

# Environmental Monitoring Report

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Project No. 34418-023  
Semestral Report  
June 2016

## 3302-BAN (SF): Southwest Area Integrated Water Resources Planning and Management Project- Additional Financing

Prepared by Bangladesh Water Development Board for the Peoples Republic of Bangladesh and the Asian Development Bank.

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**Environmental Monitoring Report for Southwest Area Integrated Water Resources Planning and  
Management project –Additional Financing  
Reporting Period: January 2016 to June 2016**

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**SOUTHWEST AREA INTEGRATED WATER RESOURCES PLANNING AND  
MANAGEMENT PROJECT-ADDITIONAL FINANCING (SWAIWRPMP-AF)**

**1. THE PROJECT**

**1.1 BACKGROUND**

The southwest area of 4 million ha (27% of the country's total) covers the right bank of the Ganges and the Lower Meghna rivers, with a population of 28.6 million (23% of the total). The region contributes 21% of the national GDP. With its sectoral share of 36%, agriculture plays a dominant role, yet its productivity is lagging behind the national average. Paddy yields remain at 3.1 t/ha due mainly to the dominance of traditional varieties associated with the area's susceptibility to flooding, and slower expansion of irrigation. About 51% of the area's population is poor, second to the highest—the northwest—among the country's four main regions. As to water resources, the southwest has 78 flood controls, drainage/irrigation (FCD/I) systems covering 1.1 million ha. It has the most acute water management problems in Bangladesh. Of particular concern is water shortage due to reduced inflow into the Ganges tributaries and associated social and environmental hardships, including salinity intrusion, livelihood loss, and environmental degradation. Other challenges include (i) the flood inflow from the Ganges in the monsoon and deterioration of existing FCD/I systems, (ii) drainage congestion and sedimentation of tidal channels caused by coastal polder construction and reduced tidal swept volume, (iii) arsenic contamination (highest in the country), and (iv) vulnerability to cyclones and tidal surges. Improving water management is critically needed in this region of the country.

Infrastructure deterioration of the existing FCD/I schemes has been a chronic issue, especially for large scale schemes. A lack of users' ownership causes quick deterioration of structures. The absence of stakeholder participation results also in inefficient and non-pertinent planning and inefficient water uses. Managing critical water resource through an integrated and participatory approach is essential for efficient water management, the sustainability of FCD/I schemes, and improved livelihood of the vulnerable poor, including women.

The Asian Development Bank (ADB) has financed for participatory water management projects for small-scale schemes since 1995. They have demonstrated success on improved infrastructure performance through operationalizing beneficiary participation envisaged in the government's Guidelines for Participatory Water Management. The completed Southwest project successfully demonstrated that the participatory approach can improve the water resources management of large FCD/I schemes. This is the first success case for large schemes among several trials in Bangladesh. Renovation of water management infrastructure in the two targeted subproject areas has been substantially completed with satisfactory achievements of anticipated targets. In total, 116 WMOs, consisting of 102 water management groups (WMOs) and 14 higher tier water management associations (WMAs), have been organized, trained and effectively functioning in the two subproject areas. About 25,400 households are benefitted, including the socially disadvantaged groups like landless farmers and women. WMOs demonstrated visible vitalization of WMO activities in agriculture, fisheries, livestock, and collective livelihood actions. Operation and maintenance (O&M) of small structures have been handed over to WMOs, after development of O&M manuals and WMOs' O&M capacity.

The additional financing project will expand the successful participatory water resources planning and management practices to other 9 (nine) additional subproject areas (~84,000 ha) in the Southwest

**Table-1: Subproject Detail**

sl.	Name of Subproject	District	Gross Area (ha)	Population	No. of WMG
1	Beel Sakunia	Faridpur	9,681	84,438	17
2 & 3	Kandor - Daduria Beel	Faridpur	3,301	15,519	6
4	Alfadanga-Boalmari	Faridpur	8,011	35,884	15
5	Chatler-Fakurhat	Faridpur	10,268	46,000	9
6	Kalidashkali-Arpara	Magura	13,197	59,124	28
7	Horai River	Rajbari	18,600	83,324	31
8	Purulia Char Bhatpara	Gopalganj	4,156	33,000	10
9	Bamonkhali-Barnali	Magura/Narail	16,782	112,200	34

sl.	Name of Subproject	District	Gross Area (ha)	Population	No. of WMG
<b>Total</b>			<b>83,996</b>	<b>469,489</b>	<b>150</b>

region of Bangladesh. It will make institutional capacity firm and ensure sustainability to the additional subproject areas through applying knowledge and experience acquired in implementation of the two completed subproject areas. The existing participatory concept, implementation procedures, and implementation arrangement will be continued, with necessary adjustments and improvements. IWMP for 4(four) straight forward subprojects is included under this project and will be prepared within 1<sup>st</sup> & 2<sup>nd</sup> year of project duration. Out of these, 2(two) subprojects will be taken for implementation and remaining two will be kept for future implementation by GOB.

## 1.2 Project Location:

The Project is located in the Southwest region of Bangladesh covering the districts of Faridpur, Rajbari, Magura and Gopalganj. Table-2 indicates the location of Sub-projects:

**Table-2: Locations of Subprojects**

Subproject	Division	District	Upazila
1	2	3	4
a. Beel Sukunia b. Kandor Beel c. Daduria Beel d. Alfadanga-Boalmari e. Chatler-Fakurhat	Dhaka	Faridpur	Nagarkanda, Faridpur sadar, Alfadanga, Boalmari, Sadarpur, Madhukali, Bhangha
f. Horai River		Rajbari	Rajbari Sadar, Baliakandi and Kalukhali
g. Purulia Char Bhatpara		Gopalganj	Kashiani
h. Kalidashkali-Arpara i. Bamonkhali-Barnali	Khulna	Magura	Magura Sadar and Salikha
j. Arol Beel k. Sonamukhi Banmandar		Jessore	Jhikargacha, Chowgacha and Sharsa

## 1.3 Objective of the Project

The overall objective of the project is to enhance economic growth and to reduce poverty in the rural areas of selected districts (Magura, Faridpur, Rajbari and Gopalganj) in the Southwest region of Bangladesh. Its intermediate objective is to enhance and sustain water security and livelihoods of rural people within the hydrological boundaries defined by existing but underperforming and Flood damage structures & embankment systems.

**Immediate objective A:** Participatory Integrated Water Resources Management Plans (IWMP) for selected hydrological units;

**Immediate objective B:** Enhanced livelihoods and livelihood opportunities impacted by IWMP as a result of upgraded infrastructures, increased user participation and improved, decentralized service delivery, and

**Immediate objective C:** Strengthening institutional capacity for planning, implementing, operating, maintaining and monitoring demand driven participatory, integrated water resources management plans.

In order to achieve aforesaid immediate objectives, the project include both institutional and investment programs those contribute in reducing poverty by securing and environmental conducive to improve health within project target areas and promoting GoB's sector reform process through the establishment of institutional arrangements for participatory project management.

## 1.4 Outline of the Consultancy Services

A consulting team led by an international firm and comprising international and national experts will be engaged as the ISPMC team, in accordance with ADB's *guideline on the Use of the Consultants*. The ISPMC team will be led by an International Team Leader who will supervise the entire activities of the ISPMC, and will be in charge of the progress and the quality assurance of the ISPMC activities. Consultant will arrange their main office in Faridpur and a sub-office in Dhaka. The consulting services are expected to continue for 68 months. The services will include the following major tasks.

- Task 1: Preparation of integrated water management plans (IWMPs) for four subprojects,
- Task 2: Implementation support for formulation and capacity development of WMOs in nine subprojects, and follow-up capacity development of existing WMOs in the Narail and Chenchuri Beel subprojects,
- Task 3: Implementation support for rehabilitation and construction of water management infrastructure in the nine subprojects, including construction supervision and quality control, and
- Task 4: Supporting institutional capacity strengthening of BWDB for participatory water resources planning and management.

**Table-3: Summary of Major Service Activities**

<b>Task</b>	<b>Major Activities</b>
Task 1: Preparation of IWMP for four subprojects.	<ul style="list-style-type: none"> <li>(i) Preparation of IWMP for two subprojects, Purulia Char Bhatpara in Gopalganj District &amp; Bamonkhali-Barnali in Magura District to be implemented under this additional financing project.</li> <li>I. Preparation of IWMP for two subprojects, Arol Beel &amp; Sonamukhi Banmandar in Jessore District that may be implemented by GOB under future projects.</li> </ul>
Task 2: Implementation support for formation and capacity development of WMOs in nine subproject areas, and follow-up capacity development of existing WMOs in the Narail and Chenchuri Beel subproject areas.	<p><u>For nine subprojects:</u></p> <ul style="list-style-type: none"> <li>(i) Support social mobilization for formulation of WMOs.</li> <li>(ii) Institutional capacity development of WMOs, including WMO operation, O&amp;M of structures, agriculture, fisheries, business development, livelihood improvement, and income generation activities.</li> <li>(iii) SIP preparation.</li> </ul> <p><u>For Narail and Chenchuri Beel Subprojects :</u></p> <ul style="list-style-type: none"> <li>(i) Follow-up institutional capacity development of WMOs.</li> <li>(ii) Support WMOs for operationalize the annual O&amp;M fund collection system.</li> </ul>
Task 3: Implementation support for rehabilitation and construction of water management infrastructure in the nine subproject areas, including construction supervision and quality control	<ul style="list-style-type: none"> <li>(i) Detailed design</li> <li>(ii) Support for tender procedures</li> <li>(iii) Preparation and update of resettlement plans</li> <li>(iv) Construction supervision, including monitoring of the environment management plan and resettlement plan implementation</li> <li>(v) Preparation of O&amp;M and LCS manuals</li> </ul>
Task 4: Supporting institutional capacity strengthening of BWDB and supporting agencies for participatory water resources planning and management	<ul style="list-style-type: none"> <li>(i) Support organizing training for BWDB and line agencies,</li> <li>(ii) MIS upgrading</li> <li>(iii) Capacity development support for OWCM and Audit Directorate of BWDB</li> </ul>

## 2. INTRODUCTION AND BASIC DATA

The project will enhance the livelihood of the rural population by improving the productivity and

sustainability of existing under-performing flood control and drainage/irrigation schemes through holistic and participatory planning, development, and management of water, and delivery of support services to address locally identified constraints on agriculture, fisheries, and livelihood development. During the process, the project will set-up and strengthen up-front at the pre-construction stage, viable water management associations (WMAs), which will take on key roles in all program delivery decisions and sustainable operation and maintenance (O&M) of local water infrastructure, while installing institutional capacities within the supporting agencies to manage the overall process, including O&M of main water infrastructure.

## 2.1 Estimated Cost and Financing Plans

Cost Estimates and Financial Planning is shown in **Table 4 & Table 5:**

**Table: 4 Cost Estimates (\$ million)**

Project Component	GOB	ADB	GON	Total
Base Cost				
1 Civil Works	4.02	22.49	0.00	26.51
2 Vehicle	0.51	0.99	0.00	1.50
3 Consultancy services	1.02	3.72	2.87	7.61
4 Training & Capacity Building	2.03	8.45	3.71	14.18
5 Surveys & Investigations	0.07	0.27	0.18	0.52
6 Project Management	3.56	3.13	0.00	6.70
7 Office Equipment	0.15	0.28	0.00	0.43
8 Land Acquisition & Resettlement	0.36	0.37	0.00	0.74
<b>Sub-total</b>	<b>11.72</b>	<b>39.71</b>	<b>6.75</b>	<b>58.18</b>
Contingencies				
1 Physical Contingency		1.77	0.00	1.77
2 Financing Charges During Implementation		3.52	0.25	3.77
<b>Total</b>	<b>11.72</b>	<b>45.00</b>	<b>7.00</b>	<b>63.72</b>
<b>(Percent)</b>	<b>(18.40%)</b>	<b>(70.60%)</b>	<b>(11%)</b>	<b>(100)</b>

## 2.2 ADB Loan Details

Date of approval	30 September 2015
Date of signing	13 December 2015
Effectiveness of loan	06 January 2016
Loan closing date (Revised)	31 December 2022

## 3. IMPLEMENTATION PROGRESS

### Environmental and Social Safeguards

#### 3.1 Environmental Clearance :

According to the project concept and documents, the project implementation requires approval for Environmental Impact Assessment (EIA) from the Department of Environment (DOE) that has been prepared earlier as part of the RRP. The DOE has given Environmental Clearance for the additional financing project in March 2015.

#### 3.2 IEE and EIA prepared for the Additional Subproject Areas.

Environmental impact management approach to SWAIWRPMP-AF is expected to have a general positive socio-economic impact on the flood- affected populations concerned. Productive polder subprojects, homesteads and townships provided protection against flooding/ damaged infrastructure for not doing maintenance for a long time is put in use/function again, pollution of drinking water wells will be prevented, salinity conditions and transport facilities will be improved, etc. With rehabilitation of flood damage/ deteriorated infrastructures will indeed improve the general well-being of the populations concerned with restoration of a sense of safety.

Possible negative impact is only expected in cases where land acquisition and resettlement of people are involved, as this is always stirring the emotions of local people, e.g. in case of retiring

of an embankment, relocation of a structure etc. However, care will be taken to avoid the potential number of households that might be affected keeping conformity with the category of “insignificant resettlement” under the ADB’s Policy on Involuntary Resettlement. Each SIP report will contain an Environmental Management Plan, of which the implementation needs to be monitored fulfilling the formats 1) for monitoring EMP and 2) monitoring compliance of contractors with construction regulations.

**Progress:** No progress. Impact may be assessed after recruitment of ISPMC when physical activities will be started.

### **3.3 Sustainable Involvement of Empowered Women in the Project Area**

The main objective of this will include creating sustainable access to safe drinking water based on trained local/beneficiary women-led institutions (groups) which would be responsible for the operation and maintenance of the installed safe drinking water technologies.

The specific objectives were to:

- i) Test arsenic in water samples from all existing drinking water tube wells in the SWAIWRPMP-AF area and identify the most drinking water vulnerable locations.
- ii) Establish access to safe drinking water in the identified worst arsenic contaminated and/or salinity affected areas by installing appropriate water technologies in approximately 60 points among the identified poorest and most environmentally (particularly safe drinking water) vulnerable WMCSs
- iii) Develop beneficiary women-led institution for water, environment and livelihood (WEL) per very project installed water point for sustainable operation and maintenance of the installed technologies.
- iv) Create awareness about household water safety, environmental sanitation, solid waste management, personal and family hygiene, safe cooking fuels, (if possible, micro-credit) and basic mother-child care among the women beneficiaries of the selected WMCSs.
- v) Promote, install and follow-up of at least about 10 numbers of household biogas plants, and
- vi) Analyze and document impacts of the project on Millennium Development Goal (MDG) targets of drinking water and sanitation in the study area concept.

### **3.4 Main Activities to be performed**

Investigation of Arsenic Contamination in drinking water tube wells:

- i. Water samples from tube wells in project areas are to be tested for arsenic with coloring, a short interview and GPS reading. PMO office will arrange training for facilitators. In this training; potential WMGs members and Community Facilitators (CFs) will be trained up;
- ii. Selection of the drinking water tube wells within the boundary of WMG area for safe water;
- iii. Baseline survey: Base line survey is to be done in the selected WMG areas. The information collected on social, demographic, water access and use, sanitation, and selected disease prevalence;
- iv. Development of Communication Materials. Distributing poster and WASH messages;
- v. Formation of WEL groups;
- vi. Promotion of water and sanitation outside WEL areas by PMO facilitators.
- vii. Installation of water options and its operation and maintenance.
- viii. Installation of Bio-gas plants
- ix. Mother and Child Care (Health Care).



#### 4. ENVIRONMENT MANAGEMENT PLAN & STATUS:

The individual SIP report will contain an Environmental Management Plan for the concerned subunit(s). The contents are summarized below for all SIPs.

Sl.	Item	Plan	Responsible	Status upto June 2016
1	Reduction of perennial wetland area as result of FCD rehabilitation	<ul style="list-style-type: none"> <li>Identify present location and size of perennial 'beels' and potential reduction by rehabilitation of FCD.</li> <li>Identify the fisher folk who are solely dependent on the permanent water bodies and are under risk of losing livelihood by rehabilitation of FCD</li> <li>Provide priority access to livelihood support measures to fisher folk identified</li> </ul>	<ul style="list-style-type: none"> <li>ISPMC, PMO, SMO as part of SIP preparation</li> </ul>	<ul style="list-style-type: none"> <li>ISPMC team not yet engaged. Action for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>
2	Artificially maintaining wetland area by recharge from river	<ul style="list-style-type: none"> <li>Identify low-lying areas under command of the river at high tide throughout the year</li> <li>Community/ WMA agrees on maintaining certain minimum water level in depression by recharge – except during pre-monsoon period when river water is saline</li> <li>Community agrees on sharing fisheries earnings with farmers who sacrifice their crops</li> </ul>	<ul style="list-style-type: none"> <li>WMA as part of CAP</li> </ul>	<ul style="list-style-type: none"> <li>Program for follow up support will be taken soon where PMO will supervise activities.</li> <li>ISPMC team not yet engaged. Action for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>
3	Routine testing of soil and pond water quality for their production capacity	<ul style="list-style-type: none"> <li>Establish baseline data</li> <li>WMA may have tests done at intervals as part of their Collective Action Plans (CAP)</li> </ul>	<ul style="list-style-type: none"> <li>WMA as part of CAP</li> </ul>	<ul style="list-style-type: none"> <li>ISPMC team not yet engaged. Action for initial soil and pond water quality tests, especially in demo ponds for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>
4	Aforestation on embankments with involvement of landless/poor.	<ul style="list-style-type: none"> <li>Identify embankments suitable for afforestation</li> <li>Plant trees on identified embankments</li> </ul>	<ul style="list-style-type: none"> <li>WMA as part of CAP</li> </ul>	<ul style="list-style-type: none"> <li>Program would be taken after formation of WMGs</li> </ul>
5	Implement training programs for WMO members	<ul style="list-style-type: none"> <li>Identify topics for training, with special topics for women</li> <li>Impart the training</li> </ul>	<ul style="list-style-type: none"> <li>Project</li> </ul>	<ul style="list-style-type: none"> <li>ISPMC team not yet engaged. Action for topic selection for training for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>

Sl.	Item	Plan	Responsible	Status upto June 2016
6	Regular re-excavation of khals, with involvement of LCS	<ul style="list-style-type: none"> <li>O&amp;M plan</li> </ul>	<ul style="list-style-type: none"> <li>Initially project/ BWDB, later WMAs</li> </ul>	<ul style="list-style-type: none"> <li>ISPMC team not yet engaged. Action for SIP preparation and development for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>
7	Stakeholder participation in all phases of the project	<ul style="list-style-type: none"> <li>Devise strategy and arrangements for community participation in problem analysis, design, implementation and operation of development measures under the project</li> </ul>	<ul style="list-style-type: none"> <li>Project</li> </ul>	<ul style="list-style-type: none"> <li>Action for all activities for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>
8	Arsenic Problem	<ul style="list-style-type: none"> <li>Providing Arsenic free water for the Project Areas peoples</li> </ul>	<ul style="list-style-type: none"> <li>BWDB</li> </ul>	<ul style="list-style-type: none"> <li>Action for all activities for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>
9	Erosion control	<ul style="list-style-type: none"> <li>River Bank Protection program at Chatlar-Fukurhat and Alfadanga-Boalmari Subproject.</li> </ul>	<ul style="list-style-type: none"> <li>BWDB</li> </ul>	<ul style="list-style-type: none"> <li>Action for all activities for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>
10	Disaster preparedness	<ul style="list-style-type: none"> <li>Prepare plan and reservation of funds</li> </ul>	<ul style="list-style-type: none"> <li>BWDB</li> </ul>	<ul style="list-style-type: none"> <li>Action for all activities for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>
11	Compensation for involuntary re-settlement	<ul style="list-style-type: none"> <li>Identification of locations needing LRP</li> <li>Carry-out LRP study</li> <li>Implement/ monitor LRP</li> </ul>	<ul style="list-style-type: none"> <li>BWDB</li> </ul>	<ul style="list-style-type: none"> <li>Action for all activities for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>
12	Environmental safeguard clauses to be incorporated in civil works contracts	<ul style="list-style-type: none"> <li>Draft safeguard clauses</li> <li>Include safeguard clauses in tender documents and contract</li> <li>Monitor compliance</li> </ul>	<ul style="list-style-type: none"> <li>BWDB</li> </ul>	<ul style="list-style-type: none"> <li>Action for all activities for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>
13	Provide WMAs with salinity meter and train WMAs in the use	<ul style="list-style-type: none"> <li>Provide salinity meter to each WMA</li> <li>Train WMA member in the use of salinity meter</li> <li>WMA to keep records of salinity measurements</li> </ul>	<ul style="list-style-type: none"> <li>Project</li> </ul>	<ul style="list-style-type: none"> <li>Action for all activities for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>
14	Incorporation of environmental issues in by-laws of WMGs	<ul style="list-style-type: none"> <li>Inclusion of Environmental Clauses under by-laws of 150 WMGs</li> </ul>	<ul style="list-style-type: none"> <li>Project</li> </ul>	<ul style="list-style-type: none"> <li>Action for all activities for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>

Sl.	Item	Plan	Responsible	Status upto June 2016
15	Creation of aquatic habitats for preservation bio-diversity	<ul style="list-style-type: none"> <li>• Identification of suitable areas for preservation of bio-diversity/ sanctuaries</li> <li>• Establishing and managing/ monitoring safe havens</li> </ul>	<ul style="list-style-type: none"> <li>• WMA as part of CAP</li> </ul>	<ul style="list-style-type: none"> <li>• Action for all activities for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>
16	Monitoring depth and quality of ground water	<ul style="list-style-type: none"> <li>• Outsource to Hydrological Dept and DPHE</li> </ul>	<ul style="list-style-type: none"> <li>• XEN-PMO</li> </ul>	<ul style="list-style-type: none"> <li>• Action for all activities for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>
17	General vigilance regarding pollution from waste disposal, industrial pollution, construction works	<ul style="list-style-type: none"> <li>• General awareness on the part of the WMOs regarding pollution</li> </ul>	<ul style="list-style-type: none"> <li>• WMA</li> </ul>	<ul style="list-style-type: none"> <li>• Action for all activities for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>
18	Trend of occurrence of rare/ endangered species	<ul style="list-style-type: none"> <li>• Sample observations made by WMO members</li> <li>• Survey outsourced by project</li> </ul>	<ul style="list-style-type: none"> <li>• WMA</li> </ul>	<ul style="list-style-type: none"> <li>• Action for all activities for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>

## 5. Environmental Monitoring Plan

The environmental data collection and monitoring plan is based on the assumptions that rehabilitation and development of FCD schemes may

- Reduce the number and size of perennial wetland areas and negatively affect pure fisher folks in their livelihood as well as aquatic flora & fauna
- Reduce the natural grazing land and therefore indirectly contribute to reduction of number of bovines
- Increase household dependency on fuel wood (rather than manure) as fuel for cooking
- Reduce the jungle area and thus contribute to reduction of terrestrial flora and fauna
- Lower the water table by increased use of tube wells for irrigation

Sl.	Item	Environmental Management Plan	Responsible	Environmental Monitoring Plan
1	Reduction of perennial wetland area as result of FCD rehabilitation	<ul style="list-style-type: none"> <li>• Identify present location and size of perennial 'beels' and potential reduction by rehabilitation of FCD.</li> <li>• Identify the fisher folk who are solely dependent on the permanent water bodies and are under risk of losing livelihood by rehabilitation of FCD</li> <li>• Provide priority access to livelihood support</li> </ul>	<ul style="list-style-type: none"> <li>• ISPMC, PMO, SMO as part of SIP preparation</li> </ul>	<ul style="list-style-type: none"> <li>• Topographical survey.</li> <li>• House hold survey.</li> </ul>

Sl.	Item	Environmental Management Plan	Responsible	Environmental Monitoring Plan
		measures to fisher folk identified		
2	Artificially maintaining wetland area by recharge from river	<ul style="list-style-type: none"> <li>Identify low-lying areas under command of the river at high tide throughout the year</li> <li>Community/WMA agrees on maintaining certain minimum water level in depression by recharge – except during pre-monsoon period when river water is saline</li> <li>Community agrees on sharing fisheries earnings with farmers who sacrifice their crops.</li> </ul>	<ul style="list-style-type: none"> <li>WMA as part of CAP</li> </ul>	<ul style="list-style-type: none"> <li>Topographical survey</li> <li>Measuring &amp; maintaining the water level of the wetland</li> </ul>
3	Routine testing of soil and pond water quality for their production capacity	<ul style="list-style-type: none"> <li>Establish baseline data</li> <li>WMA may have tests done at intervals as part of their Collective Action Plans (CAP)</li> </ul>	<ul style="list-style-type: none"> <li>WMA as part of CAP</li> </ul>	<ul style="list-style-type: none"> <li>Routine testing of soil</li> <li>Routine testing of water quality</li> <li>Measure production through DAE.</li> </ul>
4	Afforestation on embankments with involvement of landless/poor.	<ul style="list-style-type: none"> <li>Identify embankments suitable for afforestation</li> <li>Plant trees on identified embankments</li> </ul>	<ul style="list-style-type: none"> <li>WMA as part of CAP</li> </ul>	<ul style="list-style-type: none"> <li>Base line survey of the embankment regarding forestation.</li> <li>Plantation survey on quarterly basis.</li> </ul>
5	Implement training programs for WMO members	<ul style="list-style-type: none"> <li>Identify topics for training, with special topics for women</li> <li>Impart the training</li> </ul>	<ul style="list-style-type: none"> <li>Project</li> </ul>	<ul style="list-style-type: none"> <li>Maintain register for trained and non-trained WMO members.</li> </ul>
6	Regular re-excavation of khals, with involvement of LCS	<ul style="list-style-type: none"> <li>O&amp;M plan</li> </ul>	<ul style="list-style-type: none"> <li>Initially project/ BWDB, later WMAs</li> </ul>	<ul style="list-style-type: none"> <li>Post-work and pre-work survey.</li> </ul>
7	Stakeholder participation in all phases of the project	<ul style="list-style-type: none"> <li>Devise strategy and arrangements for community participation in problem analysis, design, implementation and operation of development measures under the project</li> </ul>	<ul style="list-style-type: none"> <li>Project</li> </ul>	<ul style="list-style-type: none"> <li>Checking the minutes of meetings regarding Stakeholder's participation.</li> </ul>
8	Arsenic Problem	<ul style="list-style-type: none"> <li>Providing Arsenic free water for the Project Areas peoples.</li> </ul>	<ul style="list-style-type: none"> <li>BWDB</li> </ul>	<ul style="list-style-type: none"> <li>Physical monitoring arsenic prone area.</li> </ul>
9	Erosion control	<ul style="list-style-type: none"> <li>River Bank Protection program at Chatlar-Fukurhat and Alfadanga-Boalmari Subproject.</li> </ul>	<ul style="list-style-type: none"> <li>BWDB</li> </ul>	<ul style="list-style-type: none"> <li>Physical &amp; routine monitoring vulnerable area.</li> </ul>
10	Disaster preparedness	<ul style="list-style-type: none"> <li>Prepare plan and reservation of funds</li> </ul>	<ul style="list-style-type: none"> <li>BWDB</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring the embankment &amp; other structures</li> <li>Monitoring the WMA's funds.</li> </ul>

Sl.	Item	Environmental Management Plan	Responsible	Environmental Monitoring Plan
11	Compensation for involuntary re-settlement	<ul style="list-style-type: none"> <li>• Identification of locations needing LRP</li> <li>• Carry-out LRP study</li> <li>• Implement/monitor LRP</li> </ul>	<ul style="list-style-type: none"> <li>• BWDB</li> </ul>	<ul style="list-style-type: none"> <li>• Physically survey the location</li> <li>• Monitor the redress mechanism process.</li> </ul>
12	Environmental safeguard clauses to be incorporated in civil works contracts	<ul style="list-style-type: none"> <li>• Draft safeguard clauses</li> <li>• Include safeguard clauses in tender documents and contract</li> <li>• Monitor compliance</li> </ul>	<ul style="list-style-type: none"> <li>• BWDB</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring the incorporation of the Environmental safeguard clauses in the Tender Documents of Civil works.</li> <li>• Monitoring the Environmental safeguard policy in during implementation of civil works.</li> </ul>
13	Provide WMAs with salinity meter and train WMAs in the use	<ul style="list-style-type: none"> <li>• Provide salinity meter to each WMA</li> <li>• Train WMA member in the use of salinity meter</li> <li>• WMA to keep records of salinity measurements</li> </ul>	<ul style="list-style-type: none"> <li>• Project</li> </ul>	<ul style="list-style-type: none"> <li>• Physically inspect the site &amp; also inspect the records of salinity measurements.</li> </ul>
14	Incorporation of environmental issues in by-laws of WMGs	<ul style="list-style-type: none"> <li>• Inclusion of Environmental Clauses under by-laws of 150 WMGs.</li> </ul>	<ul style="list-style-type: none"> <li>• Project</li> </ul>	<ul style="list-style-type: none"> <li>• Check the by-laws.</li> </ul>
15	Creation of aquatic habitats for preservation bio-diversity	<ul style="list-style-type: none"> <li>• Identification of suitable areas for preservation of bio-diversity/sanctuaries</li> <li>• Establishing and managing/monitoring safe havens</li> </ul>	<ul style="list-style-type: none"> <li>• WMA as part of CAP</li> </ul>	<ul style="list-style-type: none"> <li>• Monitor the site before &amp; after implementation of civil works.</li> </ul>
16	Monitoring depth and quality of ground water	<ul style="list-style-type: none"> <li>• Outsource to Hydrological Dept and DPHE</li> </ul>	<ul style="list-style-type: none"> <li>• XEN-PMO</li> </ul>	<ul style="list-style-type: none"> <li>• Measure depth and quality of water.</li> </ul>
17	General vigilance regarding pollution from waste disposal, industrial pollution, construction works	<ul style="list-style-type: none"> <li>• General awareness on the part of the WMOs regarding pollution</li> </ul>	<ul style="list-style-type: none"> <li>• WMA</li> </ul>	<ul style="list-style-type: none"> <li>• Check the no. of training regarding pollution from waste disposal, industrial pollution, construction works.</li> </ul>
18	Trend of occurrence of rare/ endangered species	<ul style="list-style-type: none"> <li>• Sample observations made by WMO members</li> <li>• Survey outsourced by project</li> </ul>	<ul style="list-style-type: none"> <li>• WMA</li> </ul>	<ul style="list-style-type: none"> <li>• Take sample before &amp; after implementation of the work and analysed.</li> </ul>

## 6. WMO Managed Activities & Status:

Sl.	Environmental Items	WMO-managed Activities	Status in June 2016
1.	Soil/ water quality	<ul style="list-style-type: none"> <li>Chemical testing of soil nutrients like nitrogen, phosphorous, potassium, calcium, magnesium, sulphur, zinc, org. matter and salinity status * ( from Upazila/District DAE or SRDI offices).</li> <li>Testing of pond/ khal etc. water quality like DO, BOD, COD etc. ** for using in fish production, domestic and other uses.</li> <li>Testing of river water salinity*** for irrigation-use.</li> </ul>	<ul style="list-style-type: none"> <li>Action for all activities for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>
2.	Use of balanced dose of chemical fertilizers	<ul style="list-style-type: none"> <li>Actual use of fertilizers per unit land in different crops (recommended crop-wise doses and assistance from DAE may be taken to compare for actual need).</li> </ul>	<ul style="list-style-type: none"> <li>PMO will monitor activities.</li> <li>ISPMC team not yet engaged. Action for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>
3.	Bovine animals	<ul style="list-style-type: none"> <li>Number of animals</li> <li>Quantity of excreta used for fuel (in kg)</li> <li>Quantity of excreta used for manure (in kg);</li> <li>Quantity used for other purposes (in kg).</li> </ul>	<ul style="list-style-type: none"> <li>ISPMC team not yet engaged. Action for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>
4.	Use of pesticides/ insecticides	<ul style="list-style-type: none"> <li>Quantity used for different crops in unit land area (crop-wise in kg/litre). (Data can be collected from 30 farmers in 3 randomly selected villages in sub-unit for comparing with recommended dose by DAE)</li> </ul>	<ul style="list-style-type: none"> <li>PMO will monitor activities.</li> <li>ISPMC team not yet engaged. Action for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>
5.	Fodder situation	<ul style="list-style-type: none"> <li>Information on grazing areas/ practice of growing fodder crops (land area and fodder species). FGD in 3 randomly selected villages in sub-unit area</li> </ul>	<ul style="list-style-type: none"> <li>PMO will monitor activities.</li> <li>ISPMC team not yet engaged. Action for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>
6.	Monitor disappearance of Beels	<ul style="list-style-type: none"> <li>Map + measure the depth + information on number of people depend on beel for livelihood. Formulate mitigatory measure for those who loose livelihood.</li> </ul>	<ul style="list-style-type: none"> <li>PMO will monitor activities.</li> <li>ISPMC team not yet engaged. Action for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>
7.	Use of fuel wood	<ul style="list-style-type: none"> <li>Information on availability (whether smooth round the year, seasonally or difficult throughout). Specify the crucial months if availability is seasonal. Ask consumption / day from 20 HHs in 3 randomly selected villages.</li> </ul>	<ul style="list-style-type: none"> <li>PMO will monitor activities.</li> <li>ISPMC team not yet engaged. Action for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>

Sl.	Environmental Items	WMO-managed Activities	Status in June 2016
8.	Drinking water quality	<ul style="list-style-type: none"> <li>Information on arsenic problem in the TW-water in the area. If yes, data on 100 HHs to be carried out in 3 randomly selected villages in the sub-unit;</li> </ul>	<ul style="list-style-type: none"> <li>PMO will monitor activities.</li> <li>ISPMC team not yet engaged. Action for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>
9.	Irrigation facility	<ul style="list-style-type: none"> <li>Extent of irrigated area by surface water (area) and specify related problem for Boro and kharif crops.(year-wise);</li> <li>Monitoring river water salinity in respect of its suitability for irrigation (WMA has salinity meter);</li> <li>Extent irrigated by ground water (area) and information on problem of lowering of GWT (year-wise) (to be carried out by FGD in 3 sample villages);</li> <li>Depth of ground water layer (mainly during Boro season).Records of BWDB Hydrology Directorate will be useful in this connection.</li> </ul>	<ul style="list-style-type: none"> <li>PMO will monitor activities.</li> <li>ISPMC team not yet engaged. Action for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>
10.	Sanitation facility	<ul style="list-style-type: none"> <li>Quantify existing sanitation facility (no of sanitation facility in 50 HHs to be selected randomly from 3 sample villages).</li> </ul>	<ul style="list-style-type: none"> <li>PMO will monitor activities.</li> <li>ISPMC team not yet engaged. Action for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>
11.	Biodiversity	<ul style="list-style-type: none"> <li>Sightings of threatened/ endangered species like shapla, goyal bon, kola beng , kaitta etc. Information to be collected randomly from 30 persons in 3 sample villages.</li> </ul>	<ul style="list-style-type: none"> <li>PMO will monitor activities.</li> <li>ISPMC team not yet engaged. Action for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>
12.	Monitoring during construction	<ul style="list-style-type: none"> <li>Monitoring the project working site so that no environmental pollution takes place (checklist already provided can be used for the purpose).</li> </ul>	<ul style="list-style-type: none"> <li>PMO will monitor activities.</li> <li>ISPMC team not yet engaged. Action for additional financing subprojects would be taken after deployment of ISPMC team.</li> </ul>

