IRRIGATION SYSTEM DEVELOPMENT [Component-B]
Target, achievements, learnings and Way forward
COMPONENT B
Irrigation System Development

COMPONENT B 72.5% (Rs 828 Cr)
COMPONENT A, C, D 27.5%
COMPONENT B- IRRIGATION SYSTEM DEVELOPMENT

The aims of this component are

1. To improve availability of water for agriculture and fisheries in areas currently cultivated under rainfed conditions.

2. The activities of this component include construction of about 3274 no minor irrigation systems (command area varying from 1.5 to 100 ha),

3. It comprising Check dams, river lift schemes and Water detention structures, and construction of Tube well and Pump Dug wells.

4. The total area to be developed under the project is about 44652 ha, benefiting an estimated 1,00,000 farm families.
## OVER ALL ACHIEVEMENT

<table>
<thead>
<tr>
<th>Description</th>
<th>Achievements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schemes approved</td>
<td>3,274 No</td>
</tr>
<tr>
<td>Schemes handed Over</td>
<td>1,756 No</td>
</tr>
<tr>
<td>Targeted CCA to be Developed</td>
<td>44,652 Ha</td>
</tr>
<tr>
<td>CCA Already Achieved</td>
<td>34,910 Ha</td>
</tr>
<tr>
<td>Total Targeted Expenditure</td>
<td>Rs 828 Crore</td>
</tr>
<tr>
<td>Total Expenditure Achieved</td>
<td>Rs 683 Crore</td>
</tr>
</tbody>
</table>
AT A GLANCE TARGET VS ACHIEVEMENT

AS ON 10TH SEPTEMBER 2019

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Target</th>
<th>Achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCA (HA)</td>
<td></td>
<td>76%</td>
</tr>
<tr>
<td>Irrigation Potential (HA)</td>
<td></td>
<td>75%</td>
</tr>
<tr>
<td>Expenditure (CR)</td>
<td></td>
<td>82%</td>
</tr>
</tbody>
</table>

Target
Achieved
District-wise Performance on Administrative Approval Amount and Expenditure

<table>
<thead>
<tr>
<th>District</th>
<th>Administrative Approval Amount (in Crore Rs.)</th>
<th>Expenditure (in Crore Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BANKURA</td>
<td>134.44</td>
<td>70.90</td>
</tr>
<tr>
<td>BIRBHUM</td>
<td>105.26</td>
<td>70.22</td>
</tr>
<tr>
<td>BARDHAMAN PURBA</td>
<td>48.41</td>
<td>42.23</td>
</tr>
<tr>
<td>COOCHBEHAR</td>
<td>51.39</td>
<td>48.22</td>
</tr>
<tr>
<td>DAKSHIN DINAJPUR</td>
<td>33.69</td>
<td>32.76</td>
</tr>
<tr>
<td>DARJEELING</td>
<td>28.01</td>
<td>19.31</td>
</tr>
<tr>
<td>HOOGLY</td>
<td>8.93</td>
<td>8.42</td>
</tr>
<tr>
<td>HOWRAH</td>
<td>5.33</td>
<td>5.14</td>
</tr>
<tr>
<td>JALPAIGURI</td>
<td>95.40</td>
<td>51.61</td>
</tr>
<tr>
<td>MALDAH</td>
<td>40.49</td>
<td>20.19</td>
</tr>
<tr>
<td>MURSHIDABAD</td>
<td>11.83</td>
<td>10.22</td>
</tr>
<tr>
<td>NADIA</td>
<td>12.51</td>
<td>11.13</td>
</tr>
<tr>
<td>NORTH 24 PARGANAS</td>
<td>10.07</td>
<td>8.88</td>
</tr>
<tr>
<td>PASCHIM MEDINIPUR &amp; JHARGRAM</td>
<td>116.99</td>
<td>67.44</td>
</tr>
<tr>
<td>PURBA MEDINIPUR</td>
<td>28.95</td>
<td>23.81</td>
</tr>
<tr>
<td>PURULIA</td>
<td>159.54</td>
<td>99.29</td>
</tr>
<tr>
<td>SOUTH 24 PARGANAS</td>
<td>62.99</td>
<td>41.45</td>
</tr>
<tr>
<td>UTTAR DINAJPUR</td>
<td>15.86</td>
<td>15.43</td>
</tr>
</tbody>
</table>
NUMBERS TAKEN FOR EACH TYPE OF SCHEME

No of Schemes

- WDS/SFMIS: 1377
- TW: 797
- PDW: 643
- CD: 248
- LI: 198
- HAPPA ETC: 11
## RABI CCA for Each Type of Scheme

<table>
<thead>
<tr>
<th>Type</th>
<th>CCA in HA (RABI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WDS/SFMIS</td>
<td>9750</td>
</tr>
<tr>
<td>TW</td>
<td>23061</td>
</tr>
<tr>
<td>PDW</td>
<td>2750</td>
</tr>
<tr>
<td>CD</td>
<td>3750</td>
</tr>
<tr>
<td>LI</td>
<td>5300</td>
</tr>
<tr>
<td>HAPPA ETC</td>
<td>41</td>
</tr>
</tbody>
</table>
## COSTING OF DIFFERENT TYPES OF IRRIGATION SCHEMES

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Cost/Ha (Rs Lakh/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WDS/SFMIS</td>
<td>1.5</td>
</tr>
<tr>
<td>TW</td>
<td>1.43</td>
</tr>
<tr>
<td>PDW</td>
<td>1.71</td>
</tr>
<tr>
<td>CD</td>
<td>1.92</td>
</tr>
<tr>
<td>LI</td>
<td>1.08</td>
</tr>
</tbody>
</table>
ACTUAL GROWTH OF CROPPED AREA SINCE INCEPTION OF THE PROJECT [2012 TO 2019] IN RABI AND PREKHARIF SEASON (on field)

Fall of crop area due to shortage of monsoon rainfall

Note: Obtained through remote sensing analysis on google earth engine
<table>
<thead>
<tr>
<th>Structure Type</th>
<th>Sources of water</th>
<th>Numbers approved</th>
<th>Total cost in Rs Crores</th>
<th>CCA (Rabi)</th>
<th>CCA (Kharif)</th>
<th>Cost / ha in Lakh</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>WDS, SFMIS, including Creek rejuvenation</td>
<td>Surface water / Run-off water</td>
<td>1377</td>
<td>293</td>
<td>9750</td>
<td>19500</td>
<td>1.50</td>
<td>Lateritic district, Coastal districts</td>
</tr>
<tr>
<td>Check dam</td>
<td>Surface water / Run-off water</td>
<td>248</td>
<td>216</td>
<td>3750</td>
<td>11250</td>
<td>1.92</td>
<td>Lateritic districts</td>
</tr>
<tr>
<td>River Lift Irrigation [Electric]</td>
<td>Surface water (river)</td>
<td>198</td>
<td>54</td>
<td>5300</td>
<td>5300</td>
<td>1.08</td>
<td>All perennial river flowing areas</td>
</tr>
<tr>
<td>Tube well [Electric, Solar]</td>
<td>Ground water</td>
<td>797</td>
<td>331</td>
<td>23061</td>
<td>23061</td>
<td>1.43</td>
<td>alluvium zone</td>
</tr>
<tr>
<td>Pump Dug well [Electric, solar]</td>
<td>Ground water</td>
<td>643</td>
<td>75</td>
<td>2750</td>
<td>4375</td>
<td>1.71</td>
<td>Alluvium and lateritic zone</td>
</tr>
<tr>
<td>Others (Hapa/Sprinkler)</td>
<td>Various</td>
<td>11</td>
<td>1.5</td>
<td>41</td>
<td>51</td>
<td>2.94</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>3274</strong></td>
<td><strong>970.87</strong></td>
<td><strong>44652</strong></td>
<td><strong>63537</strong></td>
<td><strong>1.52</strong></td>
<td></td>
</tr>
</tbody>
</table>
UNDERSTANDING DEPTH AND COMPLEXITY OF DIFFERENT TYPES OF MINOR IRRIGATION STRUCTURE DEVELOPED AND THEIR LOCATIONS IN WBADMI PROJECT (2012-2019)
West Bengal Accelerated Development of Minor Irrigation Project (WBADMIP)

Supported by the World Bank
BATCH – I
(2012-2014)
INTRODUCING TARGET
AREA AS POLYGON
(2014-2015)
West Bengal Accelerated Development of Minor Irrigation Project WBADMIP

WB ADMI Project Supported by World Bank

BATCH – II
(2014-2015)
WBADMI PROJECT Supported by World Bank

INDEX
- Batch III (2015-16) (405)
- Batch II (2014-15) (422)
- Batch I (2013-14) (345)
- Project Area -2014
- District Boundary

BATCH – III (2015-2016)
BATCH – IV  
(2016-2017)
EXPANSION OF PROJECT AREAS (2017-2018)
BATCH – V
(2017-2018)
West Bengal Accelerated Development of Minor Irrigation Project WBADMIP
WB ADMI Project Supported by World Bank

BATCH – V1
(2018-2019)
West Bengal Accelerated Development of Minor Irrigation Project (WBADMIP)

Supported by World Bank

**Schemes on Precambrian Zone**

- CD: 89
- LI: 235
- PDW: 263

**Schemes on Archaean Zone**

- CD: 90
- HAPPA: 7
- LI: 55
- PDW: 323
SOURCE OF WATER :: GROUND WATER VS SURFACE WATER

**Whole Project**
- Ground Water (GW): 56%
- Surface Water (SW): 44%

Total CCA Created:
- 20262 ha CCA
- 25811 ha CCA
SCHEME PLANNING PROCESS OF PROJECT
Scheme Selection Process

GIS Based Planning

Ground Truthing

1. Web based GIS Platform freely available on public domain.
2. More than 20 thematic map layers for visualization, analyze and decision making.
3. Interactive tools for delineating catchment areas, generating contours, cross sections, cropping intensity etc.
Web GIS Platform for WBADMIP: [http://103.16.143.46/GISWEB/map1.htm](http://103.16.143.46/GISWEB/map1.htm)
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (Ha)</td>
<td>2214.42</td>
</tr>
<tr>
<td>Maximum Flow Length (m)</td>
<td>8784.28</td>
</tr>
<tr>
<td>Average Run-off co-efficient</td>
<td>0.40</td>
</tr>
<tr>
<td>Average Slope(s/100)</td>
<td>0.02</td>
</tr>
<tr>
<td>Time of Concentration (hr)</td>
<td>1.59</td>
</tr>
<tr>
<td>C</td>
<td>55.72</td>
</tr>
<tr>
<td>Return Period</td>
<td>25.00</td>
</tr>
<tr>
<td>Q (cum/sec)</td>
<td>137.62</td>
</tr>
<tr>
<td>G Dicken’s (cum/sec)</td>
<td>112.29</td>
</tr>
<tr>
<td>Average Discharge (cum/sec)</td>
<td>124.96</td>
</tr>
<tr>
<td>H</td>
<td>1.00</td>
</tr>
<tr>
<td>L</td>
<td>55.86</td>
</tr>
<tr>
<td>Perimeter (m)</td>
<td>23468.50</td>
</tr>
</tbody>
</table>
LET US SEE HOW OUR SCHEMES LOOK LIKE
West Bengal Accelerated Development of Minor Irrigation Project WBADMIP

WB ADMI Project Supported by World Bank

Tentulberia/Kendua Check Dam
Block - Chhatna
CCA - 20 Ha
Latitude - 23.374691
Longitude - 86.958386
About 210 KM long canal re-excavated in South 24 Parganas through 59 Schemes
Solar schemes
Mouza- Madhabpur Block- Binpur-II CCA- 1.37 Ha (Rabi)

Madhabpur wds

22°37'47", 86°53'47", 22.4m, 257°

11/06/2019 12:19:28
In undulating lateritic terrain of Western part of the state.
- In series in suitable spacing in 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> order streams.
- Has gates to clear up deposited silt and have cross over bridge or gangway.
- 248 no of Check dams has been taken in this project.
- Estimated cost of Rs 216 Cr and creation of 3750 ha of Rabi CCA and 11250 ha of Kharif CCA.
- Water utilisation capacity 4500 ham.
- 127 no Check dams are already handed over to WUA.
- Remaining are under construction and to be completed by December 2019.
Design with best survey and design methodology using GIS, Remote sensing, modern survey equipment's like DGPS, Total station etc.
West Bengal Accelerated Development of Minor Irrigation Project (WBADMIP)

Supported by the World Bank
APPROVED VS HANDED OVER OF CHECK DAMS IN DIFFERENT BATCHES

TOTAL APROV-248 and TOTAL HO-127
Size of the check dams depending upon Site situation

<table>
<thead>
<tr>
<th>SIZE OF CD</th>
<th>CCA RABI IN HA</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMALL</td>
<td>4-7 HA</td>
</tr>
<tr>
<td>MEDIUM</td>
<td>7-14 HA</td>
</tr>
<tr>
<td>LARGE</td>
<td>14-22 HA</td>
</tr>
</tbody>
</table>

Size of Check dams

- SMALL (4-7 HA): 27% (68)
- MEDIUM (7-14 HA): 60% (147)
- LARGE (14-22 HA): 13% (33)

(based on Rabi CCA)
COST ANALYSIS OF CHECK DAMS

TREND OF COST/HA (CCA) IN SUCCESSIVE PHASES

<table>
<thead>
<tr>
<th>Phase</th>
<th>Cost (RS in Lakh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>0.00</td>
</tr>
<tr>
<td>II</td>
<td>2.00</td>
</tr>
<tr>
<td>III</td>
<td>2.70</td>
</tr>
<tr>
<td>IV</td>
<td>0.00</td>
</tr>
<tr>
<td>V</td>
<td>0.93</td>
</tr>
<tr>
<td>VI</td>
<td>1.50</td>
</tr>
</tbody>
</table>

- Average construction cost for check dams is Rs 1.92 Lakh / ha and 4.8 lakh / Ha-m
- The construction cost per ha gradually reduced after several design modification without compromising safety.
PUMP DUG WELL

- Mostly constructed in pre Cambrian zone western part and also in alluvial zone of north Bengal
- Depth 10-15 m, 1.5 m to 3.6 m dia, lined with concrete or brick wall.
- 643 no PDW projects are taken
- Estimated cost of Rs 75 Cr
- Targeted Rabi CCA 2750 ha and in kharif 4375 ha
- So far the project had completed about 238 no PDW.
Batch wise PDW taken and handed over

Number taken - 643, Handed over - 238,
West Bengal Accelerated Development of Minor Irrigation Project (WBADMIP)

CCA (RABI) - 2750 Ha
CCA (KARIF) - 3894 Ha
Estimated Cost - Rs 75 Cr

Average Cost Per Ha Development = 1.71 Lakh

TREND OF COST / HA IN DUGWELLS IN SUCCESSIVE 6 PHASES

<table>
<thead>
<tr>
<th>Phase</th>
<th>Description</th>
<th>Cost (Rs. Cr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>In Alluvium zone of North Bengal only, Only Diesel operated, Dia- Mostly 1.0 m</td>
<td>0.23</td>
</tr>
<tr>
<td>II</td>
<td>In both Alluvium as well as Western Lateritic zone only, Both Electric and solar operated, Dia- 1.5 m to 3.6m</td>
<td>2.09</td>
</tr>
<tr>
<td>III</td>
<td>In Western Lateritic zone only, Only solar operated, Dia- Mostly 3.6 m</td>
<td>3.95</td>
</tr>
<tr>
<td>IV</td>
<td>In Western Lateritic zone only, Only solar operated, Dia- Mostly 3.6 m</td>
<td>3.72</td>
</tr>
<tr>
<td>V</td>
<td>In Western Lateritic zone only, Only solar operated, Dia- Mostly 3.6 m</td>
<td>1.74</td>
</tr>
</tbody>
</table>

AVERAGE COST PER HA DEVELOPMENT = 1.71 LAKH
WATER DETENTION STRUCTURES

[ VARIOUS SHAPE AND SIZE BASED ON SITE SITUATION AND TOPOGRAPHY

• **New tanks and reservoir** mainly constructed
• One of the most feasible option for rain water harvesting specially in **Lateritic Districts**
• **1226 no of reservoirs** are taken.
• Estimated Cost **Rs 175 cr with creation of 5097 ha CCA in Rabi** and **11000 ha in kharif**.
• **443 Nos of such schemes are already handed over**
• Remaining are in full pace of construction phase and like to be completed by 2019.
REJUVINATION OF CREEKS

BEFORE AND DURING CONSTRUCTION

AFTER CONSTRUCTION

- These are derelict Creeks under complete rejuvenation
- Total 250 km of creeks has been taken for rejuvenation with total 95 no projects so far.
- This will create 4650 cca in Rabi and Double of it in Kharif
- About 201 km of creeks already rejuvenated with 90 no of projects.
- Remaining mostly are under construction and few are in bidding stages.
Gradual increase of Numbers to tap more rain water and facilitating more Ground water recharge
Cost trend of WDS in Different batches

- Average cost of command area development is Rs 1.61 lakh / ha
- Gradual cost reduction achieved after modifying design
• These schemes are constructed on rivers in all parts of state.
• Total 198 no schemes taken for creation of total cca 5300 ha
• Total cost involved rs 54 cr.
PROGRESS AND COSTING RIVER LIFT IRRIGATION SCHEME

- HANDED OVER 194 NO OF SCHEMES
• Constructed in recent alluvium plain of the state.
• Total 797 no of Solar or Electric operated Tube Well has been approved with estimated cost of Rs 331 Cr for creation of 23061 ha
• About 617 no of Tube wells already constructed and handed over that already creates 19255 ha
• Gradual Cost Reduction achieved
SYSTEM OF MONITORING AND QUALITY CONTROL

- Implemented Internal Quality Assurance & Control team headed by Superintending Engineer, SPMU, taking the help of Irrigation and water Way Dept’s laboratory.

- WUAs are also part of monitoring of construction.

- The project had prepared and distributed manual of checking quality of construction in vernacular language for WUS for different schemes.

- System of Monitoring through Remote sensing and GIS with MIS has adopted.
QUALITY CONTROL BY INTERNAL AS WELL AS THIRD PARTY

Ramchandrapur, West Bengal 721504

Ramchandrapur
West Bengal
India

Decimal  DMS
Latitude  22°48’62”N
Longitude  86°58’57”E

2017-06-21(Wed)  13:02

Baruipur Nirala Road
Devipur Abad
West Bengal
India

Decimal  DMS
Latitude  22°30’18"N
Longitude  88°55’75"E

2017-06-22(Thu)  12:20(pm)

Khayradihi, West Bengal
Khayradihi
West Bengal
India

Decimal  DMS
Latitude  23°8’62”N
Longitude  87°35’56”E

2017-06-29(Thu)  12:01(pm)
Innovation and Bringing Modern Technology
Project encouraged of modern planning, design and construction methodology and inculcate new ideas

• Project utilised Remote sensing and GIS technology through out the project cycle. Probably this is unique in our country in water sector.
• Project has introduced DIGITAL BORE LOG machine with GAMA resistivity to finely delineate aquifer zone during construction of tube well. It has been proved to be indispensable in sustainable ground water development.
• Project has piloted IoT based irrigation system design in 5 tube well schemes to optimise ground water utilisation in boro paddy.
• The project has adopted survey works with modern equipment like total station, DGPS. And now planning Lidar system.
• The project has successfully updated design methodology of Check dam, Tube wells and share the same to the Mother department.
• Telemetric based Ultrasonic sonic as well as DWLR are installed in 80 check dam sites to monitor water depth of the check dams.
DIGITAL BORE LOGGER OWNED BY WBADMIP UNDER SUPERVISION OF SENIOR GEOPHYSICS.

West Bengal Accelerated Development of Minor Irrigation Project WBADMIP

WB ADMI Project Supported by World Bank
A STUDY ON

AVERAGE TIME OF CONSTRUCTION

Source: Internship Research Report
By Mr João Moraes Abreu
Harvard Kennedy School
&
By Somveer
Indian Institute of Technology Kharagpur

Average time between Approval and HO, if all incomplete
were handed-over immediately, July 2018 (in days)

(ONLY ALREADY HO) Average Time Taken between Scheme
Approval date/Work Order and Handing Over, per batch
Thank You