WATER MAKES THE CHANGE

Case of Tantipara Watershed Project, Birbhum

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India will be required to produce more and more from less and less land and water resources. In India, water availability per capita was over 5000 cubic metres (m3) per annum in 1950. It now stands at around 2000 m3 and is projected to decline to 1500 m3 by 2025. Agriculture is the biggest user of water, accounting for about 80 percent of the water withdrawals. It is projected that availability of water for agricultural use in India may be reduced by 21 percent by 2020, There are gross inequalities between basins and geographic regions. Resource-poor farmers in the rainfed ecosystems practice less-intensive agriculture, and since their incomes depend on local agriculture, they benefit little from increased food production in irrigated areas. To help them, efforts must be increased to disseminate available dry land technologies and to generate new ones. It will be necessary to enlarge the efforts for promoting available dry land technologies, increasing the stock of this knowledge, and removing pro-irrigation biases in public investment and expenditure, as well as credit flows, for technology-based agricultural growth. Watershed development is required for raising yields of rainfed crops and widening of seed revolution to cover oilseeds, pulses, fruits and vegetables. *(Agriculture Policy: Vision 2020 Indian Agricultural Research Institute, New Delhi)*



1. Introduction

Watershed

Watershed is a geo hydrologically & topographically delineated area that is drained by a stream system. It includes physical and hydrological natural resources as well as human resources. Management of a watershed thus entails the rational utilization of land and water resources for optimum production but with minimum hazard to natural and human resources. Therefore, watershed management is the process of guiding and organizing land use and use of other resources in a watershed to provide desired goods and services without adversely affecting soil and water resources. This concept recognizes the interrelationships among land use, soil and water and the linkages between uplands and downstream areas.¹

Watershed approach for development in India

Watershed Development (WSD) in India has been a part of the national approach to improve agricultural production and alleviate poverty in rainfed regions since 1970s. Essentially, WSD programs aim to restore degraded landscapes in rainfed regions to increase their capacity to capture and store rainwater, reduce soil erosion, and improve soil nutrient and carbon content so they can produce greater agricultural yields for local consumption and income generation. As the majority of India's rural poor live in rural areas and are dependent on natural resources for their livelihoods and sustenance, improvements in agricultural yields improve human welfare while simultaneously improving national food security .Watershed Development programs focus on rainfed regions because these areas represent 65 percent of arable land in India and 55 percent of the country's agricultural output, and provide food that supports 40 percent of the nation's population (Planning Commission 2012). These areas, however, are characterized by low productivity, due to both geographical and climatic conditions, and also due to poor land management. Despite these challenges, the Department of Land Resources (DoLR) (2006) states, "While it is the rainfed parts of Indian agriculture that have been the weakest, they are also the ones that contain the greatest unutilized potential for growth, and need to be developed if food security demands of the year 2020 are to have a realistic chance of being met." The focus and scale of WSD has changed greatly over time, but today, the GOI through its most recent WSD guidelines (GOI 2011) and Twelfth Five Year Plan (Planning Commission 2012), recognizes the importance of ecosystems, community participation, and project flexibility for promoting economic activity and addressing cultural differences and local needs. A 'participatory' WSD approach integrates and trains community members in WSD interventions including ecosystem-based interventions (e.g. afforestation, agro-forestry), technical interventions (e.g. human-built interventions for soil and water conservation and drought mitigation), and social interventions

¹ During the course of examination, DoLR, while explaining about the technical aspects of a watershed submitted before the Committee as under

Watershed Development programs began in the early 1970s as a way to address food security and rural poverty in India's rainfed regions. Over the past fifty years, WSD has evolved from a top-down, technical, and bureaucratic approach to a participatory, ecosystems-based approach including social, ecosystem-based, and technical interventions.

Integrated Watershed Management Programme (IWMP)²

IWMP is a modified programme of erstwhile Drought Prone Areas Programme (DPAP), Desert Development Programme (DDP) National Watershed Development Programme for Rainfed Area NWDPRA and Integrated Wastelands Development Programme (IWDP) of the Department of Land Resources. This consolidation is "for optimum use of resources, sustainable outcomes and integrated planning". The scheme was launched during 2009-10. The programme is being implemented as per Common Guidelines for Watershed Development Projects 2008.

The main objectives of the IWMP are to restore the ecological balance by harnessing, conserving and developing degraded natural resources such as soil, vegetative cover and water. The outcomes are prevention of soil erosion, regeneration of natural vegetation, rain water harvesting and recharging of the ground water table. This enables multi-cropping and the introduction of diverse agro-based activities, which help to provide sustainable livelihoods to the people residing in the watershed area.

The Salient features of IWMP are as below

- Setting up of dedicated institution with multiple-disciplinary experts at State ,district, project and village level
- Cluster Approach in selection and preparation of projects with size of about 5,000 ha.
- Scientific planning of the projects by using IT, remote sensing techniques, GIS facilities for planning and monitoring & evaluation.
- Earmarking of project funds for DPR preparation (1%), Entry point activities (4%), Capacity building (5%), Monitoring (1%) and Evaluation (1%).
- Introduction of new livelihood component with earmarking of project fund under Watershed Projects i.e. 9% of project fund for livelihoods for asset less people and 10% for production system & micro-enterprises
- Delegation of power of sanction of projects to States

Criteria for selection of watershed projects

The criteria which are broadly used in selection and prioritization of watershed development projects are: a. Acuteness of drinking water scarcity. b. Extent of over exploitation of ground water resources. c. Preponderance of wastelands/degraded lands. d. Contiguity to another watershed that has already been developed/ treated. e. Willingness of village community to make voluntary contributions, enforce equitable social regulations for sharing of common property resources, make equitable distribution

² Common Guidelines for Watershed Development Projects

of benefits, create arrangements for the operation and maintenance of the assets created f. Proportion of scheduled castes/scheduled tribes. g. Area of the project should not be covered under assured irrigation. h. Productivity potential of the land.

Role of Key Stakeholders

Project Implementing Agency (PIA)

The Project Implementing Agency (PIA) provides necessary technical guidance to the Gram Panchayat for preparation of development plans for the watershed through Participatory Rural Appraisal (PRA) exercise, undertakes community organization and training for the village communities, supervises watershed development activities, inspects and authenticates project accounts, encourage adoption of low cost technologies and build upon indigenous technical knowledge, monitor and review the overall project implementation and set up institutional arrangements for post-project operation and maintenance and further development of the assets created during the project period.

Watershed Development Team (WDT)

The WDT is an integral part of the PIA and set up by the PIA. The WDT members have professional degree. The team guides the Watershed Committee (WC) in the formulation of the watershed action plan. The activities of WDT includes constitution of the Watershed Committee , organizing and nurturing User Groups and Self-Help Groups, mobilizing women to ensure that the perspectives and interests of women are adequately reflected in the watershed action plan, conducting the participatory base-line surveys, training and capacity building. Preparation of detailed resource development plans including water and soil conservation or reclamation , monitoring, checking, assessing, undertaking physical verification and measurements of the work done and future planning

Institutional Arrangements at the Village Level and People's Participation

Self Help Groups

These Groups are homogenous groups having common identity and interest who are dependent on the watershed area for their livelihood. Each Self Help Group are provided with a revolving fund of an amount to be decided by the Nodal Ministry.

User Groups

These are homogenous groups of persons most benefitted by each work/ activity include those having land holdings within the watershed areas. Each User Group is consist of those who are likely to derive direct benefits from a particular watershed work or activity. The Watershed Committee (WC) with the help of the WDT facilitate resource-use agreements among the User Groups based on the principles of equity and sustainability. These agreements are worked out before the concerned work is undertaken. It is regarded as a pre-condition for that activity. The User Groups will be responsible for the operation and maintenance of all the assets created under the project in close collaboration with the Gram Panchayat and the Gram Sabha.

Watershed Committee (WC)

The Gram Sabha constitutes the Watershed Committee (WC) to implement the Watershed project with the technical support of the WDT in the village. The Committee (WC) is registered under the Society Registration Act, 1860. The Gram Sabha elect/appoint any suitable person from the village as the Chairman of Watershed Committee. The Watershed Committee (WC) is comprised of at least 10 members, half of the members are representatives of SHGs and User Groups, SC/ST community, women and landless persons in the village. One member of the WDT is represented in the Watershed Committee (WC).

Gram Panchayat

The Gram Panchayat perform the following important functions:

a. Supervise, support and advise Watershed Committee from time to time. b. Authenticate the accounts/ expenditure statements of Watershed Committee and other institutions of watershed project. c. Facilitate the convergence of various projects/ schemes to institutions of watershed development project. d. Maintain asset registers under watershed development projects with a view to retain it after the watershed development project. e. Provide office accommodation and other requirements to Watershed Committee. i. Allocate usufruct rights to deserving user groups/ SHGs over the assets created.

2. Tantipara watershed under IWMP in West Bengal

Introduction of the Study Area:

The project Tantipara watershed IWMP-3 / 2011-12 in Rajnagar Block of Birbhum District of West Bengal is one of the 77 watersheds identified in IWMP-3 phase from 6 districts lying in the lateritic part and mid-gangetic of West Bengal. It is located at 23° 32' 30" N to24° 35'N Latitude and 87°05' 25" E to 88° 01' 40" E longitude. Four (4) micro watersheds covering 4000 hectares are included in Tantipara watershed project. These four (4) micro watersheds) (i) Jhikra (Micro WS - I) ii) Faridpur (Micro WS - II), iii) Kusmasol(Micro WS-III), iv) Madhaipur(Micro WS-IV) are distributed in three Gram Panchyats of the Rajnagar Development Block. Apart from plantation and other natural resource management work, almost 35 water harvesting structures have been completed at the end of the project span. The total project area of the watershed is about 5482 Ha, out of which 4000 Ha has been undertaken to be treated under IWMP from the year 2011-12. It is surrounded by Kuskarini river in the North, Dubrajpur Block in the West, Suri II Block in the East and Padampur, Khyradihi and Parashia mouza/Village in the west. This watershed comes under Vindhya Alluvium sub region (Agro climatic sub region) with an average annual rainfall of 1100 mm spread over an average of 110 rainy days and the mean summer and winter temperature of 37°C & 19 ° C respectively. Total effective project area under the micro

watershed is 4000ha. Out of the total Geo. Area (5482 ha) 68.4 % of the land is arable (3748 ha), and 13 % of this arable land is irrigated (490 ha). The soil is deep with fine texture pH ranging from 5.6 to 6.0 .Almost 78% of the area of the micro watershed is well drained where as 22 % of the area is moderately drained.

The watershed includes 24 villages (revenue mouza). Among watershed communities SC is 7963(41.39%), ST is 2505(13%), OBC is 1265(6.58%), General is 6501(33.78%) and Minority is 1010 (5.25%) out of the total population of the watershed is 1,9244. There are in total 4474 households where General category composes1614(36%), SC composes 1777(39.72%), OBC composes 309 (6.9%) and ST composes 565(12.63%) and Minority is 218(4.87%). Out of total 4474 agrarian households in Tantipara watershed project area 59.55% of landless, 22.05% of marginal, 15.73% of small, 2.32% of semi medium, 0.33% of medium, and only 0.02% is large farmers. The main livelihood support depends on agro based activities. The area has no assured irrigation, almost fully dependent on rainfed system of farming. Kharif Paddy is the main crop, however rainy season vegetables and some grain pulses are grown. The agrarian households are keeping large ruminants (cow & buffalo) which are extremely poor in milk production, mostly used for draft, cart-transport and beef purpose. Goat and sheep rearing is common as the area is chronically dry. However, feeds and fodder production is not in practice at all.

Challenge

On an average the watershed area has been suffering from assured source of irrigation. The core problem lies in the non availability of irrigation water, degradation of soil fertility and low knowledge base in crop diversity of the community results in both low production and productivity. This area is chronically draught prone solely dependent on monsoon rain for cultivation. Recurring soil erosion mostly from upland hampers the productivity of the area at lower reaches also. There are distinctly three types of topography - Up, Medium and Valley or Low lands locally known as Tanr, Baid, kanali, shole respectively. From the baseline survey it was found that Kharif Paddy is the main crop concentrated in Baid & kanali lands and limited in upland with assured irrigation. Except in Tanr lands there is limited variation in soil depth but wide variation is found in soil texture - Stony, loamy sand to sandy loam. There is 801ha of Govt. Forest land where canopy as well the ground cover is seen inadequate to retard the runoff velocity and control the flash or rill erosion. This results in degradation of agricultural land, deforestation and low fertilizer retention. The erosion materials brought by the water are deposited in the sloping piedmont and are deposited around the rivulets. The repeated deposition of coarse sediments results in low in agriculture production. On an average soil loss is estimated 7-8 tones/per year of the watershed.³

Water harvesting structures in Tantipara watershed project

Reexcavation of old water bodies and excavation of new water bodies was one of the major interventions under IWMP 3 in Tantipara. Study is undertaken to find out the impact of water harvesting structures created under IWMP-3 project in expanding the scope of

³ Detailed Project Report on Tantipara IWMP on the basis of which project has been implemented

livelihoods opportunity in the agriculture and allied sector and effectiveness of the institutional arrangement for sustainability of the livelihoods of the households in the catchment areas. The project period of 5 years is near completion and there is scope of assessing the status of livelihoods opportunities expanded through IWMP intervention in the particular project.

Objective of the study: The study is undertaken with the following objectives

- To study the status of the water harvesting structures created under IWMP
- To find out the level of efficiency in raising production of the area
- To explore direct as well as indirect livelihoods opportunities created due to intervention under IWMP
- To find out institutional arrangement functioning for maintenance and improvement of the assets

Methodology: : For detail investigation, 30 water Harvesting Structures are selected following Simple Random sampling method .Necessary secondary data are collected through IWMP-3 MIS and documents available with Loka Kalyan Parishad which was involved as designted Project Implementation Agency (PIA). Primary data are collected through semi-structured schedule .Data is analyzed through applying appropriate method.



a. Water harvesting structures in Tantipara watershed Project

Re excavation of old water bodies and excavation of new water bodies was one of the major intervention under IWMP 3 in tantipara. These water harvesting structures under study were either renovated or newly excavated in Tantipara micro watershed Project under IWMP -3. Detail of the location of the thirty water bodies under study is attached in Annexure – 2. The following table 1shows Status of water harvesting structures in Tantipara

Tab	Table: 1 Status of water harvesting structures in Tantipara				
Sl no	Name of WHS.	Name of village.	Newly excavated or Rennovated	WHS area. (Hectors)	Year of excavation or rennovation
1	Kulu pukur	Malkora	Reexcavated	0.3	Jun-14
2	Sajina Pond	Sajina	Reexcavated	0.19	Jun-14
3	Seepage Tank	Chandrapur	New	0.34	Apr-14
4	Buni Hir	Adampur	Reexcavated	0.33	Jun-14
5	Gour Hir	Tantipara		0.25	Jun-14
6	New pond	Monoharpur	New	0.35	Mar-15
7	Sarat Hir	Routara	Reexcavated	0.17	Feb-15
8	Panna Hir	Madhaipur		0.13	Jan-15
9	New pond	Tarasol		0.14	Feb-15

10	Kalir bandh	Adampur		0.34	Jun-15
11	Siristala Hir	Madhai pur		0.09	Apr-15
12	Laujore pond	Laujore		0.24	Mar-15
13	Dha Kandor	Malkora		0.1	May-15
14	Mondal Hir	Faridpur.		0.17	Jun-16
15	Baro Dighi	Patadanga		1	Jul-16
16	Murul Hir	Baromasia		0.13	May-16
17	Nutan pukur	Jhikra	New.	0.1	Feb-17
18	Boro Pukur	Balarampur	Reexcavated	0.33	Aug-17
19	New Pond	Tantipara	New	0.1	Apr-17
20	Mahanta Hir	Jamira	Reexcavated	0.35	Aug-17
21	Paler Hir	Phathardiha	Reexcavated	0.5	Jun-17
22	Malati Hir	Bandi		0.46	Jul-17
23	New Pond	Chatina	new	0.13	Jun-17
24	Balai pukur	Parasia	Reexcavated	0.67	Jul-17
25	Kulu hir	Kastodanga		0.26	Mar-17
26	Kulu pukur	Padampur		0.45	Jul-17
27	New pond	Tantipara	New	0.1	Mar-17
28	Manik Hir	Bordhata	Reexcavated	0.64	Mar-17
29	Brindaboni Hir	Tantipara		1	Jul-17
30	New Pond	Jikra		0.03	Mar-18
	Total area				

Out of 30 water bodies 24 were re excavated and rest 6 were newly excavated during project period. Out of those, Barodighi and Brindaboni Hir are largest water structure of one hec area each. Murul hir,Dhan Khador, Tantipara new pond are the smallest in size. It is found that during planning stage, size of the pond was determined on the basis of the availability of the land for enhancement of the size. In many cases owner of the pond agreed to excavate additional land for future benefit.

b. Profile of The Users' Groups

As per common guidelines, the Tantipara Watershed Committee (WC) constituted User Groups for each water harvesting structure in the watershed area .These are homogenous groups of farmers who are affected by each work/ activity and included those having land holdings within the watershed areas. Each User Group is consisted of those who are likely to derive direct benefits from a particular watershed work or activity. The Watershed Committee (WC) with the help of the WDT facilitated "*resource-use agreements*" among the User Groups based on the principles of equity and sustainability. These agreements were worked out before concerned work was undertaken. It was regarded as a pre-condition for that activity. Sample of an agreement is attached in Annexure- . The User Groups are responsible for the operation and maintenance of all the assets created under the project in close collaboration with the Gram Panchayat and the Gram Sabha. The following table 2 shows the distribution of members of the users' groups of thirty water harvesting structures under study according to age groups.

Number of Water Harvesting		Age group (i	n percentage)	
Structure	Total Member	Below -30	Between 30- 50	Above - 50
30	330	7.57	69.69	22.72

 Table: 2 Distribution of members of Users' group according to age

Out of total 330 beneficiary farmers of all the users groups , 69.69 percent are in the age group of 30-50, 22.72 percent are in the age group above 50 and rest 7.57 percent are below 30. So, majority of the users group members belong to the age group of 30-50. The following table 3 shows distribution of members according to social groups.

Table: 3 Distribution of members according to social group

Number ofTotalWaterMemberHarvesting		Social group(in percentage)			
Structure		Gen	SC	ST	OBC
30	330	59.01	21.81	17.57	0.9

Out of total 330 members of the 30 Users' group, 59.01 belong to general caste, 21.81 percent belong to Scheduled castes and 17.57 percent of the members belong to scheduled tribes. So, among the thirty users' groups majority of the members belong to general caste, followed by scheduled caste and scheduled tribes. Following table 4 shows the gender wise distribution of members of users' groups

Table: 4 Distribution of members according to gender

Number of Water Harvesting Structure	No. of User's Group Member	In percentage	
		Male	Female
30	330	99.39	0.6

Table 4 shows that out of 330members, 99.39% are male and 0.6% are female. The following table 5shows total size of land under possession of the users' group members of the thirty water harvesting structure under study.

Table: 5 land ownership of the members of the users' group of the water harvesting structures

Sl. No.	Total Water Harvesting Structure	Total Member	Size Total under possession (hec)
1	30	330	269.35

The table 5shows that total area of land under possession of the members of thirty water harvesting structures is 269.35(hec). However it is found that total land under possession of the members is highest in case of Balaipukur of Parasia village (17.73 hec) Sajina Pond (15.73 hec), followed by jhikira new pond and Dhankador of Malkora village. From field investigation it is revealed that size of land under ownership of each member of the users' group varies from case to case. Following table 6shows the distribution of members of each users' group according to size of land under possession

Total	Land size				
Member					
	Less than	0.134-0.4	0.41-1 hec	Above	
	0.133 hec	hec		1hec	
220	1 4 1 40/	12.02.0/	40.200/	22.020/	
330	14.14%	13.03 %	40.30%	53.93%	

 Table:6 Distribution of members of users' group according to size of land under possession (shown in percentage)

The table 6 reveals that 40.30 percent of the members possess land between 0.41-1 hec, 13.03 percent possess land between 0.34 -0.4 hec , 14.14 percent possess land below 0.133 hec whereas 33.93 percent have land above 1 hec. Field investigation shows that in case of Nutan pukur, sarathir, Murulhir, Natun pukur 60-100 percent of the group members possess land less than 0.33 acre whereas in case of Barodighi , Paler Hir, Balaipukur 70-100 percent of the members possess more land I hec land. It is found that most of the users group members belonging to ST community possess less than 0.133 hec.

C. Contribution of users'group members : As per guideline of IWMP, users'group members are the primary stakeholders of the water harvesting structures. Land or pond for reexcavationwork was given by the owners on condition that machines to be used for appropriate results. Each of the members has contributed to the Watershed development Fund which is kept under the custody of the WDC. Member under general category has contributed 10% of the total project cost whereas member from SC/ST category has contributed 5% of the total project cost.Total actual cost incurred towards excavation or reexcavation of these structures is Rs. 88, 51882.00 whereas total contribution accounts for 6,77236.00.

d. Impact on water harvesting structures

For assessing the impact of water harvesting structures under IWMP-3 project two major parameters are considered. one is the extent of benefit created particularly from in term of additional water storage capacity and the other is scope of harvesting additional crops from the catchment area.

i. Increase in storage capacity

The following table shows that additional 85,904 cubic meter water storage capacity could be created due to excavation and re excavation work. Field investigation shows that

in the post excavation stage water level in most of the cases have never gone below 6 feet even in the dry months between March to May.

Sl no	WHS.	WHS area. (Hectors)	Additional water conservation (in cubic metre)*
1	30	9.39	85904

 Table: 7 Distribution of Water Harvesting Structures according to size and additional water conservation capacity

*Considering 70% of total earth cutting at the time of excavation

ii. Increase in cropping area

Farmers are directly benefitted due to newly excavated and re excavated water harvesting structures as the irrigation facilities have been extended particularly in the post monsoon seasons when large tract of the land are usually kept fallow due to unavailability of water to raise winter crops. The following table 8 shows that out of total 188.37 hec of the command area 75.35 hec of land could be brought under second or third crop in the pre excavation stage.

Table:8Distribution of water harvesting structures according to total commandarea and area under 2^{nd} and 3rd crop in post excavation stage

Sl no	Name of WHS.	Total command area* (Hectare)	Area cover under2& 3rd crops (Hectare)
	Total	188.37	75.35

*Total command area including land owned by users's group and land owned by farmers who are not in the group but using water from the respective structure.

It is revealed from field investigation that users group members are directly benefitted from the respective waterbodies

iii. Expansion of irrigation facility

The following table 9 shows the benefit of Users' Group members in term of irrigation facility provided through excavation or re excavation of the water structures through IWMP 3

 Table: 9 Land possessed by Users' group members brought under Irrigation (hec)

Sl. No.	Total Member	Total area of the land possessed by the members brought under Irrigation (hec)
	330	86.02 hec

Total area of 86.02 hec land which is possessed by the members could be brought under irrigation in the post excavation stage.



iv. Changes in crop production

It is observed that winter crops particularly mustard, lentils and potatoes are widely grown by the users'group members due to availability of water in the season. It is an prominent phenomenon in the post excavation stage that farmers are harnessing benefit to a large extent from production of vegetables, potatoes, arums etc which are new in the production map of villages under Tantipara watershed project. In table 10, newly introduced crops are serially arranged from highest to lowest as per area brought under cultivation of the respective crop.

 Table: 10 Distribution of newly introdued crops according to the rank in respect of area of cultivation

Name of the crop	Rank
Mustard	1
lentil	2
Grams	3
vegetables	4
Potato	5
Onion	6

It is revealed from the study that Mustard, lentil and grams are the major crops grown in the post excavation phases under IWMP.

v. Increase in Income of the farmers

The study reveals that economic benefit of the farmers could be harnessed from three major sources like a. *fish cultivation in the water bodies* b. *enhanced income from kharif paddy which previously had to suffer from water scarcity in pre harvesting stage and c. from expanded scope of cultivation of winter crops*. The following table shows estimated annual income from three major sources in the post excavation phase.

Table: 11 Distribution of estimated income by the users group members according to different sources

Source	Annual estimated increase income	Reason for increase
Annual income from Fishery(Rs)	5,80,000.00	Availability of water in the waterbodies
Annual Income increased in Kharif season (Rs)	8,47,665.00	Mainly through arresting the crop loss. increase over total income from Aman Paddy is calculated considering live saving irrigation which could be assured by water facility available through water harvesting structures
Annual Income increased from winter crops (Rs)	3,767500.00	income from 2 nd and 3 rd crops like mustard, lentils, grams
Annual Income (Rs)	5195165.00	

The table 11 shows that annual income could be increased from three major sources. This can be considered as direct benefit of the water harvesting structures under study.

vi. Changes in cropping intensity

The study reveals that there is striking change of cropping intensity in the particular area from the pre project phase. The following table shows the incremental change in this regard.

	Before (as per HH Survey report)	After	Increment
Status of cropping intensity	94%	126.79%	32.79%

Table :12 Status of cropping intensity

So, 32.79% increase in cropping intensity is experienced in the watershed project area due to intervention for enhancement of the efficiency of the waterharvesting structures.

e. Perception of the stakeholders

1. Benefit harnessed by the women of the HHs of the Users' groups

Women of the HHs are not members of the Users' group but they are directly harvesting the benefit of the water bodies. Focus group discussion with women folk of the villages reflects number of issues which signifies the interventions under IWMP project in the area. The following tableb 13 reveals the perception of the women on quality, effectiveness and weakness of the construction.

Table: 13Perception of women

Comments on Effectiveness	Rank
Water scarcity is not felt by us even in the summer	1
Agriculture activities has gone high, we are getting more work in the other's farm in the post monsoon season	2
Water is available throughout the year	3
Moisture of the soil is observed in the winter	4
Cultivation is possible twice a year	5
Amount of fish we collect from pond was never observed before	6
We, the families of Bagdi para and Dom para can get the benefit of water only because of the excavation of the pond	7

Comments on structure and improvement	Rank
Quality of excavation work was very good	1
Size of the ponds need may be enlarged, we could not estimate the impact when excavation was initiated	2
Bathing ghat will be helpful for domestic work	3

Before reexcavation and excavation of the waterbodies, it is found that there was extreme scarcity of water particularly in selected village inhabited by ST households. The poor families are now getting wage earning oppportunity in the nearby villages due to additional scope of cultivation in the post monsoon period. Fallows are becoming remunerative for these families.

2. Response of the watershed committee and Gram Panchyats

Tantipara IWMP project has been implemented through institutional arrangement designed in the IWMP guideline. Project Implementing agency (PIA) was found to be sincere in involving Gram Panchyats in every phase of execution. Water shed committee was formed including members of Krishi O Sech upasamiti of Gram Panchyat to strengthen and sustain the role of panchyat in watershed related activities. Focus group discussion with Tantipara watershed committees and Gram Panchyat members exposes overall impact of the water harvesting structures. The issues raised by them are given in tabular form

Selection of the existing structure and location of new pond	Appropriately done in consultation with people and PIA has motivated us to select the location as per drainage line
On quality and efficiency of	Appropriate depth could be achieved as machines were used in

the structure	every case of excavation to avoid drudgery and delay of manual work
Expansion of irrigation, crop coverage	Large tract of fallow land are now being utisized due to availability of water; labours are getting work within the village
Maintenance of the structure in the post project phases	It will be difficult in the post project phase without technical assistance which is given by the PIA during project period
Sustainability of the users 'group	Users' group are not so serious about their role and responsibility

3. Perception of PIA on initial challenge and post project sustainability

Challenges

There are several factors which posed challenges in early stage of execution by the PIA. Some of these challenges faced by PIA are:

- a. Availability of land for water harvesting structure as people did not believe that structures will be useful under any Government scheme. However, they agreed to spare the land on condition that machine to be used
- b. Initial hesitation of the community to adopt new practice of cultivaion,
- c. Interest conflict between landed and landless farmers
- d. Cooperation of Panchyats and line departments

Key strategy adopted for execution

- a. Involvement of Gram Panchyats and Krishi Unnayan Upasamiti from initial stage of planning
- b. Identification of land and pond for development of waterbodies in consutation with Panchyat
- c. Strong technical team for execution and consultation with farmers for increasing efficiency of the structure
- d. Involving farmers in excavation work and use of machine for speedy and effective work
- e. Cooperation of Agriculture and Animal resource Development department and convergence of resources

Post Project sustainability and maintenance

- a. Since project has already reached at its terminal stage, WDC needs to take up appropriate action for maintenance and reexcavation work for further development.
- b. Users' groups and Panchyat interface needs to be more strong in planning and developing action plan for livelihoods development

Insufficiency of fund

Only 42.63% of the total approved project cost has been released for the project to PIA resulting in non completion of many initiatives particularly institution building which is required for sustainability and community ownership.

f. Process involved

There are few steps included in the process of execution of watershed approach in Tantipara project like

- Household survey.
- Land survey.
- Awareness programme.
- Para boithak.
- Preparation of DPR (Detailed Project Report)
- Identification of intervention points including water harvesting structures, land shaping ,plantation etc through PRA (Participatory Appraisal)
- Formation of Watershed Committee and empower them to do the execution
- Application from willing owners/ group of owners of land or water bodies to the WDC requesting initiation of excavation work on the land they possess (sample attached in Annexure-1)
- Confirmation of owners of land/water bodies through MOU declaring their consent over work to be done under IWMP and utilization of water by the Users' group formed by the direct beneficiaries of the water harvesting structures (sample attached in Annexure-2)
- Monetary contribution by the users' group members to the Watershed Fund maintained at WDC level (sample attached in Annexure-3)
- Work Order placed by PIA to the agency engaged for earth work (sample attached in Annexure-4)
- Excavation work under supervision of technical personnel of WDT and WDC members

3. Summary and conclusion

- Case of Tantipara shows an unique convergence of interests of the farmers that has been facilitated by Project Implementing Agency through watershed committee, Panchayats and line departments of the state government.
- Out of 30 water harvesting structures were newly excavated and rest ---were re excavated or enlarged
- Total 30 water harvesting structures are distributed in 3 villages of two Gram panchyats namely Tantipara and Chandrapur
- Total area of the thirty water harvesting structures cover total area of 9.39 Hec
- Users group for each water harvesting structure has been formed, with the beneficiaries of the structure. 30 such Users' groups are studied in the case
- Total number of Users' group members is 330 out of which male represents 99.39 percent of the total members whereas women members represent only 0.6

percent of the total group members. So, women are poorly represented in the Users' group.

- While age group of the members is considered ,it is found that majority of the members belong to age group of 30-50.
- Out of total members, 60 percent belong to general caste, 21.81 percent belong to SC whereas 17.6 percent belong to ST. Only 0.9 percent of the total members belong to Other Backward caste. So among all the social groups, members from general caste represent in highest proportion.
- Total land under possession of the thirty group members account approximately 2020.16 Bigha . There is inter group or intra group variation in respect of land ownership status of the members. In case of structures owned by ST members, size of the land owned by majority of the members is below 0.33 acre.
- Regarding benefit of the water harvesting structures, it is found that direct benefit is harnessed by the members either through additional storage of water or through expansion of croppping area due to expansion of irrigation facility in the dry spell. Additional storage capacity of 85,904 cubic metre of water has been made possible through excavation of these thirty structures.
- Out of total command area of 188.37 hec, 75.35 acre has been brought under second or third crop due to increase of irrigation facility provided by these structures.
- Out of total land possessed by group members, 86.02 hec has been brought under irrigation. Irrigation facility created by excavation of water bodies has resulted in growing of winter crops including pulses and vegetables.
- Regarding increase in income, it is estimated that total annual income from fishery has increased to Rs. 58,0000. In addition to income from fishery, assured irrigation for paddy cultivation in kharif season has resulted in annual increase of Rs. 84,7665 and cultivation of winter crops has resulted in additional annual income of Rs. 37,67,500.
- Efficiency of the structures has been proved through increase in production, area under cultivation and introduction of new crops among which mustard, lentils and grams hold a significant position
- Wage employment opportunity of the agricultural labour has been expanded due to increase in area under cultivation especially in winter season.
- Effect of recharging has resulted in cultivation of crops in nearby fields and retention of water in the waterbodies in the dry spell.Water from these structures is also lifted through pumps and carried through pipelines to the distant fields

Strength of execution

There are critical factors which are found to be responsible for efficiency of the water harvesting structures

• Location of the ponds were determined during preparation of DPR through consultation process with the local community especially with

the potential users. This has minimized the scope of conflict in the execution stage

- Mobilization of the users to become partners of the programme through monetary contribution as well as physical supervision was unique effort. The process assured the farmers regarding their role in quality of the assets for long term benefit to the users
- Institutionalizing the process of negotiations with owners of the land or pond give assurance to the PIA that no interruption will make the progress
- Excavation of new structures were done along the drainage line to harness maximum storage of run off
- Mechanization was adopted in each and every case of water harvesting structures in the rocky physiographic condition. Excavation was done through use of machines resulting in quick execution and achievement of appropriate depth for water holding capacity
- Close supervision of the technical personnel of the Watershed Development Team right from designing to excavation stage
- Immediate results from the excavated water bodies enthuse the farmers to take up further excavation and help the PIA to replicate the work with other farmers as designed in DRP(Detailed Project report)

Critical gaps to be addressed in respect of sustainability

The study of the water harvesting structures reveals certain critical gaps at the terminal stage of IWMP implementation in Tantipara. To address the gaps, following steps may be significant for sustainability of the institutional arrangement in the long run

- Inclusion of women as joint member with male counterparts in the users' group to ensure direct and active participation of women in maintenance of the structure
- Users' group need to be trained to strengthen the organisation as they will be the primary stakeholders to maintain and develop the structures
- WDC may be reorganised through incorporating more representatives from users' groups to ensure greater access of the farmers particularly who are with landless or marginal status
- Institutional capacity of the Watershed Development Association(WDA) needs to be established with proper legal entity so that farmers'interest can be protected in the long run
- Revenue model may be introduced for different purpose like hiring of technical assistance from professionals etc. Provision of water users'charge or other fees can help the farmers to adopt judicious use of water in subsequent years in the post-project phase.

Finally water harvesting structures of Tantipara watershed project show a model process of needbased intervention for the farmers with poor asset base in the dryland region of West Bengal. It has proved that appropriate technical guidance and timely execution can bring a vast measurable change not only in the level of income and confidence of the farmers, it indicate a replicable process for adoption in other rainfed areas of the state.

Declaration: Study was undertaken by Susmita Choudhury, Senior Faculty Member as an official assignment of B.R.Ambedkar Institute of Panchyats and Rural Development, Govt of West Bengal in the year 2019-20.

Acknowledgement BRAIPRD sincerely acknowledge spntaneous response, immense help for developing theoretical understanding as well as measuring field impact and cordial support at every stage of investigation extended from:

- Users' group members of Tantipara Watershed project
- Pradhan and members of Tantipara Gram Panchyat
- Watershed Committee ,Tantipara IWMP
- BDO, Rajnagar Block ,Birbhum
- Soil and Water Conservation Division, Department of Agriculture, Rajnagar Block, Birbhum
- Loka Kalyan Parishad (PIA), and project staff of IWMP Rajnagar Loka Kalyan Parishad
- Miss Debali Ghosh WDT member
- Shri Satya Sardar Team Leader and all members of WDT.

And

Dr. Bibekananda Sanyal, Director, IWMP and Usharmukti, Loka Kalyan Parishad