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INNOVATIVE PRACTICES IN WEST BENGAL UNDER MINOR IRRIGATION DEVELOPMENT PROJECT

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A. BRIEF OVERVIEW OF PROJECT

West Bengal Accelerated Development of Minor Irrigation Project (WBADMIP) is a World bank Assisted project whose project development objective (PDO) is to enhance agricultural production of small and marginal farmers in the project area. This will be achieved through mainly accelerated development of minor irrigation services to small and marginal farmers, strengthening community-based irrigation management, operation and maintenance, and support to agricultural development, including provision of agricultural services for encouraging crop diversification, use of improved technologies as well as creating income-generating opportunities. Originally, the project target was to provide 4,660 schemes to provide irrigation to 139,000 ha and benefit 166,000 farmers. Currently the revised project cost is INR 1380 Crores and the target is to develop around 2,800 schemes to irrigate 75,000 ha and 100,000 farmers that will be operated and maintained by 2,300 WUAs. The Duration of West Bengal Accelerated Development of Minor Irrigation project is from 2012 to 2017.

A total of 804 completed schemes have been handed over to WUAs. These schemes are expected to serve 23736.61 ha with gross command area of 44761.427 Ha and benefit more than 66057 users.

A total of 851 registered WUAs representing more than 73927 beneficiaries have been formed that are participating in planning, supervision and Management, Operation and Maintenance (MOM) of schemes. Among various beneficiaries, women account for 14 %, tribal for 11% and small and marginal farmers account for 78%. The members in almost all the schemes have contributed member fees indicating their interest to operate and maintain the schemes. With improved access to water, not only the monsoon crops have been saved from failure, the farmers are now growing 2-3 crops in a year. As a result, the cropping intensity has increased from 78% to 148% and while production has increased by more than 50% for Paddy. The project has supported 9664 agriculture demonstrations covering 3678.09 Ha, 8728 horticulture demonstrations covering 1191.9 Ha and 323 fisheries demonstrations. Fish production based demonstrations have also shown the potential to increase the gross income by five times.

B. CHALLENGES FACED BEFORE IMPLEMENTATION

There were many challenges faced by the projects initially which have mostly been overcome through constant effort and innovative ideas. The main hurdles that the project had faced are listed as follows.

1. Identification of focus area based on very stringent project criteria on social, agro-economic and environmental issues.
2. Framing of social safe guard and procedure of execution of the same.
3. Ensure financial sustainability of the schemes. Mobilising and enabling the potential water users to take the entire responsibility of operation and management of the schemes by collecting water charge, as there is no Govt. assistance.
4. Environmental safe guard to be stipulated in accordance with PAD. Clarification on the already existing safeguard and its limits. Identify the issues not covered under existing safeguard. Management plan for executing the same.
5. Systematisation of the procedure of collecting and collating data from field level. Timely updating in the system. Authentication of ground level data.
6. Lack of information on parameters required for construction of cost effective but safe and environment friendly structure because of projects area are mostly backward and located in remote areas.
7. Coordination between NGOs, farmers and officials.
8. Adopting new method of procurement system in compare to conventional procurement system.
9. Mobilising a big pool of newly recruited contractual staffs.
10. Updating and orienting Government officials with new project mode.

C. PROCESS FOLLOWED FOR IMPLEMENTATION

A very scientific but challenging process is followed throughout the project right from the planning stage to post implementation - hand holding as summed up in the below chart.

	Process	Project Activities flow
Preplanning	Identification of potential Water Users Association for prospective scheme	Village Selection with the application of GIS
		Project Awareness
		Receiving request for sub-project/scheme
		Preliminary assessment of social & technical feasibility by SO for potential schemes
		Community consultation assessing their readiness & willingness on the schemes
		Agreeing on terms & conditions followed by mass petition/proposal submitted to DPMU
		Facilitating verification (technical as well as social) of proposed command area and selection of scheme by DPMU
		DLIC approval

Planning	Formation and Capacity building of institutions of identified Water Users	Formation and registration of WUA under SRA 1961 along with Sub-committee formation of WUA
		Training sub-committee members on their roles & responsibilities
		Training WUA to prepare SDMP
	SDMP (Scheme Development Management Plan) Preparation and finalisation jointly with WUA, SO & DPMU	Data collection using PRA tools
		Facilitating WUAs to prepare SDMP
		Agriculture Support Service plan
		Environment safe guard, Gender & Tribal Development plan
		Engineering design and Technical Sanction by DPMU
		Completion of SDMP document jointly with WUA, SO and DPMU
		Ratification of SDMP by WUA and submission to DPMU for DLIC ratification
		DLIC ratification
	Approval from SPMU & Finalisation of Agency for construction	Administrative Approval from SPMU
		Bidding process
		Administrative & Financial sanction from SPMU
Implementation	Construction work	Construction of MI scheme, electrification, test run before handing over to WUA
	Capacity building of WUA continues	Opening of working Bank account of WUA
		Training WUAs on 6 modules
	Monitoring of SDMP implementation by WUA	Scheme layout, construction & electrification
		Implementation of plan as per SDMP
	Capacity building of WUA continues	Exposure visit
		Demonstration/ASS
		Ensuring Gender & TDP aspects
	Functioning of WUA	Facilitate WUAs on record keeping, annual balance sheet submission to the office of the Registrar
		Facilitating convergence with other Govt. programs and line departments
		Environment plan/participatory water quality monitoring
		Linking with Market & financial institution, value addition to farm produce, business plan development, etc.
		Participatory Monitoring by WUA
	Acquiring formal ownership of the scheme by WUA	Handing over of scheme to WUA

Post Implementation	Capacity building/ Strengthening of WUA continues	Refresher Training & Capacity Building at WUA/ Village and Block/District level
	Functioning of WUA continues	Operation & Maintenance BY WUA/sub-committees
		Facilitating to prepare Annual action Plan for WUA
		Scheme sustenance and arrangement of operational fund
		Warranty Service & insurance
		Linkage, convergence, value addition continue
		Participatory Monitoring continues

D. INNOVATIVE ASPECT OF THE PROJECT

Innovative processor practice or ideas has always been played a major role throughout the project to overcome many hurdles and to achieve real goal of the project. These may be numerous, but some of those discussed briefly here.

D.1 ***Information Technology with use of Space Technology-Remote Sensing, GIS & MIS for better planning, monitoring and help in decision making. The online information is available for 24 x 7 online both in GIS and MIS system. The systems are made integral to planning as there is Real time & Geo-tagged data updating. These features of the project applied practically in every aspect of the project as mentioned below.***

D.1.1 Locating Appropriates Project Area

Extensive use of "Remote sensing and Geographical information system" indigenously and innovatively in the favour of the project objective is one of the most important phenomenon that has been instrumental throughout the project.

These tools played enormous role in quickly identifying and assessing suitable areas for the work under the project considering all the vital criteria of the project like identifying single cropped area along with socially backward areas with the use of different layers under GIS platform. List of villages were selected based on GIS data which enables field officials to reach to those areas and star the work. This reduces the time for selection process considerably.

The GIS system enabled any stakeholder in the project to have access to the information of the social and agriculture practices for their purposes.

Fig 1 depicts the information on social respect and selection scoring of each village for consideration under the project where Fig 2 depicts the single cropped areas and finally produces Fig 3 the target areas.

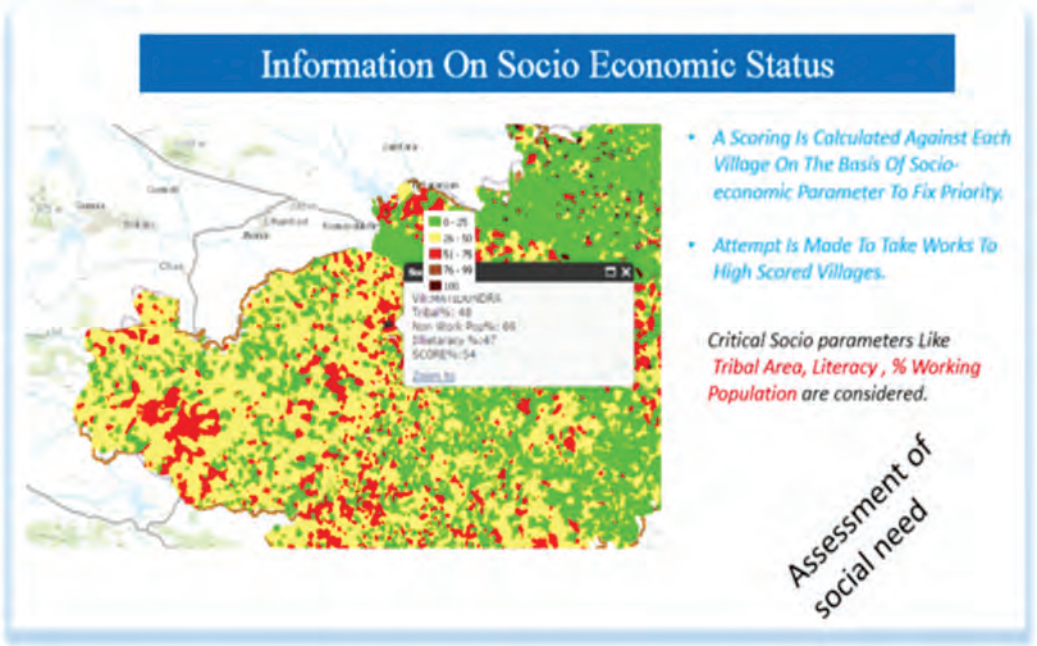
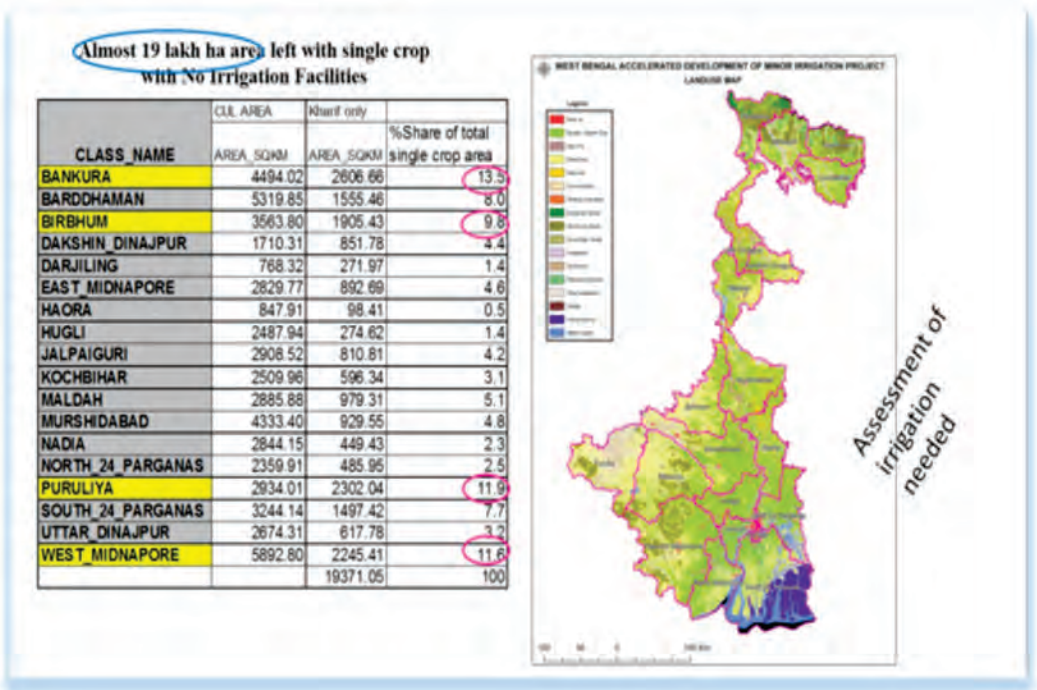


Fig 1: Social information with Social scoring data for social need.



CLASS_NAME	CUL AREA AREA_SQKM	Kharif only AREA_SQKM	%Share of total single crop area
BANKURA	4494.02	2606.66	13.5
BARDDHAMAN	5319.85	1555.46	8.0
BIRBHUM	3563.80	1905.43	9.8
DAKSHIN_DINAJPUR	1710.31	851.78	4.4
DARJILING	768.32	271.97	1.4
EAST_MIDNAPORE	2829.77	892.69	4.6
HAORA	847.91	98.41	0.5
HUGLI	2487.94	274.62	1.4
JALPAIGURI	2908.52	810.81	4.2
KOCHBIHAR	2509.96	596.34	3.1
MALDAH	2885.88	979.31	5.1
MURSHIDABAD	4333.40	929.55	4.8
NADIA	2844.15	449.43	2.3
NORTH_24_PARGANAS	2359.91	485.96	2.5
PURULIYA	2934.01	2302.04	11.9
SOUTH_24_PARGANAS	3244.14	1497.42	7.7
UTTAR_DINAJPUR	2674.31	617.78	3.2
WEST_MIDNAPORE	5892.80	2245.41	11.6
		19371.05	100

Fig 2: Locating and quantifying single cropped area (most fundamental criteria of project)

Fig 3 : Setting target areas for project and displayed in the GIS enabled web page for all.

D.1.2 Improvements of Performance of Structures

Revamping selection and design procedure of surface water based projects like Check dam or weir with the help of "remote sensing" and "GIS based indigenously developed tool" in extracting vital data from various data layer for designing safe and economical construction.

Traditionally weir type structures on streams were constructed with many assumed data due to constrained of availability of reasonably reliable hydro geological parameters which results in hydraulic failure of the structure with loss of public money and reputation.

After implementing online based GIS tools, it enables design and field engineers seating at his own office or any place of his comfort in assessing suitability of the location or selection of new location

of different types of structures right from check dam to Pump Dug wells before field visit. It also enables them to check design parameters through this online IT system which include catchment area for small dam and reservoir structures from in-built contour layer, peak discharge, afflux, probable width and height of the dam etc. by analysing various input layers like 50 years rain fall layer, its rainfall intensity layer, land use layer, slope layer and other geo morphological layer of parameters. Fig 4 depicts a snap shot of such online system.

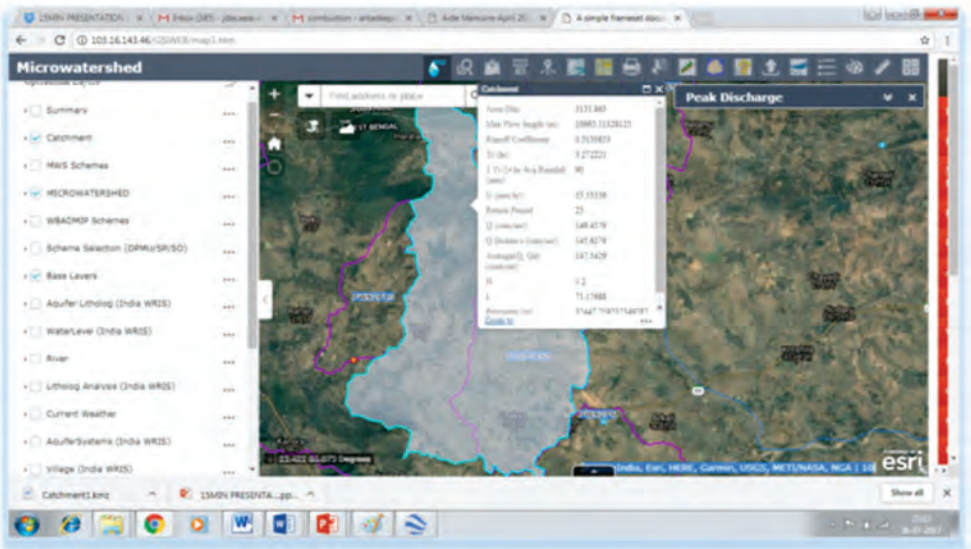


Fig 4 : Online tool to determine catchment area of a check dam, probable input and output design parameters for easy and confident design of check dam and other surface flow based

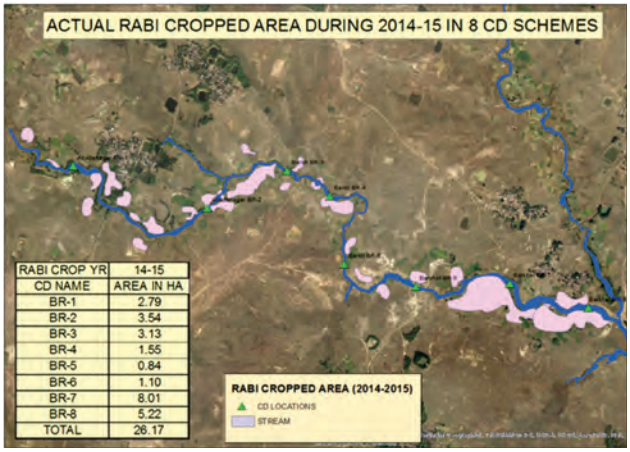
With the help ofsuch real hydro-geologic data, obtained through online tools, the rate of failure of hydraulic structures reduced significantly as per latest report and observation.

Some failures due to inappropriate hydrological information

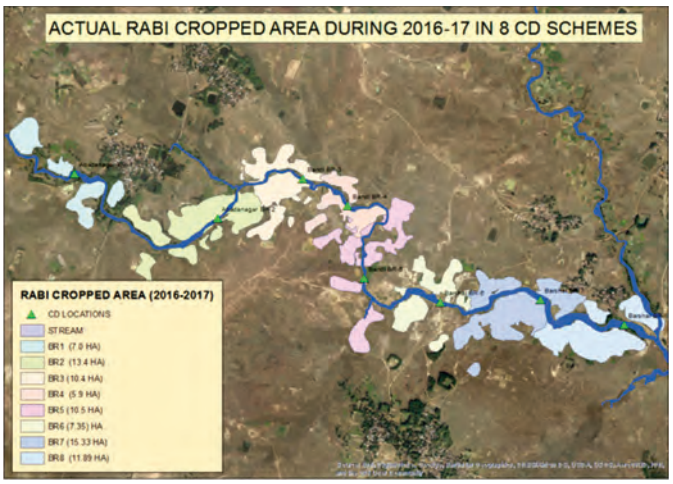
Some failures due to inappropriate hydrological information

D.1.3. Assessing Impact, After Implementation of Irrigation Projects

Probably it is the first time for the State to assess the impact of the project just after the implementation. Through analysis of latest image of remote sensing data the project collects the information about the area of crop grown in Rabi and kharif season and pass the information to the field with suitable measure instruction if required for proper utilisation of the scheme. Fig 6 indicates one of the impact analysis of a series of check dam at Birbhum.



Area of Rabi Cultivated before project



Area of Rabi Cultivated after project

Fig 6

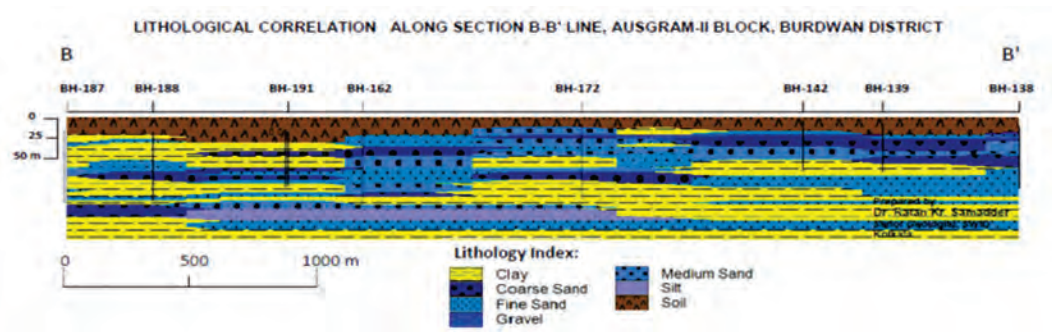
D.1.4 Preparation of Scheme Bank for Different Projects with Identifying Probable Suitable Location for Check Dam and Pond Renovation Work

The GIS based IT system has helped a lot in preparing a database for suitable locations of check dams and other structures for taking up in Jalatirtha as well as ADMI project.

A total of 583 check dams(almost 432 in Jaltirtha and remaining in WBADMIP) have been taken up and almost 471 have been completed under various fund and most of these Check dams had been identified initially through IT enabled GIS system. These schemes were executed successfully by mainly by WRIDD (264) and a good fraction by other Departments like, I & W, PWD, PUA, & Forest Dept (all combine 319). For most of the design of those projects designer took help of online GIS based information system for collecting vital hydro morphological data for safe and economic design which led to a great success of the project.

D.2 Preparation of Zonal Aquifer Mapping using Data of Ground Water Projects Executed

Many ground water projects like tube well schemes have been executed in this project. But for the first time the project has mapped aquafer mapping for those areas for future design and decision making. The project has taken the advantages of the modern software to build these maps conveniently as shown below (Fig 7)

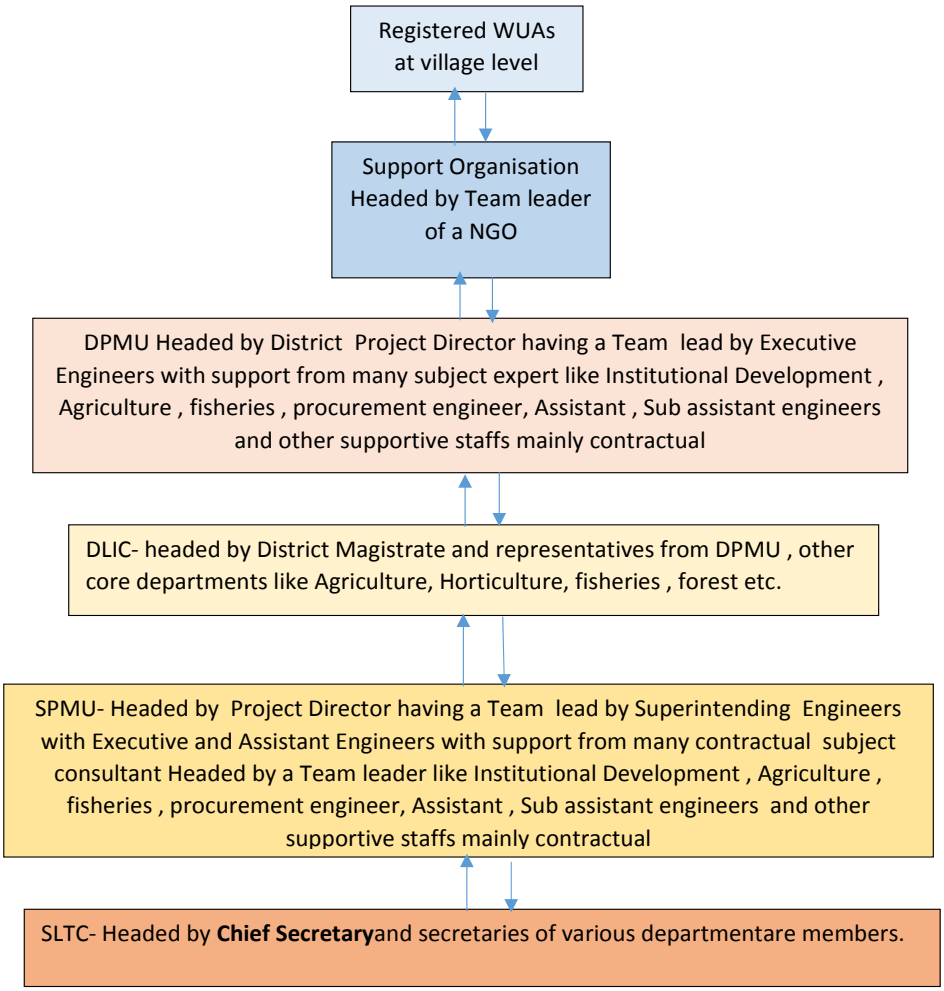


E. DESCRIPTION OF SOLUTION IMPLEMENTED

F. GOVERNANCE PRACTICE INVOLVED

The process of Governance involved right from water users' level (farmers) to Secretariat level with sufficient checks and balance.

The following chart helps to understand the Governance practice involved.

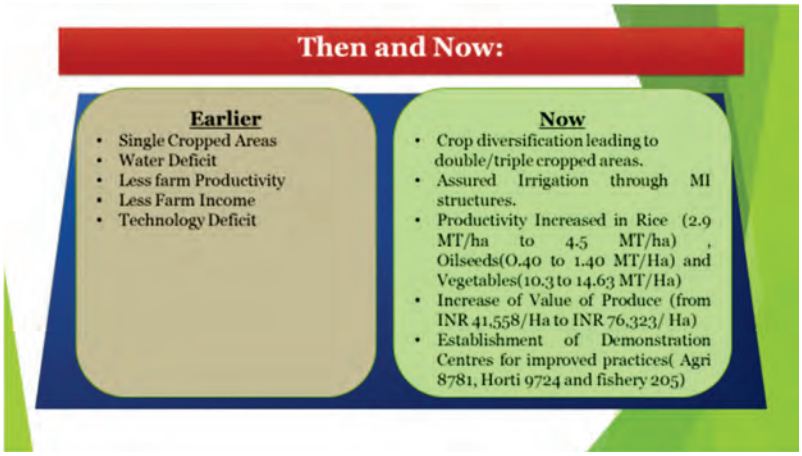


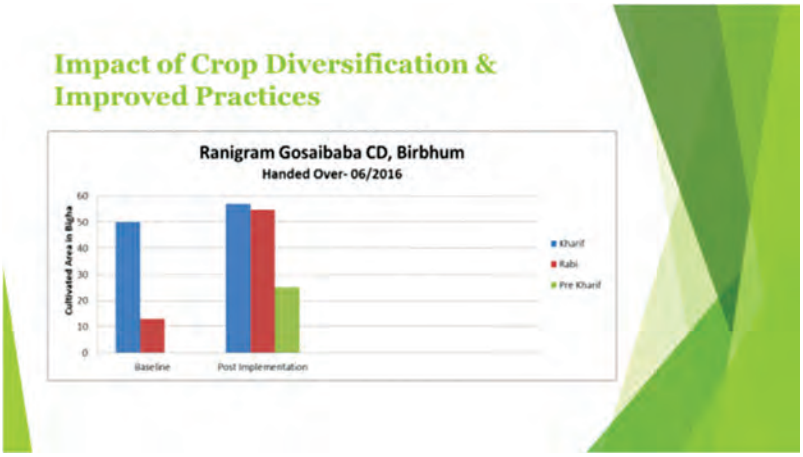
G. COVERAGE OF POPULATION

The project target was to provide 3000 schemes to provide irrigation to 100,000 ha and benefit 166,000 farmer Households.

H. COMPARISON OF PRE-DEPLOYMENT WITH POST-DEPLOYMENT SCENARIO

Following performance indicators help to understand the comparison of Pre-deployment and post –deployment.





I. BENEFITS OF SOLUTION IMPLEMENTED

Till now a large part of the Agricultural Land in West Bengal remains monocrop and rain fed. For a solution of this problem emphasis given in this WBADMI Project to develop surface water resources through construction of Surface Flow Minor Irrigation Structures at those areas, such as Check Dams or Water Detention Structures as well as Open Dug Well Schemes. Benefits of such schemes begin to give result to the beneficiaries who could not cultivate Rabi crop due to non-availability of assured irrigation. Moreover, in some areas farmers could cultivate Pre-Kharif crop also with the water left-over from Rabi. Not only that, the farmers can also save Kharif crop during drought by utilizing stored water in those Minor Irrigation Structures. Such examples are there in the arid region of Paschim Medinipur, Bankura, Purulia and Birbhum District.

J. POTENTIAL OF REPLICABILITY ARISING FROM SUCCESS OF THE PROJECT

One of the successes of this Project is to implement series Check Dams in a particular Stream. Success of such series Check Dams has been established. After installation of such series Check Dams in one of the arid District Birbhum, area of Rabi cultivation and cultivation of Pre-Kharif is increasing every year prominently in the command areas of those series Check Dams in Birbhum.

There is no doubt regarding potential of such series Check Dams in suitable streams and this can be replicated in other monocrop, rain-fed areas also.

Another success of this Project is the ability of the structure of Check Dams to withstand against natural calamity like flood. Such seasonal streams on which the Check Dams are constructed encounter huge "flash flood" during excessive rainfall within a short duration. The GIS based calculation of the catchment area gives design discharge for each Check Dam to the highest precision resulting in accurate design of the structures and no structural failure of the Check Dams have been reported so far.

Agricultural Support Service is another important part of this project. The successful Demonstration of Crop of "SRI" cultivation of paddy in the action areas of this project has influenced many other cultivators out of the action areas and they also started "SRI" cultivation of paddy. So does with the "soil less nursery" also. Potential of replicability arising from success of the project is thus proved.

K. PROCESS MAP

Work Flow map to bring forth clearer understanding of the steps followed in this project: