"INNOVATIVE IRRIGATION SYSTEM IN COASTAL SALINE AREAS OF SUNDARBAN, WEST BENGAL."

"INNOVATIVE IRRIGATION SYSTEM IN COASTAL SALINE AREAS OF SUNDARBAN, WEST BENGAL."

The Sundarbans is one of the most ecologically gifted deltas of West Bengal, but over exploitation by farmers along the freshwater sources have posed a major threat to the entire ecosystem; as a result affecting cultivation & productivity owing to salt water ingress from the sea. The challenge for WBADMIP is to seek community partnership in re-excavating and strengthening embankments, rainwater harvesting and innovation in cultivation and horticulture.

Mr. Prabhat Kumar Mishra,
Principal Secretary, GoWB & Project Director

Mr. Debashis Roy,
Additional Project Director

Mr. Amit Ghosh,
Executive Engineer, South 24 Parganas

Mr. Joydeep Das,
Executive Engineer

Mr. Akhilesh Parey,
Team Leader

Mr. Amitava Mukherjee,
GIS Specialist WBADMI Project Team
and WBADMI Team

PROJECT SHOWCASE

"INNOVATIVE IRRIGATION SYSTEM IN COASTAL SALINE AREAS OF SUNDARBAN, WEST BENGAL."

Sunderban area in South 24 Parganas District falls within gangetic delta, having saline aquifer not suitable for agriculture irrigation. In some places there is sweet water aquifer which is being overexploited by farmers in desperation. This is accentuating the threat of disturbance in the groundwater and saline water ingress from the sea. Salinity level is also high in soil resulting in soil degradation and fall in agriculture productivity. Most of the area has traditionally been mono-cropped with some exceptions. This has caused migration and hardship for the local population. Pisciculture has been a good source of income for fish farmers. However, the productivity is low and use of available water resources is non-optimal. In this fragile ecosystem there is a huge opportunity to go for rainwater harvesting. The area receives almost 1700 mm of rainfall which can be gainfully stored in derelict water bodies and interlinked sweet water creeks. These creeks are age old system made for the drainage of access/flood water to the sea. Many of these creeks have got silted and can easily be re-excavated. There is no need to go through the process of land acquisition since the land in these creeks belongs to the government. The challenge has been to seek community partnership to remove encroachment and arrange land on the embankment where the excavated soil can be kept. All this has been achieved under the West Bengal Accelerated Development of Minor Irrigation Project through a careful dialogue with community. So far more

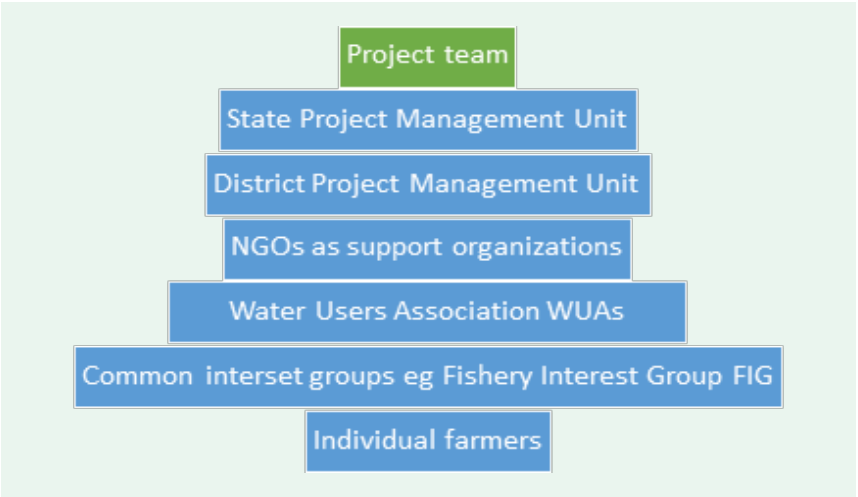
PROJECT SHOWCASE

"INNOVATIVE IRRIGATION SYSTEM IN COASTAL SALINE AREAS OF SUNDARBAN, WEST BENGAL."

than 300 km of old creeks have been re-excavated resulting in command area of more than 6000 Ha. At the same time inputs on agriculture, horticulture and pisciculture have been provided. This has resulted in increase in cropping intensity from 97% to 194% in the project area. Several remunerative fish species/ culture (like IMC with fresh water giant prawns, Bhetki, Chital, Magur, Magur with IMC, Pangus culture etc) have been reared in the water bodies which have been created and 1,16,000 fruit saplings (e.g. Coconut, Betelnut, Pineapple, Drum stick, Papaya etc) have been planted in about 150 Ha area covering 113 KM on both sides of the embankments. It is expected that in the long run this approach will result in bringing in a fundamental change in the quality of life of the people in Sunderban area through sustainable use of water.

WORLD BANK PROJECT WBADMIP

WB ADMIP is a World Bank supported Project implemented by Water resources investigation & Development Department, Government of West Bengal with a total Project cost of 1380 Crores. The project objective is to enhance the agriculture production of 1,00,000 small & marginal farmers famers of the project area by providing assured irrigation facility in 75000 ha area by creating about 2500 minor irrigation schemes. The project also provides agriculture support services to maximize the available



"INNOVATIVE IRRIGATION SYSTEM IN COASTAL SALINE AREAS OF SUNDARBAN, WEST BENGAL."

potential and is implemented with active involvement of Community Institutions i.e. Water Users' associations.

The project is implemented by the team of Departmental Engineers, project based contractual staff (good mix of multi-disciplinary team in each districts) and NGOs with the overall guidance & support of World Bank experts. While technical inputs are provided by the engineering staff the last mile connectivity to the farmers is provided by the NGOs which are acting as the support organisations.

At village level Water users' associations (WUAs) act as single window for delivery of all the project interventions for potential farmers. Continuous capacity building and handholding support is provided to all WUAs facilitating their evolution.

The project has focussed on building an institutional framework to operate in close coordination with community, provide a single window platform to weave agricultural support services and ensure an outcome-based result. This is a major improvement over the existing sectoral structure

"INNOVATIVE IRRIGATION SYSTEM IN COASTAL SALINE AREAS OF SUNDARBAN, WEST BENGAL."

of governance wherein different Departments operate in silos. The project implementation structure is shown.

Project is empowering WUAs to operate, maintain and manage the Project interventions and facilitating its adoption of good practices in the neighboring areas.

SOUTH 24 PARGANAS

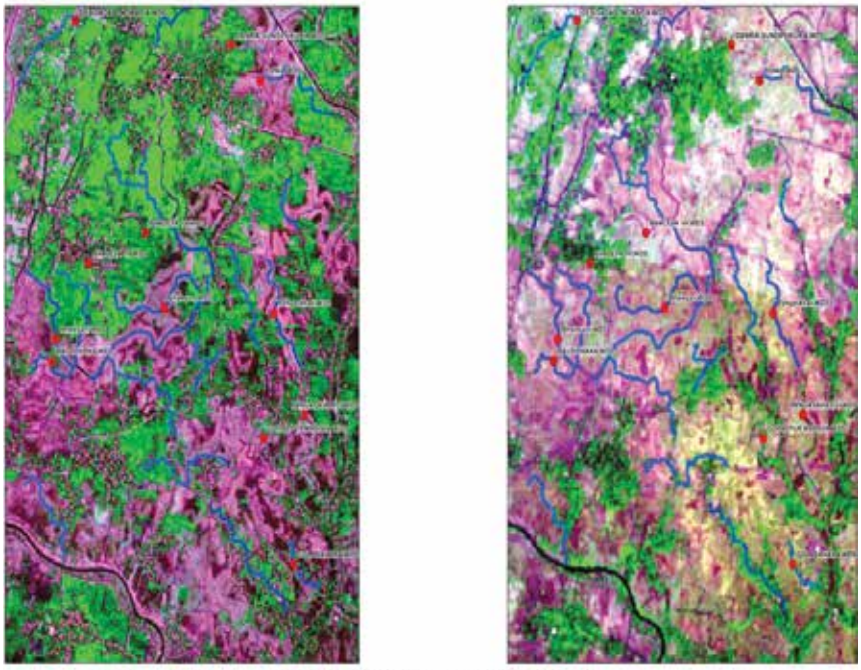
Sunderbans in South 24 Parganas District is having very deep aquifer and in most of the cases it is saline. Hence it is not suitable for agriculture and is non-economical. Huge numbers of derelict water bodies and silted creeks are available in the area. WDS (Water Detention Structure) has been identified as the best technical option. It entails appropriately designed cross section option to create irrigation opportunity by re-excavation of silted creeks. The excavated earth is placed on the embankment with grass turfing to prevent erosion. The embankment is also used for fruit plantation which acts the soil binder and generates extra income. The canal has adequate number of inlets and outlets which help in channeling water from the catchment area. The soil in Sunderbans is mostly fine clay which has little porosity. Therefore, there is hardly any leaching and the water is stored in the channel for a very long time. Future upkeep and maintenance of the canal rests with the water user associations (WUA) who charge water tax from farmers to generate necessary resource. Solar pumps having less carbon footprint have been introduced for lifting water along with sprinkler system to achieve more crop per drop. Other innovation relates to putting water to the best possible use by promoting best practices related to agriculture, horticulture and pisciculture. For example, system of rice intensification has been promoted which reduces water need by almost half. Fresh water giant prawns have been introduced to maximize economic gains in a sustainable way. The area is presently having inflow of various varieties of prawns which are environmentally not suited to the ecosystem of the Sunderbans. Value added inputs of Mobile based advisory services have also been provided to farmers on whether forecast, advisory services, alerts, pest management, water management, organic farming and so on. The intervention has on the whole helped in recharging ground water, protecting it from saline intrusion, removing water logging, improving tree cover and improving quality of water.

LAND UTILIZATION STATISTICS OF SOUTH 24 PARGANAS

Geographical Area	– 9,96,000 Ha
Cultivable Area	– 4,06,215 Ha
Gross Cropped Area	– 6,90,727 Ha
Net cropped Area	– 3,93,465 Ha
Area under more than one crop	– 2,54,962 Ha
Gross Irrigated Area	– 1,40,703 Ha
Average Rain fall (annual)	– 1750-1770 mm

LAND HOLDING

Up to 1 ha – 64%, Up to 2 ha – 20% Above 2 ha – 16%
SOURCE – COMPREHENSIVE DISTRICT AGRICULRAL PLAN, SOUTH 24 PARGANAS



"INNOVATIVE IRRIGATION SYSTEM IN COASTAL SALINE AREAS OF SUNDARBAN, WEST BENGAL."

KEY CONCERNS

- Predominantly Single cropped rainfed
- Ground water level very deep and affected by sea water intrusion
- Saline affected area
- Huge numbers of derelict waterbodies & silted interlinked sweet water creeks are available
- Interrupted drainage and Waterlogged area
- Rainfed Paddy followed by Boro Paddy only in irrigated lands
- Limited Vegetable production only in irrigated areas
- Traditional Pisciculture practices in the available water bodies

SURFACE WATER IS THE ONLY OPPORTUNITY FOR THIS COASTAL AREA-

Focus is on rainwater harvesting. The ground water in Sunderbans is generally affected by saline water intrusion from the sea and is not an assured source due to unavailability/ over exploitation. The work done in the project area has motivated farmers to explore more reliable option of surface water through rain water harvesting in the more than 150-year-old canals by their re-excavation. It has resulted long term sustainable conjunctive use of ground water and surface water. It has helped in reducing effect of seawater/saline water intrusion, has removed water logging and opened up opportunities for extra winter crop. In addition, ecofriendly agricultural and horticultural practices were promoted for reducing water contamination.

PROJECT INITIATIVES

- The project is designed to ensure sustainability of investment in three ways: a) institutionalizing systems, processes, tools and guidelines developed within State implementing framework, b) knowledge and capacity building across all levels and stakeholders, and c) Use of modern technologies & equipment's e.g. GIS etc for more effective decision making.

- Guidelines, specifications and design parameters for engineering structures: norms for design of minor irrigation infrastructure have been optimized. The re-excavation of old silted creeks turns out to be the cheapest mode of ensuring irrigation. The average cost per Ha-m of water resource created is 1.64 Lakh. WUAs collect water charges as part of the water management fee. This has developed into a financially sustainable mode of operation for the infrastructure.

- Internal knowledge and skill enhancement are evidenced by a GIS based online hydrological analysis tool developed in-house by government officials and engineers in the project team. This has helped reduce structural overdesign and associated capital costs. In response to requests from other departments outside the project, the project team is training state engineering cadres on using this tool. Stakeholders have graduated to becoming effective trainers and advocates of technology in irrigation.

- The project successfully demonstrated how Water Users Associations (WUAs) can maximize gains from investments through convergence with other departments,

PROJECT SHOWCASE

"INNOVATIVE IRRIGATION SYSTEM IN COASTAL SALINE AREAS OF SUNDARBAN, WEST BENGAL."

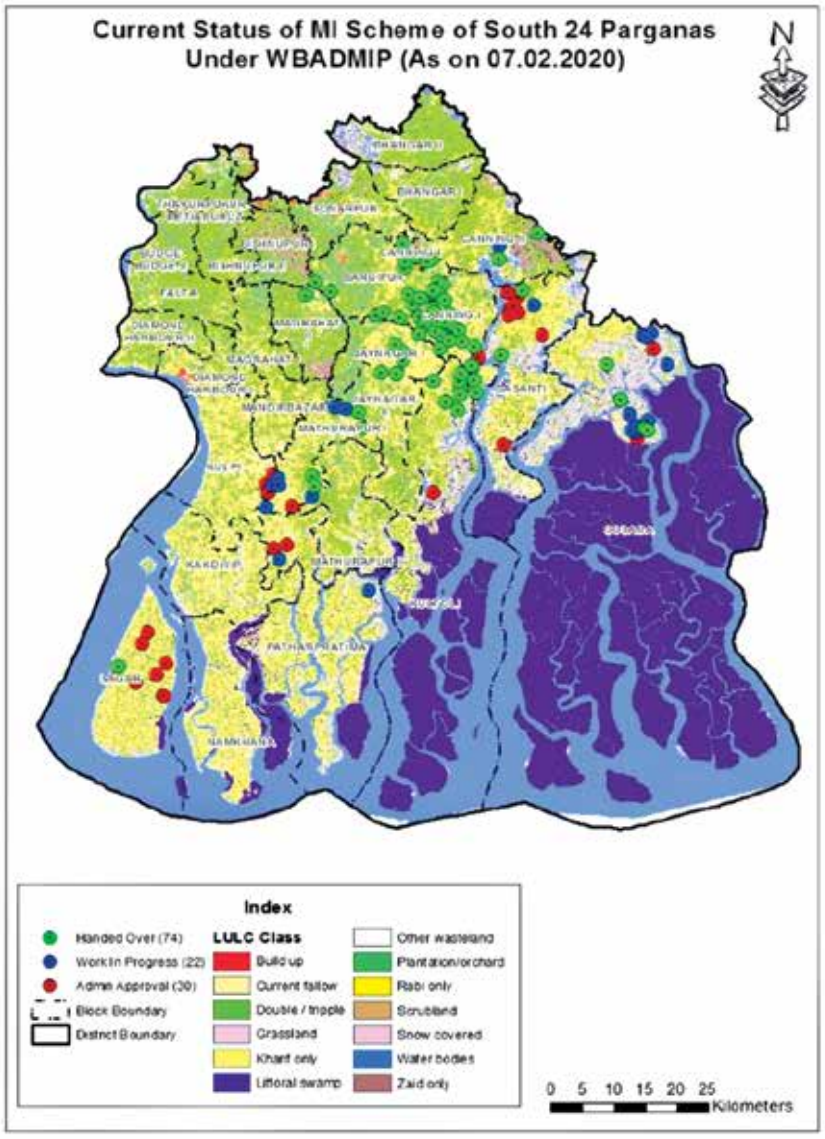
markets and academia. Such partnerships work on skilling, sustained operation and maintenance arrangements as well as improved on-farm water efficiency and building market access. The success of this model is exhibited by WUAs who have matured sufficiently to self-initiate knowledge/ information sessions, interact with service providers, implement on-farm solutions and engage with agribusinesses agencies. This has resulted in efficiency gains which has helped in reducing the overall cost.

- Support Organizations have been selected in their core areas of operation where they have already built a bond with community. This has resulted into fast tracking community engagement and has reduced cost of operation.

- Project is promoting appropriate technologies (implements/ machines/ inputs etc) and practices for wide scale adoption by the farmers. This is given to WUAs as incentive to adopt good practices and evolve into empowered community-based organizations. This has helped WUAs generate resource by earning on custom hire basis. Similarly, the good practices (very low/no cost) have also been demonstrated by the project through these WUAs in farmers' fields on agriculture, horticulture and fisheries. This is creating substantive impact as the neighboring farmers can easily adopt these practices even without project facilitation.

- Project promoted IMC with fresh water giant prawns, Bhetki Chital, Magur, Magur with IMC, Pangus

"INNOVATIVE IRRIGATION SYSTEM IN COASTAL SALINE AREAS OF SUNDARBAN, WEST BENGAL."



culture etc covering about 90 Ha Water body.

- Almost 150 Ha covered with 1,16,000 fruit saplings (e.g. Coconut, Beetle nut, Pineapple, Drum stick, Papaya etc) planted on the 113 KM both sides of the Creek embankments.

EMERGING TRENDS

- It is obvious that the project interventions have a very positive impact on
- The socio-economic conditions and
- General livelihood of the rural communities
- Water available is made available to the members for Irrigation and fishery
- Agricultural, horticulture fishery support activities introduced to WUA members
- Change from single cropped kharif only to Rabi and pre-Kharif
- Cropping intensity and agriculture income almost doubled
- Creeks becoming opportunities for intensive pisciculture and reported very profitable
- Consequently change in social status, impact on malnutrition, education and migration
- Positive change in water, vegetation and aquatic biodiversity in the area
- Peoples in the area particularly women & youth are motivated to take up lead in the development of their area
- Peoples in the neighbouring areas are eagerly waiting to learn from the experiences and adopt
- Vibrant WUAs proactively taking responsibilities addressing conflicts, benefit distribution etc. these WUAs contributed more than 1.8 Crore on arranging water pumps, flexible pipes, temporary cross bridge over creeks etc.

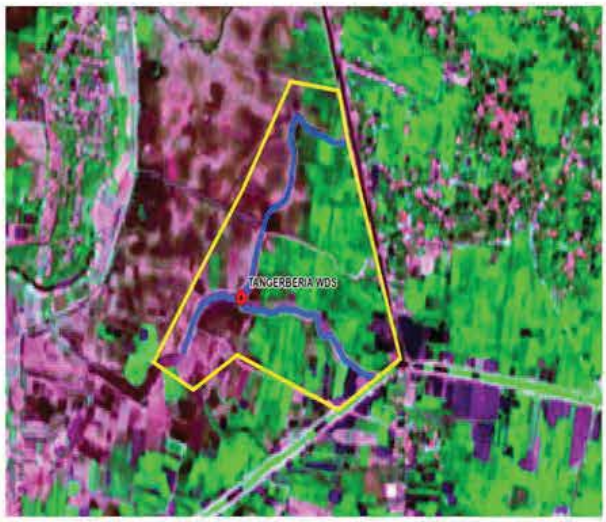
Observed change in net income from agriculture produce from INR 15000 Per Ha to 42000 Per Ha. Fishery interventions emerging as more viable livelihood option for the village community, rates of the agriculture produce fluctuates but fish rates always going up. Unit cost INR 1.27 Lakhs per Ha of fishery activities providing average net income of INR 1.80 lakhs per Ha. Change in Cropping Intensity in the Project Area changed from Pre Project 97% to Post Project -194 %.

PROJECT IMPACT

Sunderbans has a fragile ecosystem which has been affected by cyclones for ages. The global warming and climate change has increased frequency of cyclones in the area. Cyclones increase sea levels which

"INNOVATIVE IRRIGATION SYSTEM IN COASTAL SALINE AREAS OF SUNDARBAN, WEST BENGAL."

TANGANBARIYA WDS , BARUIPUR , 24 Pgs (S)
Change in One Mino r irrigation scheme Creek



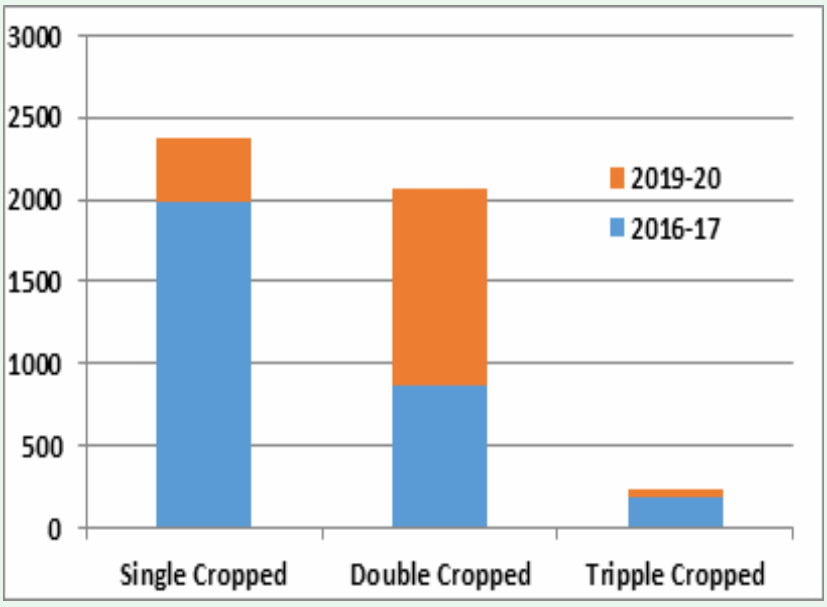
Rabi Command area After Scheme

TOTAL LENGTH OF WATER DETENTION STUCTURE : 1.4 km
WATER STORAGE CAPACITY : 98000 m^3
RABI CULTIVATED AREA : 38 Ha

Rabi Command area Before Scheme

TOTAL LENGTH OF WATER DETENTION STUCTURE : 1.4 km
WATER STORAGE CAPACITY : 30000 m^3
RABI CULTIVATED AREA : 7 Ha

increases salinity in the area. This has disastrous impact on agriculture and pisciculture. The project intervention has helped in achieving climate resilient agriculture in the area. The area suffers from saline water ingress and limited groundwater aquifers. Re-excavation of old creeks has resulted in improving overall water availability which has helped in reducing salinity. Intelligent interventions in the form of minor irrigation and well thought, innovative intercropping, plantation, various fishery practices and supported by the right information, advisory and tools have significantly improved the socioeconomic conditions and reduced vulnerability of the farmers in the project area. Ensuring efficient use of resources and delivering environmentally sustainable production solutions has worked conjunctively and successfully. The impact of the project initiatives can be easily understood through comparison for project area

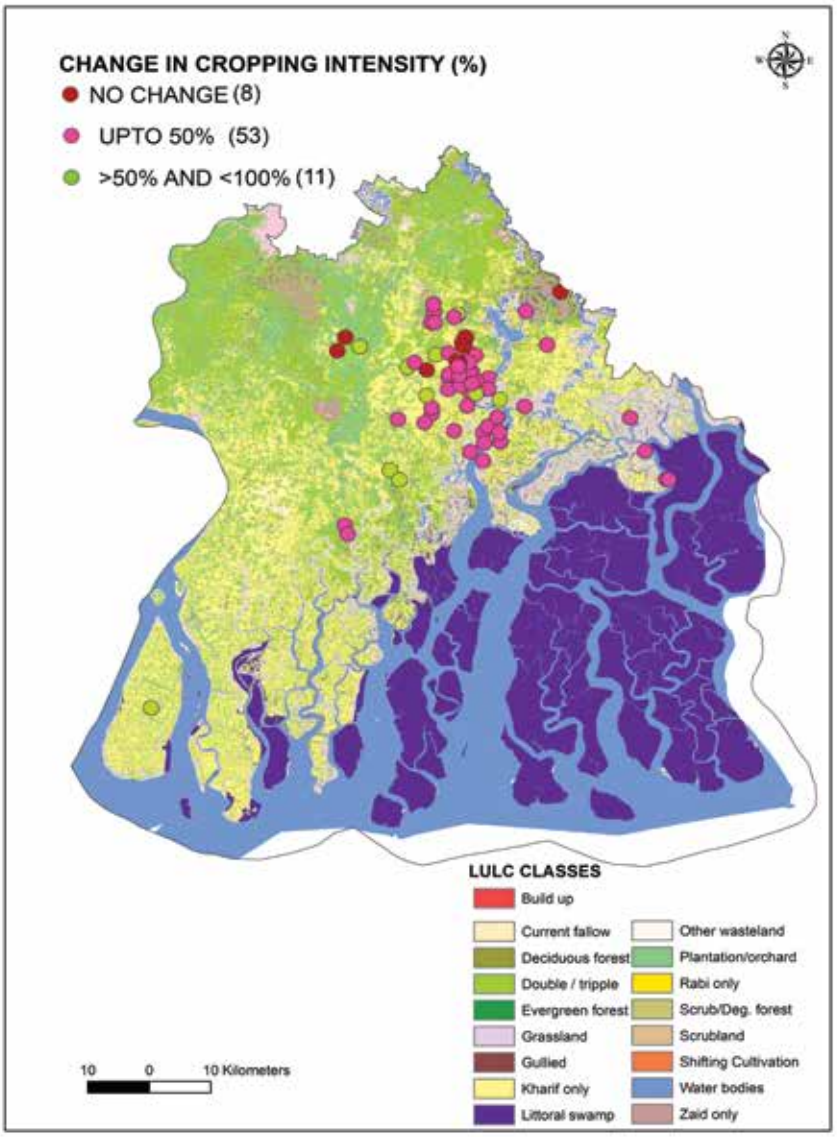


CHANGE IN CROPPING AREA (HACTARE), SOUTH 24 PARGANAS DISTRICT

Year	Single Cropped	Double Cropped	Tripple Cropped	Potential area created
2019-20	2383	2073	230	4686
2016-17	2008	872	190	3070

CHANGE IN CROPPING AREA

GIS based post scheme implementation analysis is one of the achievements of West Bengal Accelerated Development of Minor Irrigation Project. The irrigation schemes are mostly taken up in the rain fed single cropped areas (mostly kharif cropped) of the western lateritic regions, Coastal Saline region and Hilly region of West Bengal. The schemes are mainly surface water based due to very limited scope / saline intrusion in groundwater. The Remote Sensing (satellite image based) and GIS based impact assessment has been carried out on more than 1500 handed over schemes of the project. The changes in cropping intensity are monitored through the satellite images before and after implementation of the schemes. The change in the cropping intensity is shown in the Map.



before & after intervention as shown in the satellite images.

Integrated efforts of the WB ADMI Project are a unique example of integrated development for the Coastal areas. The community of the project is very excited to see the initial impact of the project and the neighbouring village communities are coming up to learn and adopt these experiences.

Project Documentary on Creeks development/ Water Detention structure in South 24 Parganas https://www.youtube.com/watch?v=bIbuCSZiOg8

For more details visit us at www.wbadmip.org

CONCLUSION:

Re-excavation of old creeks and canals, and rebuilding embankments, have resulted in long term use of groundwater and surface water on a sustainable basis. WBADMIP's project initiatives have successfully implemented and showcased how Water Users association can maximise gains, work on partnerships, build skill-sets, and adopt appropriate technologies for a sustainable future. ❑❑❑

ABOUT THE AUTHOR

Mr. Prabhat Kumar Mishra, Principal Secretary, GoWB & Project Director, Mr. Amit Ghosh, Executive Engineer, South 24 Parganas, Mr. Joydeep Das, Executive Engineer, Mr. Akhilesh Parey, Team Leader, Mr. Amitava Mukherjee, GIS Specialist WBADMI Project Team, Mr Debashis Roy, Additional Project Director, and WBADMI Team
To know more about the authors, kindly write to us at: info@thewaterdigest.com