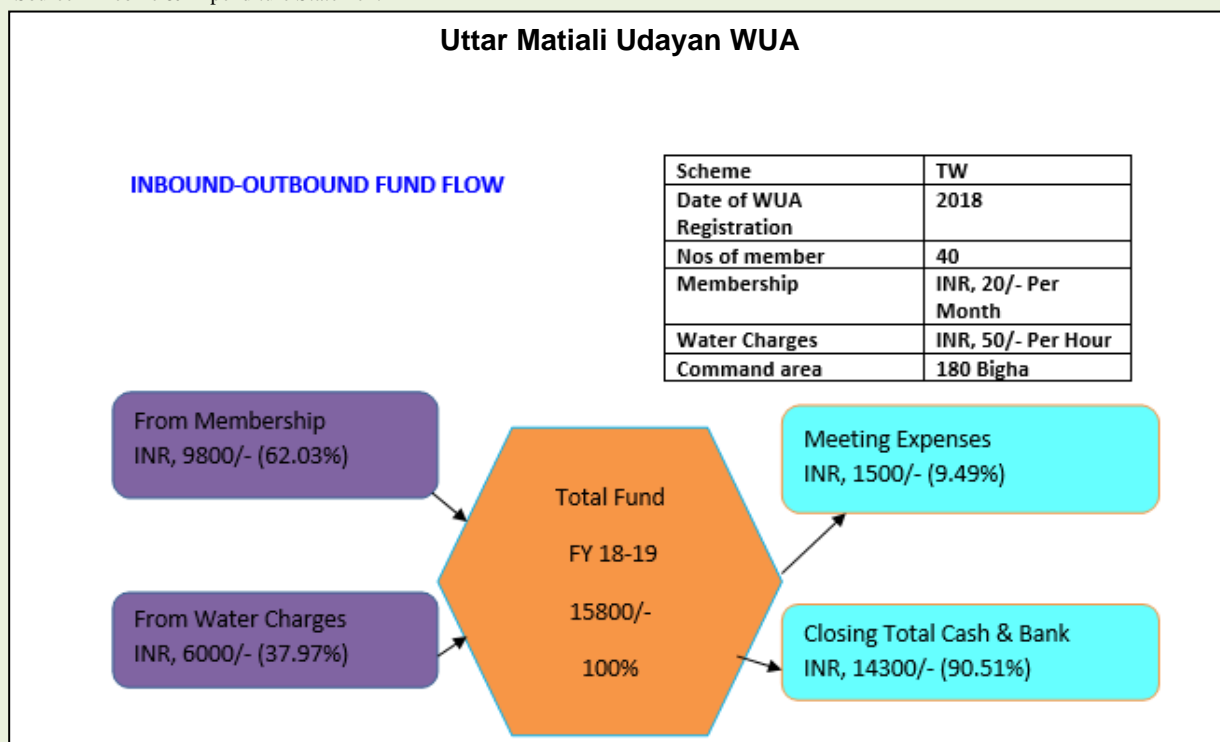
Inbound-Outbound Fund Flow

We tried to collect audit reports and the Income & Expenditure statements of the last financial year. Primarily, the audit report was requested as it is more authentic than other financial

documents but in certain cases, we have collected the Income & Expenditure statement prepared by the WUAs before the meetings. Out of the 10 WUAs, 70% provided the essential documents such as audit report or Income & Expenditure statement for Fund Flow analysis.



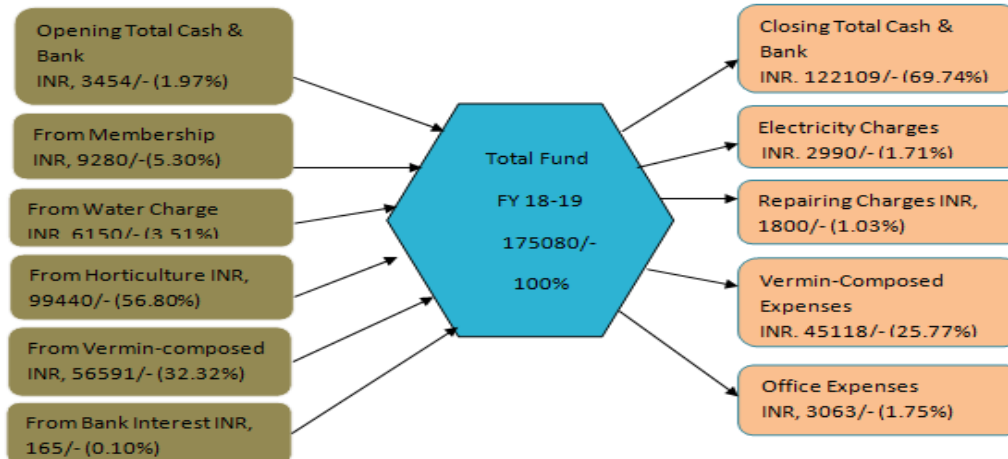
Source – Income & Expenditure Statement



Dakshin Kalamati Janakalyan WUA

INBOUND-OUTBOUND FUND FLOW

Scheme	STW
Date of WUA Registration	2018
Nos of member	40
Membership	INR 20/- per Month
Water Charges	INR 80/- per Hour
Command area	235 Bigha

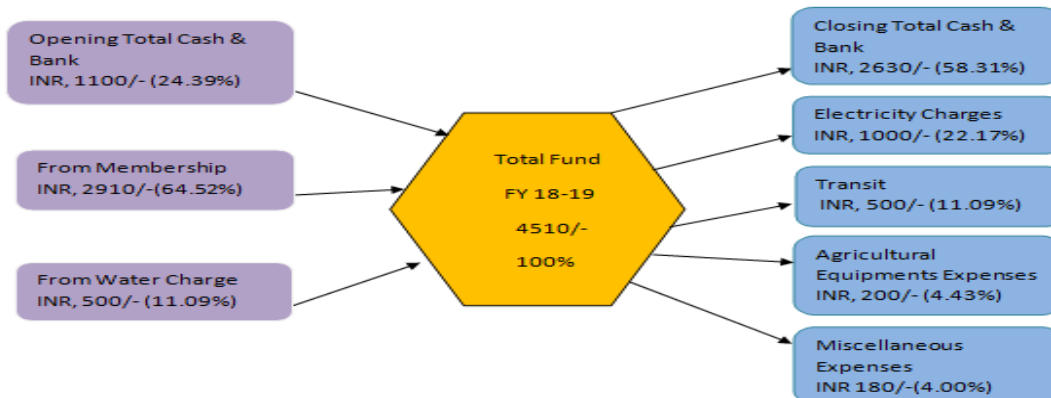


Source - Audit Report

Barachanga II Nirmaldhara WUA

INBOUND-OUTBOUND FUND FLOW

Scheme	STW
Date of WUA Registration	2017
Nos of member	51
Membership	INR 30/- per Month
Water Charges	INR 60/- per Hour
Command area	140 Bigha

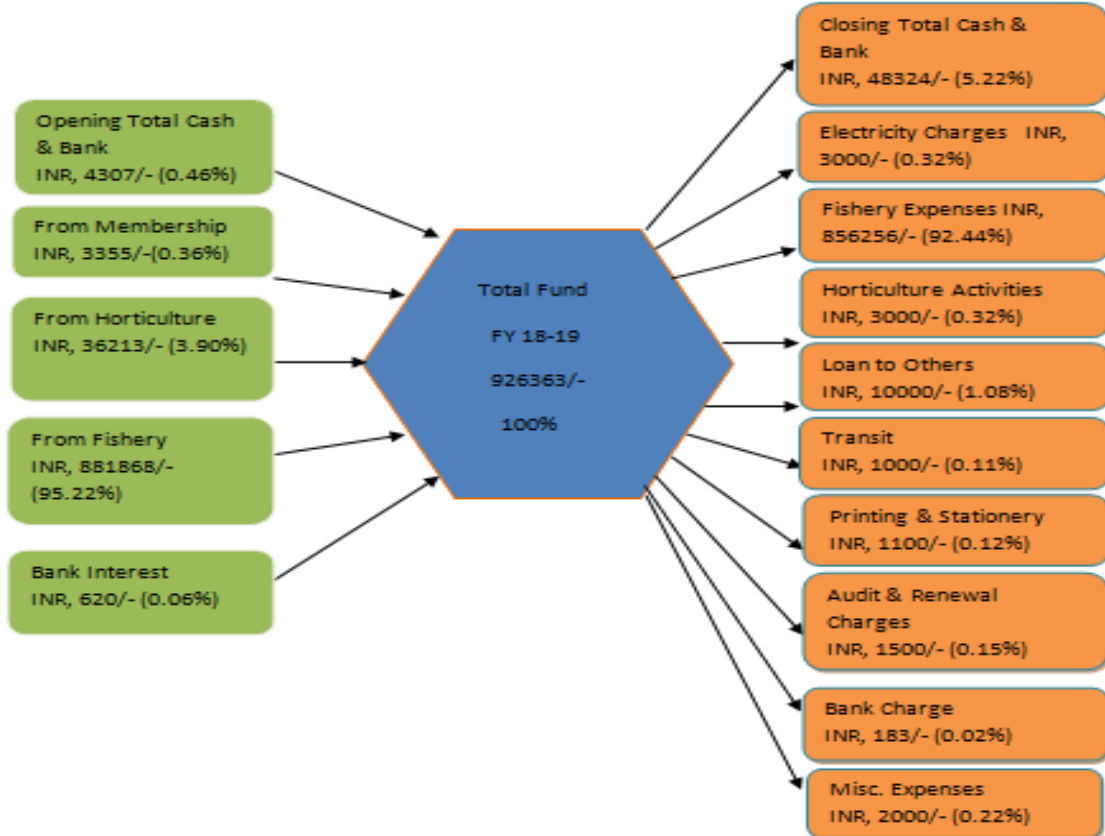


Source - Audit Report

Bhangarhat Jatileswar Krishi Unnayan WUA

INBOUND-OUTBOUND FUND FLOW

Scheme	MDTW
Date of WUA Registration	2013
Nos of member	56
Membership	10/- per Month
Water Charges	100/- per Hrs
Command area	150 Bigha

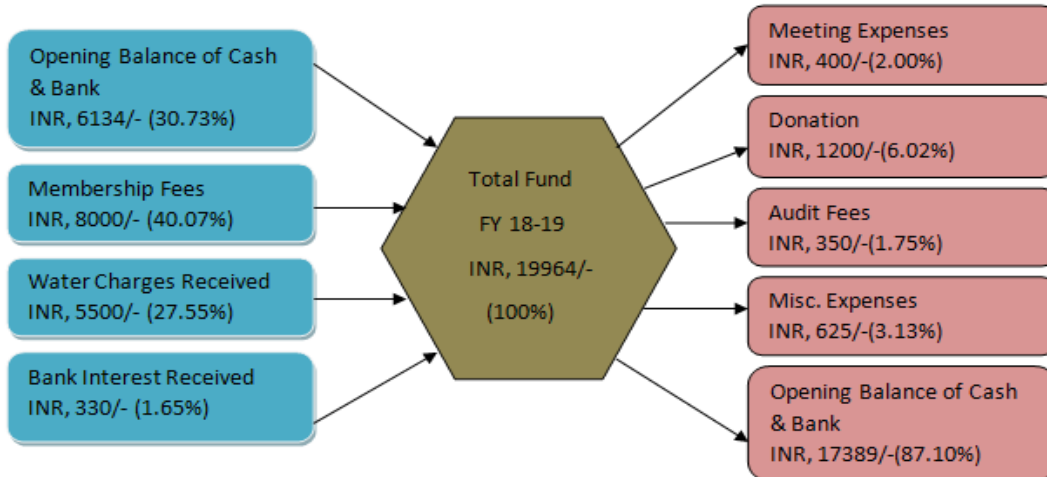


Source - Audit Report

Amtor Mini River Lift Irrigation WUA

INBOUND-OUTBOUND FUND FLOW

Scheme	RLI
Date of WUA Registration	2016
Nos of member	56
Membership	INR 20/- per Month
Water Charges	INR 50/- per Hour
Command area	218 Bigha

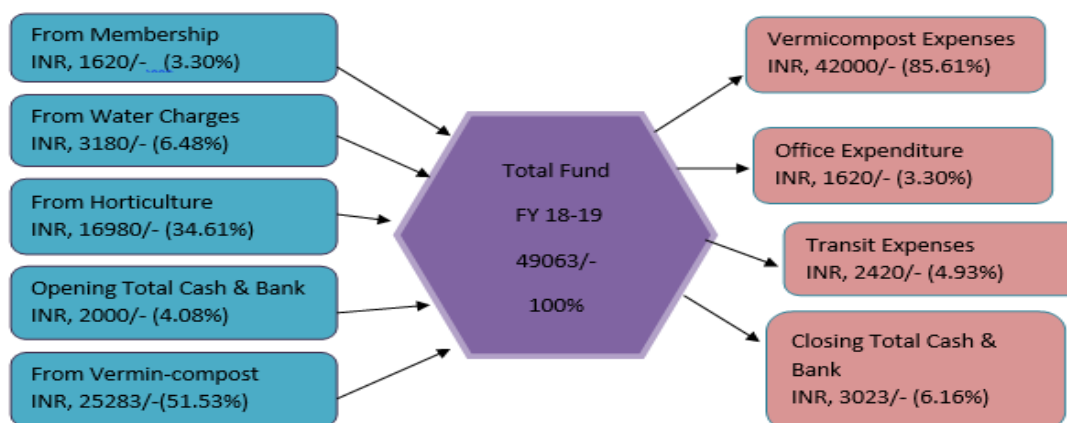


Source - Audit Report

Uttar Matiali Krishi Darshan WUA

INBOUND-OUTBOUND FUND FLOW

Scheme	TW
Date of WUA Registration	2018
Nos of member	45
Membership	INR, 10/- Per Month
Water Charges	INR, 50/- Per Hour
Command area	180 Bigha



Source - Audit Report

5.5 Summary of Findings

i. Water management practices of WUAs



Irrigation water is distributed through canals, pipes, spouts etc. WUAs collect water charges for water distribution for payment to land donors, operator fees, electricity bill, maintenance charges etc. For WUA-1, water charges are determined by considering the electric charge and operator charge. One WUA was instructed by WBADMIP officials to take insurance for borewell but till the time of the survey, it wasn't taken. WUA-2 has procured water distribution pipes for covering additional areas. In Boro season (paddy cultivation in Rabi), water is supplied through surface channels but in other seasons, water is supplied via distribution pipes. Water charges for Boro

cultivation vary as they are based on the distribution system i.e. if a single member wants water from one spout, the charge will be Rs. 120/- per hour, but if multiple users want water from one spout, charges will be Rs. 75/- per hour as the expenditure and water wastage are optimized. Hourly water charges control wastage of water. WUA-2 follows a systematic procedure in water distribution. They give a receipt to members along with a specific serial number that controls distribution time schedule. Land donors of WUA-3 receive Rs.10/- per hour as operator's remuneration from the scheduled water charges of Rs.50/- per hour for STW. In WUA-5, the water charge is Rs. 150/- per hour for non-members while Rs. 120/- per hour for the members. Most of the members usually pay membership once a year, while WUA issues printed membership receipt for the same. For WUA-6, scheduled water charges for drinking are being shared by all beneficiaries equally while the rate for purpose of irrigation is Rs 40/- per hour. WUA-7 charges Rs.10/- extra as a water charge to farmers outside the WUA. For water distribution, WUA usually prepares a beneficiary list before pre-kharif season. In WUA-9, water is distributed according to the capability of the motor. The WUA can run 2 spouts simultaneously. Operator fees, electricity bill, and maintenance charge are the key determinants of water charges. In WUA-10, about 17-18 beneficiaries are using own diesel pump sets for lifting water from the canal. Beneficiaries who enjoy RLI facilities usually pay Rs.100/- per Bigha in Rabi.

ii. Economic issues of WUAs including leveraging benefits

WUAs suffered few issues as well. These are lack of insurance, non-payment of water charges, problem in sowing due to installation of solar systems, improper electricity bills and delay in handover of scheme. The WBADMIP suggested WUA-1 to take insurance to cover failure of borewell but it remained undone. Out of the 46 members, 20 members have not paid water charges on time in WUA-3. And due to the establishment of solar systems, members couldn't perform Boro farming, which resulted in negligible farmers earnings. For WUA-5 the major problem is electricity bills issued by electric supply office for dysfunctional units. The members who possess land under the dysfunctional shallow tube-wells, purchase water from private shallow at Rs.160/- per hour. The same WUA didn't get distribution pipe from the WBADMIP. As an alternative, a few members contributed for the delivery pipe; the cost of which is being adjusted with the water charge. For WUA-7, the major issue was inordinate delay in handing over of Medium Duty Tube Wells (MDTW).

iii. **Transparency and fairness in functioning of WUAs**

Most of the WUAs are arranging meetings on a monthly basis, which indicates transparency in WUAs. For WUA-5, meetings are pre-scheduled– on the 25th of every month. For WUA-6, most (67) of the male members either stay abroad or are engaged in the Army. So, the meeting sessions were mostly attended by the female family members. Interestingly WUA-7 is conducting meetings in late evenings to facilitate the presence of the WUA members. This has been done through the initiative of a panchayat member. For WUA-9, MC committee meets once a month.

iv. **Training and capacity building of WUA members**

Exploratory visits have encouraged farmers to adopt innovative technology and modern methodology of farming. Some farmers have participated in the *Krishi Mela* and have also received prizes from Government Agriculture Department for their achievements. Farmers who possess land outside the command area are motivated to adopt modern farming but due to the scarcity of water, the results have not been satisfactory, as is the case of WUA-1.

WUA-2 enjoys two schemes in parallel; ‘WBADMIP’ and ‘ATMA’. From WBADMIP, the WUA got inputs for vermicompost, polyhouse farming, and hatchery. From ATMA, they got inputs for fishery. The WBADMIP doesn’t deliver any ICE materials. However, it shared a booklet containing information on agriculture. Selected members visited others WUAs aimed at gathering experience on developing the WUA’s performance and maintaining essential documents. The WUA visits electricity office every month for depositing electricity bill. It was reported that apart from the WBADMIP scheme, WUA-3 got two quintals of paddy seeds from the ADS separately. The WBADMIP also arranged training sessions on agriculture through *Krishi Bandhus* (KB) but due to *Hatbar* (local market), farmers didn’t attend it.

WUA-4 has received fishery kits from the WBADMIP. Although the WUA has not obtained training on agriculture by WBADMIP, a few WUA members have conducted fishery training sessions. Later, the WBADMIP awarded the WUA for facilitating fishery training session as a facilitator, with the contract value of Rs.29,000/- which was still due at the WBADMIP’s end at the time of the survey. The WUA is using 22 ponds, which are owned ponds, for fisheries activity. The other beneficiaries who are not facilitated with fishery inputs (28 beneficiaries), received horticulture inputs.

For WUA-6 Gorkhaland Territorial Administration (GTA) organizes meetings every two months with all the portfolio members of eight WUAs. It also encourages farmers to participate in agri-mela for showing their products. They have also urged government to promote solar panel so that electricity can be saved. 2250 plants were also distributed among 90 beneficiaries of 8 WUAs by the GTA committee. Most of the beneficiaries spent the profit amount on increasing livestock capacity.

WUA-7 beneficiaries got training on inter-crop farming and a few beneficiaries were promoted for exploratory visits. Beneficiaries have registered their phone numbers in Krishi Kotha Scheme. With the assistance of the WBADMIP office, farmers have become aware about effective utilization of spray gun kit.

With the support of the WBADMIP, WUA-8 received training from Krishi Vigyan Kendra (KVK) on modern farming technology. Experts from the KVK usually visit once a month to evaluate the training impact. Beneficiaries received training on modern technology of paddy cultivation and horticulture from the WBADMIP scheme. At the time of survey, a section of farmers displayed a progressive attitude towards experimental farming due to bolstered confidence as a result of the training. As the electricity bill is issued in individuals' names, they are responsible to pay it on time but as a whole, the WUA supervises entire activities.

In WUA-9, beneficiaries were benefited by fishery inputs (1500 pics) from WBADMIP. It may be noted that recently, the group has earned Rs. 24,000/- against 2.5 quintal fish sold. Other than the Farmer Interest Groups (FIGs), the WUA is also supported through fish inputs, individually among 90 members. Further, some selective progressive farmers (7 in number) got agriculture training from Nimpit Mission and 25 members were trained by the WBADMIP. 70 members were helped through crops' seeds, while 3 general members got vermicompost inputs. Two MC members have been benefited by polyhouse farming inputs, benefitting two groups comprising of 12 and 14 female SHG members.

v. Change in Crop Diversification, Employment and Income

Crop diversification has improved due to increased availability of water after the scheme. Farmers were educated, trained and encouraged for more profitable cultivation practices. The WUA-1 has shifted its cropping pattern from paddy (Boro) to maize and also followed inter-cropping method for potato and brinjal. It was also reported that beneficiaries were using the land outside the command area with the help of their personal shallow. WUA-2 farmers have

become capable of keeping sufficient food stock for livestock at the time of the survey. WUA-4 has undertaken additional activity of fisheries and entire profits from fisheries are enjoyed by the pond owner/fisherman, although they get all inputs from WBADMIP. Farmers holding land at high-level have cultivated vegetables, which are more profitable than paddy, in spite of the higher initial investment in as compared to paddy. For WUA-6, the major crops cultivated are paddy, mustard, potato and maize. This has been possible by using a land thrice a year. In WUA-7, beneficiaries do not cultivate Boro paddy as it consumes excessive water in Rabi season. Most of the beneficiaries prefer to farm vegetables like potato, cucumber, ash gourd etc. For WUA-9, major crops are paddy and wheat. Recently 9 of the beneficiaries, who received training, have introduced different type of pulses by applying modern technique. 4 beneficiaries have also started mango plantation through the WBADMIP scheme. Other 8 members produced inter-crops (vegetables) in the same field and 15 per cent of the profit from such farming went to the WUA. Few members of the group have received training on seed treatment, seed protection, SRI, vermicompost, through the WBADMIP scheme. After the WBADMIP intervention, vegetable farming has also increased. For WUA-10, before the implementation of the scheme, most of the command area was unutilized, especially in the Rabi season due to scarcity of water. However, at the time of the survey, half of the command area is being used for paddy farming, while rest of the land is being used for mustard, sunflower and vegetables.

An estimation shows that in the 10 WUAs studied for the case study, the total generation of labour days in a year was between around 10,000-25,000 labour days.

vi. Change in Migration

A considerable slide in migration has been observed. As for WUA-3, prior to the implementation of the scheme, 90 per cent family migrated for work but at the time of the survey, it has decreased to around 70 per cent. For WUA-8, at the time of the survey, the migration rate was as low as 50 percent, while it was nearly 90% in pre-scheme days. In WUA-2, labour used to migrate in search of employment. But, at the time of the survey, they have work opportunities in the village itself. Work-related migration has remained the same for WUA-1 and WUA-5, as migrants are a particular section of farmers with marginal landholdings (below 3 bighas). However, while considering the overall scenario of migration, a marginal downward trend is observed. For WUA-9, before WBADMIP, the migration rate was at 40%, but at the time of the survey, the percentage was observed as negligible.

vii. Women Empowerment

With the introduction of the scheme, the women associated with it have become much more empowered. In the case of WUA-2, for operational and maintenance of pollyhouse, it has formed a group of 10 female members. In WUA-4, the managing committee comprises of 11 members; among whom 3 female member participants are very active. In WUA-6, most of the male member stay either abroad or are engaged in the Army. Therefore, female members of the family are actively engaged in business, petty activities and other economic activities. Even though the registered members of the WUA are males, the meetings are mostly attended by their female family members. WUA-8 has two female registered members and one of them is the President of the WUA. Both the Assistant Secretary as well as the Assistant President are female in WUA 9.

viii. Coverage of Small & Marginal Farmers

In WUA-7, about 50 per cent farmers under the scheme are marginal with landholdings between one to three bighas. These farmers take additional land on lease for farming. In WUA-10, landholding pattern of beneficiaries is as follows: 88 members (70%) have land measuring below 3 bighas, 24 beneficiaries (19%) hold below 7 bigha but more than 4 Bighas and 11 percent of members hold an average of 9 bighas cultivable land.

ix. Future plan of action/vision of WUAs

The scheme has helped WUAs to develop a vision. WUAs have planned to lend money to beneficiaries for the formation of a team meant for marketing of agricultural produce in the near future to boost their profits. The Overall performance of the WUAs is excellent and very encouraging. The beneficiaries are very happy as they can support their children's higher education. WUA-3 is planning to raise membership fee after the withdrawal of support by the WBADMIP. They are preparing to contact Agriculture and Fishery Department for inputs, having good relations with both. In near future, the WUA is seeking to buy diesel motor from its own funds. WUA-7 is considering buying a tractor from their WUA funds. WUA-8 is planning to introduce a hatchery with the support of the WBADMIP. WUA-9 wants to continue with their operation if the support from the WBADMIP is withdrawn in future. They will introduce new source to cover more land and improve operation.

x. Challenges

Delay in implementation of the scheme and inappropriate support may hamper the operation of WUAs. In WUA-5, nine out of the 70 members left the group due to a delay in implementation. In early 2018, seven beneficiaries of WUA-6 started fishing activity but in 2019, only three beneficiaries were discovered continuing with it as accessories and materials (polyethene) supplied by the WBADMIP got damaged. However, five additional beneficiaries initiated to restart it. Everyone is trained by the WBADMIP scheme. A fall in membership in the WUAs has been observed due to supply of damaged accessories and materials (polyethene) by the WBADMIP.

Delay in payment of fees and improper charging of bills is also another challenge. In WUA-5, 46 out of the 70 members were not paying the fee when the irrigation system was not operating. On the other hand, electricity bills were issued against sources that were not operational.

CHAPTER 6: MAJOR CONCLUSIONS AND RECOMMENDATIONS

The current study was conducted on 63 WUAs for understanding institutional functioning of WUAs. The sample WUAs were selected on the basis of stratified random sampling method from six agro-climatic regions of West Bengal. The WUAs were selected across different categories and schemes. The units of analysis are twofold: WUAs and members of the WUAs. The information regarding WUAs was provided by key informants such as Secretary, Treasurer, President, Cashier, and Landowner. Additionally, 10 case studies of the WUAs have also been conducted. The WUAs selected in the case studies are better performers in their respective agro-climatic regions.

At the time of the survey, 70 percent of the schemes were functioning. On an average, the WUAs have 66 registered members, with 56 males and 10 females. The WUAs have Managing Committees for decision-making regarding operation of the association and the MI system. The members of WUAs are selected during the formation of the WUAs. In 81 percent WUAs, the managing committee has not changed since inception. Moreover, 71 percent of the managing committees have not conducted any formal meeting. The WUAs have a general body consisting of registered members. Among different issues, crop planning, membership fee, income and expenditure of the WUAs are discussed in the general body meetings. 96 per cent of the functioning WUAs have maintained minutes of the last three general body meetings. Financial audit was conducted in 65 per cent WUAs. A lesser percentage of schemes of recent batches have done financial audit.

The WBADMIP provided MI systems for the schemes. The members of the WUAs, including the chairperson, have contributed land for the scheme. 37 per cent of the WUAs made informal contract with the land provider. They were either offered water free-of-charge or at a reduced charge, or they were engaged as operators and compensated accordingly. The maintenance of the scheme was done by the land contributor and other members of the association. In surface water irrigation related MI schemes (Category II), other members were more involved in maintenance than in the case of other schemes.

Non-availability of water supply was observed in 21 per cent of the functioning schemes during one year before the survey. The major reasons for non-availability of the water supply were power cut (29 per cent) and sudden breakdown (39 per cent). The problem of water supply is highest in the central zone and for the RLI schemes. The problem of water supply is higher for surface water schemes than the ground water ones. The problem of maintenance due to lack of

capacity is highest in Coastal and Northern Plateau. The WUAs expressed during the survey that they require immediate technical support to avoid problems in maintenance and subsequent break in water supply during cultivation season.

The major sources of income of WUAs are periodic membership fees and water charges. The water charges during Rabi are higher than the charges in Kharif. Moreover, water charges are higher if WUAs impose discriminating charges across seasons as compared to uniform charges. This implies that water charges are imposed according to the need of water for cultivation. Thus, it ensures efficient use of the scarce resource. However, on an average, nine members per WUA delay payment of water charges. Approximately, 46 per cent of the functioning WUAs conduct additional activities such as fishery, horticulture, and vermicomposting for extra income. Most of the WUAs in the coastal area undertake additional activities, especially fishery, for income enhancement. The major expenditure items of WUAs are electricity bills and operator charges. 77 per cent key informants expressed satisfaction over the performance of the operators.



The functioning of WUA as an institution was much better for the newly formed WUAs. All the WUAs that were formed in the last one year maintained the cashbook. All the WUAs formed during the last one year also maintained the crop planning register, pump logbook, water charges register book, and register book for other services. Barring regular maintenance

of cashbook and minutes book, all other documents required for smooth and transparent institutional functioning of WUAs are maintained by a lesser percentage of WUAs in the coastal zones. A higher proportion of WUAs with higher grades maintain bank passbook. The comparison between treatment vis-à-vis control WUAs reveals that treatment WUAs are much better with regard to functioning of institutions. None of the WUAs in the control group are registered, while all the WUAs in the treatment group are registered under the West Bengal Societies Registration Act, 1961. The average numbers of female members, beneficiaries and managing committee members are much higher for treatment WUAs as compared to control WUAs. WUAs in control group could not provide any document on any meeting of general body. The MI of WUAs in the control group are either maintained by block office or not maintained at all. None of the WUAs in the control group have done any crop planning. The MI systems of treatment group are maintained by members and in many WUAs, the members engage in crop planning.

Our regression results illustrate that higher the number of members having large land holdings and lower the number of members having small land holdings, higher is the collection of membership charges and lower is the number of members delaying payment of water charges. However, higher the percentage of small farmers (or lesser is the heterogeneity amongst the farmers), higher is the collection of membership fees and lower is the number of members delaying water charges. Furthermore, higher the number of villages covered by the command area, lesser is the collection of membership fees. However, higher the command area (keeping number of members constant), lesser is the delay in payment of water charges. The dependability of WUAs on external assistance is also analysed through regression analysis. The results reveal that if the member (other than the Chairperson) provides land for the scheme and general meeting is conducted regularly, WUAs come out stronger over a period of time with the belief that they would be able to run the WUA without any third party or external assistance. The WUAs that face no problem of maintenance and collect membership fee as planned, are more likely to perceive external assistance less important in the future.

Based on the sampled members' responses, benefits in terms of increased area under irrigation, increased diversification of economic activities, increase in income, and improvement in the economic condition of the members is evident, although with inter-district and inter-category variations. In terms of participatory outcomes, significant proportion of sampled members participated in the WUA meetings. Members seemed to be largely satisfied with the availability

of the irrigation water. Availability of water was found to be better for the TW, PDW, CD and RLI schemes, WUAs of northern plateau and central zones, WUAs under Batch V, IV, and II and better graded WUAs.

Our analysis also clearly brought out that among the three different categories of irrigation schemes, a comparatively higher proportion of sampled members under Category I and Category II schemes experienced better economic and participatory outcomes. On one hand bio-physical characteristics including location, water level as well as water lifting and storage capacity of the schemes contributed to such inter-category differences in economic outcomes, and on the other, the differences in participatory and also economic outcomes could partially be attributed to expected benefits out of different schemes, thereby incentivising the members to participate.

The nature of decision making in WUAs are largely democratic. Six out of every 10 respondents opined that the management committees of WUAs took decisions on issues of the associations through general meeting that involved more than 50% members' participation. Democratic nature of decision making increases the longevity of the association. Nevertheless, significant majority of the members' ignorance about the rules and procedures of functioning of the WUAs and also about the physical and financial details of the schemes and their limited partaking in other participatory avenues, e.g. crop development plan and water mapping, has created serious policy discomfort, and in turn makes the sustainability of those positive benefits rather uncertain. Members' participation in different training and capacity-building programs was also negligible.

Default in payment of charges and managing or handling defaulters may be one of the major issues in WUAs. Only six percent member respondents revealed that they have defaulted on payment of charges previously. In case of more than 50% of the cases of default, no action has been taken on the defaulter. Of the cases where no action has been taken, in three-fourths of such cases, the defaulters have defaulted twice or more. In such cases, non-action is not a sustainable idea as it would adversely impact the payment motivation of other members who are paying the charges without default. Lack of penalty in the long run might result in more defaulters as there won't be any incentive to comply.

Conflict resolution and transparency are very important aspects for sustainability of collective organizations. One-third (33%) of the total respondents have indicated that there is no conflict

in the association. 44 per cent have reported that they don't know how the issues of conflict are solved in the WUAs. In a few cases, conflict was not resolved. A large portion of the respondents are not aware about transparency. Overall, 44 per cent of the respondents have expressed lack of knowledge on transparency.

The grade-wise and batch-wise analysis showed consistent trends in terms of governance of the functioning of WUAs. As one moves to the better grades of WUAs and later batches of WUAs, the members have expressed that there is a greater democratic nature of decision making. This is reflected both in the selection process of management committee and the involvement of members in decision-making process. Lack of knowledge has turned out to be a critical issue among the WUAs. However, with better grades of WUAs and later batches of WUAs, the ignorance - both on the selection process of management committee and decision-making process - in WUAs declines.

The grade-wise and batch-wise analysis of WUAs also showed similar trends in terms of handling conflicts in WUAs. Better the grades, and more recent the batches, higher was the rate of conflict resolution. Also, the ignorance on conflict resolution declines, as one moves to better grade WUAs and more recent WUAs. In terms of transparency, the members of better grade WUAs and more recent WUAs expressed lower ignorance level.

The WUAs practice different water management practices as revealed by the case studies. These case studies evince that the WUAs have formed rules for charging water supply according to local conditions. The problems faced by the WUAs are non-payment of water charges, problem in sowing due to installation of solar systems, improper electricity bills, and delay in handover of scheme. However, the transparency and fairness in the functioning of the WUAs are maintained through monthly general body meetings. Exploration visits have encouraged farmers to adopt innovative technology and modern methodology of farming. Farmers were encouraged to participate in agricultural fairs for demonstrating their products. The members of WUAs have received trainings and equipment for additional income generation.

In the WUAs considered for case studies, crop diversification is observed due to the availability of water after the introduction of the scheme as well as education and training of the farmers, to opt for more profitable cropping options. It has led to an increase in income of farmers as well as increase in labour workdays. An estimation shows that in the 10 WUAs studied for the

case study, total generation of labour days in last one year was between around 10,000-25,000 labour days. As a result, migration has reduced by a considerable margin. It also has a positive impact on female empowerment. Women have been involved in several activities, including cultivation in pollyhouse and vermicomposting. Overall performances of the WUAs are very encouraging. The beneficiaries are happy due to an increase in income. As a result, they can now support their children's higher education.

The following are the recommendations from this study which may be considered during the formation of the WUAs going forward:

- i. The WUAs should have more of large farmers for greater financial sustainability. Heterogeneity among the farmers with regard to land holding should be less. Lesser heterogeneity would develop more trust with the members. As a result, WUAs may become financially more successful and sustainable. More sharecroppers in the WUAs would make WUAs financially resourceful.
- ii. The WUAs should have command area spread over lesser number of villages. This would reduce the transaction cost of revenue collection (say, collection of membership fee) and hence would be financially beneficial.
- iii. The command area of the WUAs should be as large as possible with lesser number of members. This would reduce delay in payment of water charges.
- iv. All the members should be encouraged to provide land or share some resource during the formation of the WUAs. This would make the functioning of the association more participatory and members would have greater ownership with reduced necessity of external assistance in future.

Following are the recommendations from the perspective of institutional functioning of WUAs:

- i. It is important to change the composition of the managing committee from time to time. The WUAs should be advised to this effect.
- ii. The managing committee should have separate meetings to take stock of situations. This would enable swift action in a crisis, such as when the water supply gets stopped. This would help in building internal capacity to conduct the operation of the WUAs and minimize external assistance.

- iii. The general body meetings should take place regularly (rather than occasionally). This would bring transparency and accountability. This would enable the WUAs to conduct their operation and be less dependent on any external assistance.
- iv. The operator performs one of the most crucial tasks in the WUAs. In many cases, the operator is one who has provided land for the MI system. In all the cases, the MI operator is also one of the members of the WUA. In many cases they are not paid for their work. The operator should ideally be a paid staff selected from outside the WUA. This would usher in more transparency. The operator should be hired to operate according to the rules developed by the WUA, not party to designing any rule or regulation. Otherwise, it goes against the basic principles of managing commons as advocated by Ostrom (1990).
- v. There are some members who delay payment of water charges. There is in general no penalty or punishment for even the repeat offenders. This again goes against the principles of managing commons advocated by Ostrom (1990). There should be graduated sanctions for delaying or not paying water charged or membership fee.
- vi. The membership fee should be increased as much as possible to enhance revenue generation. However, it should not be very high, as with an increase in fee (rate) the total collection increases, but it increases by a decreasing amount.
- vii. The WUAs should be encouraged to collect membership fee up to their full potential. This would enable them to be free from third party or external dependence in future.
- viii. The members should be more exposed to training and capacity-building programmes.
- ix. More awareness should be generated amongst the members regarding the institutional processes. The members should be made aware of the governance and transparency in functioning.

Following are the recommendations from the study to WBADMIP regarding MI systems and technical assistance:

- i. WBADMIP should encourage more solar irrigation systems as back up. This is because one of the major reasons of non-availability of water supply is power cut.
- ii. WBADMIP should establish a network of technical experts so that the problems related to maintenance of machines may be resolved at the earliest.
- iii. WBADMIP should look into the possibility of choosing machines which require lesser maintenance or machines that have lesser technical complications. This would enable

the WUAs to maintain and repair the MI systems easily. As a result, the risk of WUAs going dysfunctional would decline, as will their dependency on external assistance.

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