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**Environmental Management Framework Report
For
Integrated Agricultural Development Project
(IADP)**

FOR PUBLIC RELEASE

Submitted to the World Bank

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH

MINISTRY OF AGRICULTURE

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Acronyms/Abbreviations

APR	Annual progress Report
AR	Audit Report
BADC	Bangladesh Agricultural Development Corporation
BAEC	Bangladesh Atomic Energy Commission
BARC	Bangladesh Agricultural Research Council
BARI	Bangladesh Agricultural Research Institute
BFRI	Bangladesh Forestry Research Institute
BINA	Bangladesh Institute of Nuclear Agriculture
BJRI	Bangladesh Jute Research Institute
BLRI	Bangladesh Livestock Research Institute
BP	Best Practice
BRAC	Previously NGO named Bangladesh Rural Advancement Committee: Now it is the Brand name of that NGO
BRRI	Bangladesh Rice Research Institute
BSRI	Bangladesh Sugarcane Research Institute
BRTA	Bangladesh Road Transport Authority
BTRI	Bangladesh Tea Research Institute
BWDB	Bangladesh Water Development Board
CDD	Community Driven Development
CF	Community Facilitators
CG	Community Group
CIWs	Community Infrastructure Works
CSO	Community Support Organizations
DAE	Department of Agricultural Extension
DLS	Directorate of Livestock Services
DOE	Department of Environment
DOF	Department of Fisheries
DPHE	Department of Public Health Engineering
DSR	Dam Safety Report
EA	Environmental Assessment
ECA	Environmental Conservation Act
ECR	Environmental Conservation Rules
EIA	Environmental Impact Assessment
EIE	Environmental Impact Evaluation
EMF	Environmental Management Framework
EMP	Environmental Management Plan

EPo	Environmental Policy
ER	Environmental Review
ES	Environmental Screening
ESA	Environmentally Sensitive Area
ESMF	Environmental and Social Management Framework
FAO	Food and Agriculture Organization
FIAC	Farmers' Information and Advice Centers
FRI	Fisheries Research Institute
GDP	Gross Domestic Product
GMO	Genetically Modified Organisms
GoB	Government of Bangladesh
GP	Good Practice
HSE	Health, Safety and Environmental risk
IADP	Integrated Agricultural Development Project
IEE	Initial Environmental Examination
IP	Indigenous People
IPM	Integrated Pest Management
IPNM	Integrated Pest and Nutrient Management
IPNS	Integrated Plant Nutrient System
IPP	Indigenous Peoples' Plan
IUCN	International Union for Conservation of Nature
LEA	Limited Environmental Assessment
LGD	Local Government Division
LGED	Local Government Engineering Department
LGSP	Local Government Support Project
LLP	Low Lift Pump
M&E	Monitoring and Evaluation
MDG	Millennium Development Goal
MIS	Management Information System
MOA	Ministry of Agriculture
MoEF	Ministry of Environment and Forest
MOI	Ministry of Industry
MoLF	Ministry of Livestock and Fisheries
MoLGRDC	Ministry Of Local Government, Rural Development and Co-Operatives
NARS	National Agricultural Research System
NATP	National Agricultural Technology Project
NCS	National Conservation Strategy

NEMAP	National Environmental Management Action Plan
NGO	Non-Governmental Organization
ODs	Operational Directives (of the World Bank)
OM	Operational Manual (of the World Bank)
OP	Operational Policies (of the World Bank)
PAST	Project Appraisal and Supervision Team
PDO	Project Development Objective
PMC	Project Management Committee
PMP	Pest Management Plan
PMU	Project Management Unit
PO	Participating (Partner) Organization
PSC	Project Supervision Committee
PTC	Project Technical Coordinator
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
RPMU	Regional Project Management Unit
RR	Review Report
SAAO	Sub-Assistant Agriculture Officer
SCA	Seed Certification Agency
SDF	Social Development Foundation
SGA	Seed Growers' Association
SIPP	Social Investment Program Project
SRDI	Soil Resources Development Institute
STW	Shallow Tube Well
TNA	Training Needs Assessment
TOT	Training of Trainers
UNDP	United Nations Development Program
UNO	Upazila Nirbahi Officer (Executive Officer at the Upazilla)
UP	Union Parishad
UAO	Upazila Agricultural Officer
URT	Upazila Resource Team
UZ	Upazila
VDC	Village Development Committee
WB	World Bank
WQS	Water Quality Standard
WUG	Water User Group

GLOSSARY

Adverse impact is an environmental impact that is harmful to human interest over either the short or long term.

Beneficial impact is an impact that improves the resources, economy, and / or quality of life.

Biodiversity (biological diversity) is the variety of species within a given area or region.

Bounding is the process of determining spatial and temporal boundaries within which environmental impacts will be assessed.

Compensation is payment in cash or kind to the recipients of unavoidable negative and /or residual impact.

Cumulative impacts are environmental impact that results from actions that are added to others of the past, present and foreseeable future, caused by multiple human activities and /or natural elements that are either repeated or occur in combination.

Conservation is the preservation of natural resources so as to maintain supplies and qualities at levels sufficient to meet present and anticipated needs.

Critical habitats are areas of land and water required for the survival of a plant or animal population.

Ecosystem (ecological system) is a marine, freshwater or terrestrial linkage of dynamic and interactive components normally divided into two major categories (i) biotic (living) (ii) abiotic (non-living).

Enhancement is increasing the benefits of the positive impacts of a project.

Environment is the totality of the natural and human surroundings and includes biophysical components of the natural environment of land, water and air encompassing all layers of the atmosphere, all inorganic and organic matter both living and dead; and socio-economic components of the human environment including social, economic, administrative, cultural, historical, archeological, human health, nutrition and safety aspects as well as land and associated resources, structures and sites.

Environmental impact is a change in the state or functioning of an environmental resource or components caused by actions of a project. It should be distinguished from the impact to resources or components caused by natural factor, e.g., floods.

Environmental impact assessment (EIA) is the systematic study, assessment and reporting of the impacts of a proposed program, plan or project, including a plan to deal with the negative impacts.

Environmental management plan (EMP) is a plan to undertake an array of follow-up activities to provide for the mitigation of adverse environmental impacts and enhancement of beneficial impacts.

Habitat is the division of the environment having a certain combination of physical (e.g., slope, drainage, soil type) and biological (e.g, food) factors necessary for sustainable animal, plant or human use and survival.

Important environmental components (IECs) are components which, by virtue of their importance to ecosystem functioning, production of food and/or maintenance of livelihoods and quality of life, are considered essential and worthy of sustaining at existing or enhanced levels under the proposed new project.

Indicator is an organism or physical feature that by its presence, absence or abundance indicates a particular property of the surrounding environment.

Initial environment examination (IEE) are environmental assessments undertaken for a regional or pre-feasibility level study for identifying and assessing possible environmental impacts.

Intervention is the specific action caused by a project that creates an environmental impact, e.g., obstruction of a drainage canal by embankment.

Mitigation is any action taken to reduce unacceptable negative impacts. It includes design changes in both the project or its operational strategies.

Planktons are microorganism in water, including plants(phytoplankton) and animals (zooplankton).

Residual impacts are those environmental impacts that remain after application of mitigation measures and practically cannot be overcome.

Reversible impact is an environmental impact that recovers either through natural process or with human assistance.

Scoping is a process whereby the important environmental components, project development issues and concerns of local communities are determined.

Sustainable development is development that ensures preservation and enhancement of environmental quality and resource abundance to meet the needs of the present without compromising the ability of future generations to meet their own needs.

EXECUTIVE SUMMARY

1. PROLOGUE

Bangladesh has made considerable progress in economic growth as well in many human development indicators. The country's agricultural sector, specially the crop sector has shown phenomenal growth during the last four decades from independence. Despite this progress in its fight against poverty, the country has still a long way to go if the Millennium Development Goal (MDG) of reducing poverty has to be achieved (i.e. bringing poverty down to 29% by 2015). Under the present situation, bulk of this economic growth has to come from the agriculture sector which is still the largest contributor to the Gross Domestic Product (GDP).

Despite this significant achievements in the agriculture sector, the country is still faced with some daunting challenges for agricultural production. There are: extremely poverty-stricken areas and widespread incidence of malnutrition in agro - ecologically disadvantaged and economically depressed areas. A well coordinated research, extension and management intervention in such areas. areas are pre-requisites to increased production and poverty alleviation in the country (MOA, 1999).

The Government of Bangladesh is, therefore, in the process of embarking upon an integrated agriculture development project (IADP) with financial assistance from the World Bank (WB). The project is expected to be implemented in two of the country's most ecologically constrained and poverty stricken areas i.e. four administrative districts in each of Barisal Division (Barisal, Potuakhali, Borguna and Jhalokathi) and Rangpur Division (Rangpur, Kurigram, Nilphamari, Lalmonirhat). Barisal region is in the coastal belt in the south having constant threat of tidal surge, cyclones as well as soil and water salinity while Rangpur region is in the North and is afflicted with frequent flooding and the phenomenon of 'Monga' (seasonal hunger) from September to November each year.

The proposed project will have four components such as :

Component 1: Technology Generation and Adaptation

Component 2 : Technology Adoption

Component 3: Water Management

Component 4: TA and Capacity Building.

Component 5: Project Management.

2. THE TARGET GROUP AND THE GUIDING PRINCIPLES OF THE PROJECT

The target group is the farmers of the selected districts comprising mainly crop farmers, livestock farmers and fish farmers of marginal (operated area of 0.05 to 0.49 acre of land) and small (operated area of 0.50 to 2.49 acres) category. Moreover, around 25% of the beneficiaries are being women farmers. The guiding principle of the IADP operations will be to strengthen community empowerment through "demonstration type" extension system. This approach is expected to be highly fruitful since a marginal or small farmer of such an economically backward status, with his/her meagre resources, all alone, is essentially, a misfit in the realm of agricultural development endeavours.

3.PURPOSE OF THE STUDY

The purpose of this study, in essence, is to provide clear and systematic guidelines and to ensure that environmental sustainability of IADP-funded sub-projects are achieved through safeguard measures during project implementation.

4. IMPLEMENTATION AND MONITORING OF THE PROJECT

Impact	Crops	Vegetable
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The IADP will have (i) a project Management Unit (PMU) at Dhaka and (ii) Regional Project Management Units (RPIUs) in the two Regions of the Project. The PMU will be headed by a Project Director. He will be supported by the experts in the various relevant fields. Four Technical Coordinators from the four implementing agencies (BADC, , DAE, DOF, DLS) and other four coordinators of another four agencies (BRRI, BARI, BFRI, SCA) on behalf of their organization. In addition to Project Management, the Units will also be responsible for overseeing the implementation activities of the Project. Performance monitoring of all Project activities as well as evaluations and impact assessments of the Project will also be arranged by these Units.

5. EXPECTED POSITIVE AND ADVERSE IMPACTS OF THE PROJECT

The proposed project is expected to open up opportunities for positive impacts like new innovations through research and their adoption at farm level resulting in improved environment, increased production and enhanced livelihood. The environmental management framework (EMF), however, focuses on the likely adverse impacts which might result through project implementation. The EMF is, therefore, developed for producing a mechanism to identify the key environmental impacts and to screen subprojects on the basis if these impacts. The essential objective is to minimize possible risks and to mitigate them to the tolerable extent. The framework will act as a guideline for more sub-project specific environmental impact assessment (EIA) to be prepared at the sub-project formulation stage as well as for assisting the IADP consortia to comply with the plethora of national laws and regulations commensurate with the relevant international obligations and World Bank safeguards on environmental issues.

The potential environmental impacts that can arise out of the components of the Proposed IADP are shown in Table A. However, for the most activities of IADP, these impacts would not be significant. Mitigation measurement against most of the impacts are possible, both at the sub-project development stages as well as the implementation stages, and these will be identified by the consortia from among the suggestive measures provided in the EMF as well as through constant advice from the PMU and the RPMU and PSCs advisory committees.

	Cultivation (HYVS, HV crop, Diversification)	Harvesting & storage of produce	Transportation & processing	Farm production (HYVs, Hybrids)	Harvesting & storage	Transportation & processing
Stress on water resources	√		√	√		
Increased salinity / Land degradation	√			√		
Soil & Ground water contamination (due to use of pesticides etc)	√			√		
Eutrophication & impact on aquatic fauna	√			√		
Health & safety	√		√	√	√	√
Pesticide / insecticides residues in food chain	√	√		√	√	
Disposal of Pesticide/fertilizer containers	√			√		
Bio-diversity loss (Plant / Animal)	√			√		
Increase in crop / Plant vulnerabilities (crop failures)	√			√		
Impacts on natural habitat	√			√		
Loss of soil fertility	√			√		
Air quality (construction/ operation)	√	√			√	
Surface water quality						

Table A: Environmental Impact Identification in Various IADP Activities

Impact	Livestock		Fisheries		Water Management
	Development & production	Storage, transportation, processing, packaging, marketing	Aquaculture & fishing (inland, riverine)	Storage, transportation, processing, packaging, marketing	Development of irrigation systems
Stress on water resources	√		√		
Increased salinity / Land degradation					√
Soil & Ground water contamination (due to use of pesticides etc)			√		
Eutrophication & impact on aquatic fauna					
Health & safety	√	√	√	√	
Pesticide / insecticides residues in food chain		√		√	
Disposal of Pesticide/fertilizer containers					
Bio-diversity loss (Plant / Animal)	√				
Increase in crop / Plant vulnerabilities (crop failures)					
Impacts on natural habitat	√		√		√
Loss of soil fertility					
Air quality (construction/ operation)		√		√	√
Surface water quality			√		

Table A: Environmental Impact Identification in Various IADP Activities (Contd.)

6. SIGNIFICAT FINDINGS AND MAJOR ENVIRONMENTAL IMPACTS WITH THEIR SCALE AND SCOPE

The operational policy (OP 4.01) of the World Bank requires environmental assessment (EA) of projects proposed for financing by WB to help ensure that these are environmentally sound and sustainable. The Bank favors preventive measures over mitigatory or compensatory measures, whenever feasible. World Bank funded projects that may have Environmental impacts prepare Environmental Assessments and Environmental Management Plans (EMP) to analyze and deal with environmental issues.

The World Bank has mandatory Environmental assessment (EA) guidelines in the form of OP/BP/GPs. Out of several policies governing the EA of projects, the OP/BP/GP 4.01 is the central policy that defines the Bank's environmental assessment requirements. The WB's Environmental Safeguards that have been triggered for this Project include: (i) Environmental Assessment OP 4.01, (ii) OP 4.09 (Pest Management), and (iii) OP 4.04 (Conservation of Natural Habitats). In addition OP 4.10 (Indigenous Peoples) and OP 4.12 (Resettlement) social safeguards may also be triggered for the Project. Finally, OP 7.50 International Waterways may also be triggered.

The major expected environmental impacts of the Project include increased use of pesticides and imbalanced fertilizer application as a result of development of new crop varieties (Salt-tolerant for the Southern region and early maturing, drought and sub-mergence tolerant rice varieties for the North) as well as enhanced extension activities of the DAE through project support including supply of inputs like seeds of improved varieties, fertilizers.

The likely scale and scope of increased pesticide usage by the farmers in the project are could be quite large leading to subsequent environmental and health risks as well as degradation of soil quality through imbalanced use of fertilizers. However, these potential environmental impacts will be minimized through use of screening procedures and checklists provided and organizing intensive training of extension workers on mitigation measures and Integrated Pest Management (IPM).¹

Since investments are not currently specified at this stage, the EMP will take the form of an Environmental Management Framework which will focus on developing the processes needed to environmentally manage the project.

This study report outlines how the Environmental Assessment (EA) of the proposed IADP for Bangladesh and Environmental Management Framework were conducted.

7. ACTIONS SUGGESTED FOR STUDYING ENVIRONMENTAL IMPACTS

The actions suggested for studying the Environmental Impacts include :

- Establishment of methodologies for environmental impact assessment procedure within the sub-project cycle;
- Assessment of the potential environmental impacts of the proposed project, be it positive or negative, and proposing mitigation measures to address the impacts;
- Providing information to the stakeholders about the potential environmental impacts on project implementation as well as relevant mitigation measures and their strategies;
- Highlighting the Environmental Impact Assessment (EIA) procedures.

To achieve the above actions of EMF, the sub-projects will have to follow the environment screening process using the National EIA Guidelines and procedures as well as the WB's Safeguard Policies

¹ **Integrated Pest Management (IPM)** is a mix of farmer-driven, ecologically based pest control practices that seeks to reduce reliance on synthetic chemical pesticides. It involves (a) managing pests (keeping them below economically damaging levels) rather than seeking to eradicate them; (b) relying, to the extent possible, on nonchemical measures to keep pest populations low; and (c) selecting and applying pesticides, when they have to be used, in a way that minimizes adverse effects on beneficial organisms, humans, and the environment.

stipulated in the Operation manual OP 4.01 and GP 4.01. These are explained in the study report following the procedure outlined below:

- Review the environmental assessment exercises from secondary sources and documents of similar projects as well as interact with local officials and beneficiaries.
- Learn innovative approaches, alternative mechanisms and strategies which has proved useful in other projects in the targeted areas.
- Collect primary data/opinion of scientists and officials of the research institutes and extension departments of agriculture, livestock and fisheries posted in two districts of the two concerned regions through discussion and interview.
- Conduct rapid Census and Consultation meetings with some prospective project beneficiaries and other stakeholder to obtain their considered view and suggestions about any potential environmental hazards which might occur due to the implementation of the project.

8. OUTCOME OF THE STUDY

- (1) Developed an EMF by working closely with the personnel of the project implementing agencies, the first step being the assessment of the current conditions and identification of the environmental issues in the sub-projects based on site visits and consultations. The EMF preparation included an Environmental Assessment (EA) of the potential activities of the project and an Environmental Management Plan (EMP).
- (2) The EMF was developed to ensure that neither the proposed agricultural research, field adaptations and water management (both needs and quality) nor the existing environment is compromised in any way through the project implementation.
- (3) Developed an Environmental, health and safety guidelines for the farmers engaged in crop, livestock and fish farming utilizing the WB's Environmental, Health and Safety Guidelines.
- (4) Suggested specific plans or implementation mechanisms to address relevant environmental issues and potential impacts.
- (5) The implementing agencies have been advised to review the proposed project components, their purposes and objectives as well as to compare them in terms of their relative impacts on the various environmental indicators. Depending on the result of comparison, any of the components or approaches of a component may need modification or alteration.
- (6) Recommendations were made for developing a monitoring and evaluation plan using the results of Environmental Assessment and Workshop resolutions.
- (7) Recommended for establishment of a limited set of monitoring indicators (both qualitative and quantitative) to track the progress achieved.
- (8) Suggestion was made to develop a workplan for imparting necessary training to the extension staff who will, in turn, train/advice the farmers on environment management in various activities like demonstration of improved varieties of crops/fish etc, irrigation management, use of balanced fertilizers in fish rearing and crop production, safe handling and optimum use of pesticides etc.
- (9) Suggested mitigation/compensation measures for any negative environmental impact that may emerge through the project interventions.

1. INTRODUCTION

1.1 Background

Despite significant achievements in poverty reduction, Bangladesh faces considerable challenges: pockets of extreme poverty; incidence of malnutrition is the highest in the world; the country is most at risk from natural shocks and highly vulnerable to forecast climate change patterns; and large areas with unfavorable agricultural environments (tidal surge prone [2 million ha], flood-prone [0.75 million ha] and drought prone [1.3 million ha]). Moreover, there exists a strong and durable interface between chronic poverty/food insecurity and unfavourable agricultural environments. Paradoxically, a typical Bangladeshi farmer, all alone, with his/her meager resources is, in essence, a misfit in the realm of agricultural development endeavors. Organizing the farmers into a loose but well-knit system seems to holding the key to sustainable rural development. The proposed Project has specific attention to this aspect since community groups (CGs) are being emphasized in it rather than individuals. These realities form the motivational background of this Proposed Project.

Agricultural production in the districts selected for this project is severely constrained in multiple ways: on-the-shelf technologies, adapted to the relevant agro-ecologies, are not available to farmers in the field; even in the case of currently cropped varieties, non-availability of quality seeds/breed and effective extension support, lowers their productivity below achievable potential; and insufficient water management investments/practices reduce productivity, diversity and intensity of agricultural production. The proposed Integrated Agricultural Development Project (IADP) project aims to enhance agricultural productivity on a sustainable basis in the selected areas by addressing these constraints in an integrated way through its three technical components. The proposed Project Development Objective (PDO) of the IADP is to enhance the productivity of agriculture (crops, livestock and fisheries) in selected agro-ecologically constrained and economically depressed areas. These areas are in Rangpur, Kurigram, Nilphamari and Lalmonirhat districts in the North and Barisal, Patuakhali, Barguna and Jhalokathi districts in the South. (Fig.1)

Fig.1 MAP OF BANGLADESH



Most of the sub-projects under the

Proposed Project are not expected to lead to significant or irreversible environmental impacts but there will be minor impacts. Therefore the overall environmental category has been determined to be 'B' and World Bank Operational Policies on Environmental Assessment (OP 4.01), Natural Habitats (4.04), Pest Management (OP 4.09) and International Waters (OP 7.50), will be triggered for this project. In order to avoid potentially adverse environmental impacts, these policies (i.e., OP 4.01, 4.04 and OP 4.09) will be used for assessing potential environmental problems and determining mitigation measures. As the details of all the subprojects are not known at this time of project preparation, an **Environmental Management Framework (EMF)** is required for this

Project. All proposed requests for funding of sub-projects will be subject to environmental screening in order to prevent execution of subprojects with significant negative environmental impacts; decrease potential negative impacts through adaptations in design, location or execution; prevent or mitigate negative cumulative impacts; enhance the positive impacts of subprojects; and prevent additional stress on environmentally sensitive areas.

The objectives of this EMF are:

- To establish clear procedures and methodologies for the environmental review, approval and implementation of subprojects to be financed under the Project;
- To specify appropriate roles and responsibilities, and outline the necessary reporting procedures, for managing and monitoring environmental concerns related to subprojects;
- To determine the training, capacity building and technical assistance needed to successfully implement the provisions of the EMF;
- To establish the areas for project funding requirements to implement the EMF requirements; and
- To provide practical resources for implementing the EMF.

The implementation of EMF will help to ensure that activities under the proposed project will:

- Protect human health;
- Enhance positive environmental outcomes; and
- Prevent negative environmental impacts as a result of either individual subprojects or their cumulative effects.

1.2 Terms of Reference

This EMF has been drafted in the light of the accumulated local experience. The document includes a negative list of subprojects and assessment of the existing legal framework, addressing any gaps between Government and Bank policy, and includes practical environmental codes of practice, mitigation principles and procedures for environmental enhancement of subprojects, with:

1. Clear steps and feasible allocation of decision-making and responsibilities for screening impacts, assessing the adequacy of mitigation plans, managing grievances and correcting any errors;
2. A needs assessment and plan for the capacity building required to implement the framework; and
3. A document for the public consultation process for developing the framework.

1.3 Methodology

The approach in the IFC guidelines² on annual crop, poultry, aquaculture and mammalian live stock production on environmental management occupational health and community safety, EMF for current and previous WB projects on Agriculture, projects with multiple small scale subprojects have been followed in developing the present document. The experiences from local initiatives in some areas of the country including the indigenous peoples (i.e., in Rangpur Division) have been integrated in the framework development process. This was done through field visits and actual interactions with the stakeholders at the project areas. The field work essentially involved visits to existing project areas where similar sub-projects are being implemented and discussions with various stakeholders including UP representatives, local NGOs, CBOs, local interest groups and concerned individuals. The areas for field visits were selected in cooperation with MOA and the GOB project preparation team. Some limited discussions were also conducted with the personnel involved in project support, supervision and fund management. The field work program was actively coordinated with the work for the social part of the ESMF preparation activity.

The Environment Management Framework (EMF) for two previous agriculture projects NATP³ and LGSP⁴ were carefully studied in conjunction with the World Bank Operational Policies (OP 4.01 and OP 4.09), Bangladesh ECA (Environmental Conservation Act, 1995) and ECR (Environmental Conservation Rules, 1997).

The experience from other countries like Bosnia⁵, India⁶ and other countries for similar initiatives were also studied to prepare this Environmental Management Framework. An easy to implement user friendly set of forms for Environmental screening and monitoring for subprojects have also been prepared and included in **Annex-2**.

Consultations with a broad cross-section of communities including elected representatives, NGOs, Government officials, academics and independent researchers were done during the preparation of the present document.

The report has been prepared in English and an Executive Summary in Bangla has also being prepared. For better dissemination in the community both the report and the operational manual should be translated into Bangla. However, this has to be done separately at a later stage.

2. PROJECT DESCRIPTION AND ENVIRONMENTAL BACKGROUND

2.1 Purpose of the Project⁷

Key expected outcomes from the project are: increase in yield of rice, maize, wheat and oilseeds; increase in yield of milk and goat meat; and increase in yield of fish. The target group is farmers, predominantly marginal and small in the selected districts (about 200,000 crop farmers, 75,000 livestock farmers and 75,000 fishers; and about 25% of beneficiaries being women farmers). According to BBS a marginal farm holds an operated area of 0.05 to 0.49 acre of land and a small farm is a farm-holding having an area of 0.50 to 2.49 acre of land.

² IFC guidelines on EHS (2007)

³ EMF for NATP (2006)

⁴ EMF for LGSP (SDF, 2006)

⁵ EMF Bosnia (2007)

⁶ ESMF for Bihar Rural Livelihoods Project, India (2007)

⁷ From Project PCN

2.2 Components of the Project

The Project has five components including Technology Generation, Technology Adoption, Water Management, TA and Capacity Building and Project Management as described below:

2.2.1 Component 1: Technology Generation and Adaptation

The purpose of this component is to undertake adaptive research to meet farmers' needs in the selected project locations. The component will cover crops (rice, maize, wheat, pulses and oil seeds) and fisheries. The focus will be on adapting/developing and releasing to the farmers promising new crop varieties/hybrids, fish breeds and complementary production technologies that increase yield and provide technological solutions to production constraints under the agro-ecological conditions of project areas.

The component will support the four actions needed to bridge the gap in applicable technologies for the project areas: (i) support relevant research institutions – BRRI, BARI and BFRI – to undertake validation and adaptation of mature technologies for dissemination to farmers; (ii) support greater involvement of farmers and extension agencies in the trials and demonstrations to improve relevance and effectiveness (i.e., better research-extension-farmer linkages); (iii) enhance capacity of research institutions to produce larger quantities of breeder seed/stock so that the released technologies can be adopted at scale; and (iv) support training and capacity building to improve the process of technology development and transfer at various levels.

This component has the following sub-components, reflecting three areas of focus: (i) Technology for Rice; (ii) Technology for Other Crops (wheat, maize, pulses and oilseeds); and (iii) Technology for Fish.

(i) Technology for Rice (BRRI)

The following activities will be financed under this sub-component: (i) evaluation and release of new varieties; (ii) development and refinement of location-specific and problem-solving rice husbandry practices; (iii) strengthening breeder seed production capacity; and (iv) training

- a) ***Evaluation and release of new varieties:*** BRRI has identified several promising lines of rice of relevance to the project area which are at an advanced stage of development and testing. These include varieties that show tolerance to submergence, salinity, drought and cold as well as those with shorter maturity period. These promising lines will be taken up for participatory evaluation and variety selection on the farmer fields in the project areas. If the performance in the adaptive and validation trials is found to be better than the existing varieties, then steps will be taken for the release of these lines as varieties for general cultivation.
- b) ***Development and refinement of location-specific and problem-solving rice husbandry practices:*** With reference to the special agro-economic characteristics and needs of various locations in the project area, trials will be done with respect to crop management, soil management, pest management, cropping patterns, and irrigation/water management. The objective will be to identify cost-effective practices, especially with resource poor farmers in mind, that can lead to further gains in productivity, cropping intensity and crop diversification.
- c) ***Strengthening of breeder seed production capacity:*** With a view to address the shortage of quality seeds, the project will also support augmentation of the breeder seed production capacity of BRRI in its two regional stations in Barisal and Rangpur that fall in the project area.
- d) ***Training and capacity building:*** This will involve training for BRRI resource persons as well as training given by BRRI staff in technology transfer and seed production to extension agents, farmers and other relevant players in the rural areas.

(ii) Technology for Other Crops

Four crops have been included under the project: wheat, maize, pulses and oilseeds. Consumption of wheat in Bangladesh is growing at 3% p.a. and annual demand currently stands at 4 million tons against domestic production of 1 million ton. Wheat also requires less water and is less susceptible to disease and insects. Maize is an increasingly important crop in Bangladesh serving food, feed (from growing poultry industry) and forage needs. Maize has higher stress tolerance capacity (e.g., with respect to salinity, drought, water-logging) and can be introduced in different cropping patterns in both winter and summer seasons. With respect to both oilseeds and pulses there is significant shortfall in domestic production in relation to demand, and the crops suffer from low yields due to lack of improved varieties and management practices.

The following activities will be financed under this sub-component: (a) evaluation and release of new varieties; (b) development and refinement of location-specific and problem-solving crop husbandry practices; (c) strengthening breeder seed production capacity; and (d) training

- a) **Evaluation and release of new varieties:** BARI has identified several promising lines in wheat and maize (high yield, short duration, with adaptation to drought, boron-deficiency and acid soils) which will target project districts mainly in the North. Similarly, it has identified promising lines in oilseeds and pulses (high yield, short duration, and adaptation to salinity, drought, boron-deficiency and acid soils) which will target project districts in both the North and the South. These varieties will be taken up for participatory evaluation and variety selection on the farmer fields in the project areas. If the performance in the adaptive and validation trails is found to be better than the existing varieties, then steps will be taken for the release of these varieties for general cultivation.

The other three activities being financed will follow along the lines for BARI above:

- b) **Development and refinement of location-specific and problem-solving crop husbandry practices:** will involve agronomic management trails and demonstrations relating to salinity, drought, improved cropping patterns, inter-cropping, fertilizer management, soil health management, pest management, water harvesting and efficient water-use technology. The objective will be identify cost-effective practices, especially with resource poor farmers in mind, that can lead to further gains in productivity, cropping intensity and crop diversification.
- c) **Similarly, to enhance breeder seed production:** the capacity of selected agricultural research stations will be augmented, and
- d) Finally, **training and capacity building:** will involve training for BARI resource persons as well as training given by BARI staff in technology transfer and seed production to extension agents, farmers and other relevant players in the rural areas.

(iii) Technology for Fish (BFRI)

Activities to be financed under this sub-component include (a) on-station pure line development; (b) adaptive trials of aquaculture technologies at farmers' field conditions; and (c) training and capacity building.

- a) **On-station pure line development:** This will involve three activities: stock improvement through family selection program; stock improvement of Climbing Perch (*Thai koi*) through brood stock replacement technique; and development of pure line *Thai Pangas* for stock improvement and mass seed production.
- b) **Adaptive trials of aquaculture technologies:** This will involve also three types of activities: (i) refinement of *monosex tilapia* fry nursery technique in farmers' ponds; (ii) refinement of *Thai koi* fry production in farmers' ponds; and (iii) refinement of quality fingerling production of *pangas* in farmers' ponds. An important objective of these trials will to be assess optimal stocking density, and undertaking relevant cost-benefit analysis.
- c) **Training and capacity building.** This will involve training for BFRI resource persons as well as training given by BFRI staff in aquaculture, pond productivity and fish disease prevention and control, including to hatcheries.

2.2.2 Component 2: Technology Adoption

This component will support the Project Development Objective by enabling farmers in the project area to sustainably adopt improved agricultural (crops, livestock and fisheries) production technologies and management practices. This will allow them to increase productivity as well as intensify and diversify agricultural production. This component lies at the heart of the project since it addresses the central challenge of moving farmers out of a traditional, low-input/low-output and high-variability production system through changes in their choices and behavior/practices. It does so by enhancing farmers' knowledge and skills base, improving availability of quality seed/breed at farmers' level, strengthening extension-farmer linkages and augmenting – as appropriate - their productive assets and social capital base.

Rationale. Agricultural production in the project areas is significantly challenged due to number factors, leading to high levels of household poverty and food insecurity. A large number of farmers continue to use local (unimproved and impure) seed varieties and traditional cultivation practices, resulting in low yields with high variability (partly from exposure to natural hazards such as droughts and submergence). In crops, availability of good quality seeds at the local level is severely constrained, and farmers' own production and storage of seed suffers from significant weaknesses. An estimated 20% of local seed (stored and) used by farmers are unviable. Moisture, rodents and insect pests are key problems in seed storage at the farm level. Livestock and fisheries production – practiced proportionately more by the landless, poor women and unemployed youth – suffers from low productivity, low technical know-how, lack of improved breeding practices/services, and inadequate health care. Finally, there are significant gaps and weaknesses in provision of institutional and public service support to farmers. Coverage of extension agencies is thin: the departments of Livestock and of Fisheries have only staff each at the *Upazila* (sub-district) level. Although the department of agricultural extension does have staff below Upazila level (the Sub-Assistant Agriculture Officer or SAAO) several factors limit their effective outreach. For instance, each officer covers a large number of farm families but they also have significant concurrent work responsibilities. Also, the knowledge and technical skills of the extension staff need to be upgraded.

Sub-Components and Activities to be Financed under this component:

This component aims to address these problems and issues through the five following sub-components: (1) Crop Production; (2) Fisheries Production; (3) Livestock Production; (4) Enhancement of Seed Availability; and (5) Community Mobilization.

1. Crop Production (DAE).

This sub-component involves two activities: (i) community seed production, and (ii) improved production practices.

(i) Community Seed Production. The primary objective of this activity is to enhance availability of good quality seed at the farmers' level. As already observed, availability of good quality seed is a critical constraint, especially for small and marginal farmers. Evidence suggests that use of improved variety seeds alone – with no other change in inputs/practices – increases yields by at least 15%. In the project context, however, demonstration of improved agronomic practices will be integrated into this activity. More importantly, seed production activities will target seeds of those new/improved and/or locally adapted crop varieties which have been selected for widespread promotion/dissemination under the project. This is to ensure that adoption by farmers of project-supported crop varieties does not subsequently suffer due to lack of availability of suitable seed.

The activity of community seed production involves the following aspects that will be financed by the project: (i) training of farmers in seed production and storage (as well as associated set of improved production practices for the crop being produced); (ii) support for storage in form of “seed cocoons” at the community level and secure, re-usable storage bags at the individual level; (iii) seed and selected inputs to support demonstrations as well as subsequent adoptions; and (iv) training and capacity building in seed production of extension staff and other stakeholders.

(ii) Project Approach to Seed Production Training. The project approach to technology dissemination – in this case as well as in the others – is to use demonstrations as an entry point for enabling wider adoption of the technology by the community. Over 400 seed production “interventions” are expected to be organized during the lifetime on the project in a phased manner. Each intervention will target a village (a Seed Producing Village or SPV) to be chosen according to specific criteria. Each intervention will have the following three-year structure design to widely spread the disseminated technology, using a farmer field school (FFS) approach:

(a) **In the first year**, a small group (a set of three) of “demonstration farmers” will be targeted, on whose fields seed production, drying and storing – along with other desirable agronomic practices - will be demonstrated under close technical supervision according to a strict training/demonstration calendar. The project will provide these farmers with a demonstration support package comprise high-quality seed and some inputs. This group of demonstration farmers will be chosen according to specified criteria. As part of overall arrangement, the first cohort “demonstration farmers” will be expected to intensively involve, in training/demonstrations on their fields, between 20-25 other farmers – again selected transparently through specific criteria - who intend to adopt the demonstrated practices in their own fields in the next cropping season.

(b) **In the second year**, the second cohort (of 20-25) “adopting farmers” will be supported by the project through provision of a smaller packet of improved seeds and a lighter technical back-up that the first cohort farmers. The rationale for providing a seed package is to start off the these adopting farmers with supply of certified good quality seeds (which they may not otherwise be able to procure) as well as give them more incentives on the margin to experience for themselves the favorable economics of using good quality seed. The lighter technical back-up from the project side is premised on provision of some hands-on advice and support from first cohort farmers to these second cohort farmers on FFS principles. Critically, these second cohort farmers are also expected to engage other farmers from the project area interested in adopting these practices for themselves

(c) **In the third year**, a third cohort (maximum 50 or so) “adopting farmers” will be supported by the project in a manner similar to the second cohort farmers.

As a result of the phased demonstrated-cum-adoption-support approach adopt by the project, there will be significant spread effects in any one site/village following a project intervention. This critical mass of adoption, it is expected will not only make it easy to sustain the demonstrated practices in the targeted locations but will also contribute to lateral spread to other villages through village-to-village spread effects. Notably, following transparent and community based beneficiary identification according to strict eligibility criteria, the majority of farmers receive direct seed/inputs support from the project are expected to be small/marginal and resource poor, with a significant proportion being women.

(iii) Seed Storage. In each SPV developed under the project, the project will provide a seed storage cocoon (typically, with one ton capacity) to provide the means for safe and secure community storage of seeds. At the level of individuals, it will also seek to popularize the use of seed storage drums. To enable effective community management of seed-related activities, a Seed Growers’ Association (SGA) will be constituted in every SPV. It will comprise various seed producing farmers to who sign up to the (open) terms and conditions of the SGA, and will have an appropriate governance structure. The SGA will own and regulate the use the seed storage cocoon as well as other community productive assets (e.g., tillers, seeders) that may be supported by the

project in specific cases to ease particular local constraints. The SGA will also be the natural body to develop to liaise, over time, with the SCA and BADC to arrange, where possible, for seed certification as well contract “seed outgrower” arrangements.

Technical support for seed production and storage activities will be organized by the DAE staff. They will be supported on location by an on-site project-hired Community Facilitator (more details in Community Mobilization component below) with regard to group formation and mobilization, as well follow-up on various technical steps advised to farmers.

It is expected that as a result of **(i)** extensive training and induced adoption of seed production among farmers; **(ii)** physical and social investments in community seed storage and management; and **(iii)** closer and more effective links formed with extension staff, there will be a dramatic change in the availability of good quality seed for all the farmers. The quantities of seed produced and stored locally could easily supply the needs of significant number of villages in the “demonstration neighborhood”, thus producing an impact on output and productivity which will extend well beyond the “direct” effects being forecast for the project.

(iv) Improved Production Practices. Under this activity, the project will aim to demonstrate and support adoption of various technology themes/packages such as short duration “boro” rice cultivation, cultivation of salinity and submergence tolerance varieties, cultivation of oilseeds and pulses, water use efficiency and so on. Again, technologies will be initially demonstrated to small groups of farmers who will be, however, linked to subsequent cohort of adopting farmers. The project will finance demonstration costs, costs of relevant farm equipment and other group productive assets, and training and capacity building. The result from this activity is significant upgradation in agronomic practices, cultivation of better suited crop varieties, improved cropping patterns and increased cropping intensity.

2 Fisheries Production (DOF)

The aim of this activity is to improve aquaculture performance in the project area. Aquaculture productivity in this area is below the national average principally for three reasons: lack of quality fingerlings (juvenile fish), lack of technical know-how (especially intensive rather than extensive culture practices) and weak extension support. Accordingly, four kinds of project activities will be undertaken to support fish production: **(i)** fish nursery; **(ii)** carp polyculture; **(iii)** fish monoculture; **(iv)** cage culture; and **(v)** training and capacity building.

(i) Fish Nursery. To improve local availability of quality seeds/fingerlings at affordable prices, the project will support demonstrations of best nursery management practices in farmers’ ponds throughout the project area. Eligibility criteria will favor targeting small but stable farmers. They will be supported by supply of quality seed (by hatcheries that would have received broodstock and management training from BFRI under Component 1 to produce high quality fingerlings) and technical advice/back-up. The largest number of demonstrations will be for *carp* followed by *tilapia*. Additionally, demonstration will be organized for *koi* in the north and for *pangas* in the south. As in the case of crops, demonstration farmers will be expected to involve a group of next cohort adopting farmers in demonstration activities at their pond sites. The next cohort adopting farmers will be supported, on a sliding basis, by the project to take up improved nursery management practices. The expected result is sufficient critical mass of nurseries in the local area to supply the fingerling needs of all categories of fish farmers.

(ii) Carp Polyculture. Carp polyculture is the most commonly practiced form of aquaculture in Bangladesh and almost every homestead pond is stocked with some carp, but yields tend to be very low (around 1.5t/ha) due to inadequate management. Simple management procedures

(stocking the correct ratios of different species, regular fertilization and feeding etc) can easily double the output of these systems, which can also be raised further by the addition of tilapia. The project will work to improve management practices for carp/tilapia polyculture, specifically targeting small farmers with less than average pond size. Where feasible, the project will also work with landless groups forming them into groups that could access ponds and adopt polyculture technologies.

(iii) Fish Monoculture. This activity will aim to introduce commercial forms of aquaculture in the project area. Evidence from outside the project areas suggest that commercial forms of aquaculture - such as intensive pangasius and tilapia culture - have resulted in significant local economic growth and poverty reduction as a result of upstream and downstream employment opportunities in supplying goods and services. The project will provide demonstration and subsequent adoption support for the following; **(i)** intensive *tilapia* monoculture; **(ii)** improved semi-intensive *tilapia* culture; **(iii)** intensive *koi* monoculture; and **(iv)** intensive *pangas* monoculture. Small farmers will be preferentially targeted. For some species (*koi* and *tilapia*) it is possible to undertake intensive culture even in very small ponds and ditches (between 5-10 decimals in spread).

(iv) Cage Culture. This activity will target the landless fishers living close to public water bodies. Cage culture is a promising technology for areas where there is plenty of water, as in the project districts in the South. Sets of 10 cages will be located in public access water bodies close to the homes of demonstration group members. Since ownership of land is not a requirement for cage culture, poor landless fishers will be selected as project participants. The project will provide demonstration inputs and technical support.

Training and Capacity Building. This will involve training for DOF resource persons as well as training given by DOF staff to a variety of stakeholders such as nursery operators, fry traders and farmers.

(v) Cage and pen culture demo farm: Cage culture demo farm will also be established in feasible water-bodies. Total 20 (south- 15 & north- 5) cage culture demo farm/year will be established during the 2nd to 5th year of the project and the project will bear all the operational costs of the demo farm. Feasible water-bodies under the water management programs i.e. BADC developed water-bodies will be given more preference for this intervention. Similarly pen culture demo will be established in the feasible canals, specially in the southern region. Total 16 pen culture demo (1 demo x 4 years x 4 districts) will be established and the project will bear all the operational costs of the demo farm.

(vi) Renovation of DoF Fish Seed Multiplication Farm (FSMF):

Existing fish seed multiplication farms (FSMF) under the Department of Fisheries is established during 1980 to 1990 and constructed mainly for carp seed production. At present the FSMFs is running with several constraints and not modified for other commercially important species. In this context, renovation and necessary modifications of FSMFs to create the facilities suitable for brood management, quality seed production and rearing of hatchlings. Total 4 (four) FSMF (two potential FSMF from each region) will be renovated under this program. Annual work-plan of the selected FSMFs will be designed as per scheduled program.

3 Livestock Production (DLS)

The activities being financed under this sub-component are: **(i)** support for poultry production; **(ii)** support for goat production; **(iii)** support for dairy production; **(iv)** health campaign; and **(v)** training and capacity building.

Overall, the livestock sub-sector is closely interlinked with the integrated farming system in Bangladesh. Cattle, buffalo, goat, sheep and poultry are a source of cash income, nutrition and food security in the rural areas. Ample scope exists developing these activities further as part of a

mixed farming system, which can contribute to poverty alleviation and sustainable livelihoods especially women and the rural poor. Current livestock activity exhibits the following characteristics/constraints: (i) low productivity; (ii) lack of good husbandry practices; (iii) lack of organized farming system; (iv) shortage of fodder and forages; (v) lack of improve breeding practices; and (vi) lack of adequate animal health care and technical services.

(i) Support for Poultry Production. Poultry is the most prominent livestock activity in the country and it is estimated that more than 80% of rural households keep some poultry, almost exclusively local unimproved breeds. There is a very significant, and rapidly growing, demand for poultry products, with indigenous birds commanding a premium price. Of the approximately 2.5 million poultry farming households (HH) in the project areas, the vast majority involves backyard production, with 2-10 birds per HH. Major limitations to productivity are the poor knowledge/practice of the traditional rearers, poor health/mortality, and inadequacies of shelter. The project will support the development of backyard poultry through building the capacity of (women) rearers by imparting appropriate training, dissemination of simple technologies, routine vaccination and de-worming, assistance in construction of well-ventilated night shelters, brood management and nutrition. These can help significantly enhance production and reduce mortality within a short period of time. The project approach is to form demonstration groups (who will be linked to potential adopters that are expected to take up the demonstrated activities in the coming year). Each demonstration group will be provided the requisite training, partial inputs support as well as vaccination and de-worming. Further, in every group one rearer will be selected as “vaccinator” for taking care the routine vaccination program in his/her group as well as provide these services to the wider community (for a fee).

(ii) Support for Goat/Sheep Production. Goats are an important source of income and nutrition, especially for the poorer sections. More than 50% of households (approximately 800,000) in the project area own small ruminants. Constraints faced in goat production include: (i) lack of elite bucks to improve bloodlines; (ii) poor nutrition (especially for kids at critical times); and (iii) high mortality due to diseases (particularly *Peste des Petits Ruminants* PPR). The project will support farmers to improve goat productivity through the provision of support for AI (possibly from private sector providers such as BRAC), breeding bucks, health and nutrition. As in the other cases, a phased approach will be followed. “Lead farmers” will form a demonstration group in association with other “adopting farmers”. The lead farmers will be given support for feeding and low cost shelters. The remainder of the group will be provided support for feed for either the doe or kid during the late gestation and early lactation, in order to enhance the survival rate of the kids. As part of the health campaign activities, the group will be supported, along with other members of the wider community, with vaccination and de-worming.

(iii) Support for Dairy/Buffalo Production. Dairy production is also an important source of supplemental income, employment and nutrition. In the project area – as in the country at large – there are significant shortfalls in supply of milk, resulting in imports of large quantities of milk powder. Most cattle are kept by the landless and smallholder farmers (65%). The indigenous cows have very low productivity (200-250 litres per lactation period of 180-240 days). Beyond problems in timely (“doorstep”) access to breeding and veterinarian services, availability of feed (especially, scarcity of land for fodder production due to poor understanding of the economic benefits) and lack of good husbandry practices are the key constraints. The project will seek to address these issues by providing “phased” demonstrations with four elements: (i) breed improvement through AI (where feasible); (ii) nutrition enhancement through fodder plots and balanced feeding rations; (iii) farmer training; and (iv) health improvement through vaccination, de-worming and fertility camp. For dairy demonstrations farmers will be formed into groups and the demonstration will be provided to Lead Farmers (selected by the group). The group will be supported through training, support for a fodder plot, and through selected feeds for the cow/calf

during gestation/lactation. AI will only be provided to those farmers/groups who agree to keep a bull for the breeding purposes of the group/village.

(iv) Health Campaign. Vaccinations, de-worming and health care will be provided with the intention of mass coverage of villages in which the project is working. The project will seek to raise the awareness of farmers to the importance of these activities, and will seek to put a mechanism in the village through local resource persons, backed by DOL, to undertake these activities on a regular basis. The project will also pilot a system of health care cards so that farmers can record and know when the critical times are for the next intervention.

(v) Training and Capacity Building. This will involve training for DLS resource persons as well as training given by DLS staff to a variety of stakeholders such as nursery operators, fry traders and farmers.

4 Enhancement of Seed Availability (SCA and BADC)

Lack of good quality at the farmer level is the single most important – and remediable- constraint to increase agriculture production and productivity in Bangladesh. In 2008 the seed requirement for the country was estimated at 310,000 tonnes while the corresponding distribution of ‘improved’ seed in the same year was in the order of 46000 tons, accounting for a SRR of 15%. Low SRR has many ramifications: slow replacement of old by new cultivars (BIRRI average approximately 4 new paddy varieties every 3 years), slow dissemination of new varieties (less than 5% of the paddy area is planted with varieties released by BIRRI since 1995, while almost 20% of the area is planted to varieties that are more than 20 years old), and limited promotion of varieties by extension staff (limiting farmers choice). Consequently, many farmers, especially small and marginal ones, continue to use local (unimproved and impure) varieties – stored in traditional unreliable ways - on around a fifth of the planted area.

The project will assist in enhancing availability of good quality seeds of targeted crops to not just other farmers in the project districts (i.e., those beyond the demonstration and adoption groups) but potentially to farmers in neighboring districts as well. This will be done by supporting: **(i) expanded network of seed farmers**; **(ii) seed certification** - enhanced ability of the SCA to undertake quality control and certification of seeds produced by farmers; and **(iii) seed distribution** – augmented capacity of the BADC to process and preserve (quality) seeds produced by the farmers and then distribute it to needy farmers in project and other locations. Institutionally, the project will be working with SCA since it is the sole, legally mandated seed certification authority in the country, and with BADC because of its wide distribution network and outreach among farmers, and the reputation BADC seeds seem to enjoy. However, in accordance with the national seed policy, the project and its implementing agencies will also support the expansion of private sector role in seed distribution.

(i) Expanded Network of Seed Farmers. This will be composed of seed production groups constituted and enabled under Seed Production sub-component of Component 2 (described above). The activities of these groups will support and be supported by interventions under this sub-component, as explained below.

(ii) Seed Certification. SCA has the legal mandate for seed certification and performs two key roles with respect to the project operations: (i) variety testing service for varieties developed by research institutions for release to farmers; and (ii) seed quality testing service for seeds produced by institutional seed producers as well as farmers. Testing and certification by SCA is a necessary condition for seeds produced by farmers to either traded in the market or supplied to other farmers through the BADC system. In this regard, the constraint in the project area – where a large number of seed manufacturing groups will be constituted – is that SCA presence on the ground (and hence capacity) for certification is virtually non-existent.

In order to fully exploit the expanded (potential for) seed production that the project will be enabling through project support seed production groups, the project will support the SCA to expand its certification network in the project area. Specifically, the project will augment existing SCA capacity in the North (at Rangpur) and establish a new variety and seed testing facility in the South (at Patuakhali). The expected result is an enormous increase in certified, good quality seeds from the project area that can be distributed to other farmers in the country through public or private distribution channels. A direct benefit to seed producing groups (established under the Seed Production sub-component of Component 2) is that, following certification, the market value of their produce would be considerably enhanced.

(iii) Seed Distribution. Certified, quality seeds produced under the project may be distributed by private or public channels (with SGAs having the flexibility to enter into contractual/distributional arrangements of their choice). A reliable seed distribution system with outreach requires, however, facilities for cleaning, grading, drying, fumigation, controlled-condition storage, as well as a distribution network to reach out to farmers. In general BADC plays a key role in this regard in Bangladesh in major “notified” crops (rice, wheat, maize, potatoes, etc.). Its existing facilities are, however, stretched and, in any event, are not present in the southern project districts. The project will therefore work with BADC with the following objectives: (i) BADC will work, where feasible, with project SGAs to make them contract out-growers of seed; (ii) BADC will use the expanded volume of quality certified seeds generated under the project to fulfil the seed needs of farmers over much larger regions in the north and the south. Towards this objective, the project will support the construction of seed processing and preservation centres in the south and relevant augmentation of BADC capacities to enable it to provide relevant support and coverage to project farmers in the north.

5 Community Mobilization

The project will adopt a group-based strategy to reach out to beneficiaries. In order to build on the social capital already achieved by the on-going programs, the project will assess the feasibility of using existing producer groups. Where necessary, new groups will be mobilized. To achieve the project objectives, the groups will need two kinds of facilitation: **(i)** technical support and **(ii)** social/operational support.

Technical support involves providing specific guidance on production technologies, management practices, and other technical choices relating to pre-/post- production stages (for the relevant sub-sectors/themes, ranging from crop, livestock and fish to water management). The provision of the technical inputs will be organized and back-stopped by the relevant implementing agencies. (Their roles in this regard are discussed in Annex 3 on Implementation Arrangements.)

Social/operational support different categories of activities: **(a)** from a group point of view, helping with group identification, formation/mobilization, helping develop group norms and functions, evolution of group governance system, group asset ownership and use, and so on; **(b)** from an implementation point of view, helping groups to understand the nature and objectives of the project, assisting them to play a key role in design and implementation of the project interventions at a local level; **(c)** from a monitoring point of view, enabling groups to have a “voice” and ensuring that they have the opportunity and capacity to provide feedback; and **(d)** from the governance point of view, ensuring that project specific eligibility criteria and other selection methods are transparently followed, groups governance arrangements work appropriately, and other risks relating to resource diversion or distortion of project-financed investments is minimized.

The project will hire a set of dedicated **Community Facilitators (CF)** to help perform the social/operational functions as well as some of the back-up functions with regard to technical support (under guidance of relevant department staff). Overall, the project is expected to work in over 375 unions in eight project districts. Each union comprises about 8-10 wards (lowest administrative unit, akin to a village), nearly half of which may be site of one project demonstration or the other. For each union, the project will recruit a CF whose responsibility will be to support all project activities within the union. The CFs will be backstopped and supported by a District CF Coordinator. Eight such coordinators will be recruited for the eight districts for the lifetime of the project.

Gender. Inclusion of women in the project will be ensured through a three pronged approach.: (i) at least 30% of the project beneficiaries for dairying, goat rearing and poultry shall be women; and (ii) 30 % of the committee members and other decision making positions in groups/ associations formed under the project will be targeted to be women.

2.2.3 Component 3: Water Management (BADC)

This component will support the Project Development Objective by creating on-farm water use conditions and capacities that allow farmers to increase cropping intensity, improve cropping patterns and reduce irrigation related risk/variability in crop production that can sometimes inhibit investments in other modern technologies/inputs. The component addresses the third set of constraints to enhancing agricultural productivity and growth in the project area which are weaknesses in existing irrigation and on-farm water management systems.

Rationale. Bangladesh is significantly dependent upon irrigation for agricultural production and food security. *Boro* rice, a fully irrigation dependent crop, contributes to a significant amount of rice production in the country. However, in the last two decades, several irrigation/water related problems have been intensifying. Although the nature of water stress varies with location, the typical problems faced in the project districts include: (i) lowering of groundwater table putting stress on the operation of STWs resulting in low irrigation efficiency; (ii) variability/shortage in availability of surface water flow in the existing natural channels (some silted up) restricting use of LLPs for supplementary irrigation; (iii) scattered drainage problems in lowlands during pre-monsoon (April – May) due to siltation of channels connected to river systems; (iv) reduced irrigation efficiency due to poor field conveyance through earthen (sandy) canal systems; (iv) scarcity of water in dry months causing shortage of water for drinking, essential household needs, and feeding of livestock; and (v) in Barisal and Jhalokati districts in the South, while there are enough sweet tidal water flows in main river system almost throughout the whole year, but most in-village channels are in-filled with sediments making it difficult for farmers to lift water by LLPs during low tide in dry months (January – April).

Sub-Components and Activities to be Financed under this component

There are three sub-components: (i) conservation and utilization of surface water (including rain-water harvesting); and (ii) enhancement of irrigation efficiency; and (iii) training and capacity building.

(i) Conservation and Utilization of Surface Water. The following activities will be undertaken: (i) rehabilitation of (existing) natural water bodies, canals and ponds for better conservation of surface water; (ii) (in the south) rehabilitation of existing natural water channels to facilitate water conservation by entry of tidal sweet water; (iii) harvesting rain-water in rehabilitated natural water bodies and creeks with clay cover to prevent loss; and (iv) harvesting rain-water at homestead level for household consumption, livestock and kitchen garden use. The first three activities will be undertaken through Water User Groups (WUGs), formed according to specified eligibility conditions. The groups will be supported with capacities and inputs (where appropriate) to make efficient use of the water collected/harvested for supplementary irrigation. The group will also be trained in operation and maintenance of the relevant rehabilitated water structures.

(ii) Enhancement of Irrigation Efficiency. The following activities will be undertaken: (i) installation of buried pipe network connections to linked to deep tube wells (DTWs) or Low-Lift Pumps (LLPs) on canals in appropriate locations to enhance field irrigation efficiency; (ii) enhancing pump efficiency (of LLPs and shallow tube wells or STWs); and (ii) repair of selected existing (non-functional) DTWs in the project area. These activities will also be undertaken through relevant WUGs, with locations and beneficiaries being selected as per specified criteria.

(iii) Training and Capacity Building. The project will support a variety of training: (i) to WUGs in on-farm water management (linked to Component Two demonstrations where possible); (ii) to farmers/LLP pump users/LLP pump mechanics; (iii) to farmers in rain-water harvesting; (iv) to BADC resource persons and by BADC resource persons to other stakeholders to enhance their skills and capacities.

2.2.4 The purpose of this component is to develop public sector capacity for program development in agriculture and food security, build implementation capacity of key agencies through training and institution building support and enable effective implementation of the proposed project. The component will have the following sub-components: (i) -TA and capacity building for sectoral policy planning and coordination, and institutional strengthening for more effective implementation;

1. Activities to be financed under this component will include:
 - building skills and technical expertise in sectoral policy planning and program design;
2. Human resource development on policy planning, project management, procurement, monitoring and evaluation, negotiation and other relevant fields

Reasons for Choice:

Agriculture and food security are the top development priority of the government. It has been given the largest share in the latest budget of the government. The donor community is also seeking to enlarge its support to Bangladesh to help achieve stronger agricultural growth and better food security. The domestic and international resources can be better used if the allocative efficiency of the public agencies involved in agriculture is enhanced. Specifically, resources can be saved, and much better spent, through better sectoral policy planning and prioritization (including coordination of donors' efforts). and through more robust and effective implementation arrangements. The technical assistance and capacity building support that the project can make available will be crucial in helping achieve above outcomes/goals.

The ultimate beneficiaries are those 60+ million people who are food insecure and suffer from malnutrition. Based on the needs assessments undertaken by the TA component and in consultation with the Investment Component, the direct recipients of capacity development activities will be the following. It is important to note though, that a careful needs assessment will be undertaken at the start up of the project to more precisely target recipients.

- Managerial and technical Government staff involved in designing and implementing agriculture, food and nutrition security investments (from planning, policy and technical divisions of MoA and MoFL, and for specific cases the MoFDM and other ministries and Planning Commission.
- Providers of investment-related services such as Farmers Organizations (FOs),CSOs (including relevant NGOs), and other relevant beneficiaries in the private sector specifically those involved in implementing the IADP investment components as well as other investment operations in the field of agriculture, food security and nutrition).

2.2.5.Component 5: Project Management

This component will support the realization of the Project Development Objective by ensuring that (i) interventions undertaken under the project are appropriately planned, coordinated and aligned with project design and development objectives; (ii) implementation arrangements and

activities are in line with relevant fiduciary and safeguards policies, procedures and standards; and (iii) there is due monitoring, oversight and reporting of project implementation and the resulting outputs and outcomes.

Activities to be Financed under this component:

The project will finance the establishment and operation of (i) a *Project Management Unit* (PMU) in Dhaka and (ii) Regional Project Implementation Units (RPMUs) in Rangpur in the North and Barisal in the South.

(i) *Project Management Unit*. The PMU will be headed by a Project Director. Technical Coordinators from each of the eight implementing agencies involved: BADC, BARI, BFRI, BRRI, DAE, DOF, DLS and SCA will work as representative of their respective organization. It will also have expertise in Administration, Financial Management, Procurement, M&E/Communication, Database Management and Social/ Environmental Safeguards as well as relevant support staff. It will also be responsible for: overseeing the implementation activities of the project; coordinate financial, procurement and administrative management; development and implementation of a Management Information System (MIS) for the project to facilitate performance monitoring of all project activities; organize evaluation and impact assessment of the project; arrange for expert advice and input from consultants on any subject matter area related to project implementation; review and compile relevant reports and other materials; submit to the World Bank and PSC, six monthly and annual progress reports within one month of the due date, and the audit reports within six months of the close of fiscal year; and liaise with the World Bank concerning operation and management of the project, as and when required to support implementation of project activities.

(ii) *Regional Project Management Units*. The RPMUs will be headed by Regional Project Manager and supported by team of core technical and support staff. Operating under the overall guidance of the PMU, the RPMUs will be responsible for: detailed planning and implementation of all project activities within their respective Regions; coordination with relevant implementing line departments and agencies; preparing annual regional plans; guiding district, Upazila and Union level staff the project and from implementing agencies teams to work in accordance with the spirit and principles of the project; monitoring and supervising the work being done in the field; maintaining appropriate records and accounts; ensuring due attention to safeguards issues; and ensuring appropriate governance and accountability, including through management of a suitable grievance redress system.

2.3 Major environmental concepts of the project

The main environmental concerns of agriculture projects include loss of natural habitat and management of agrochemicals (pesticides most importantly). The Environmental Management Framework (EMF) provides guidance on the approaches to be taken during Project Preparation and Implementation. This framework should be consistent with the Government of Bangladesh's environmental laws and associated regulations as well as with World Bank safeguard policies.

Additionally Resettlement Plans and Indigenous Peoples' Development Plans, if at all required at any place, will be developed with due urgency.

3. ASSESSMENT OF CURRENT CONDITIONS AND ENVIRONMENTAL ISSUES

3.1 Anticipated Environmental Issues in the Subprojects

The anticipated environmental issues related to the three sectors in which subprojects are expected to be financed by the Project are shown in Table 1. This list is by no means exhaustive. It has been compiled from national, regional and international experience. This list may provide general guidance to the project implementing agencies on the general type of projects that may be implemented under this project. It should be realized that people may come up with creative ideas on many different types of projects beneficial to the community. Such subprojects should be judged on their merit and should be financed if they have manageable environmental dimensions within the framework. More details on the impact and their mitigation are provided in **Annex-3**.

Table 1. Issues in Subprojects that may be Financed by the Project

Environmental Issues in Crop Production
<ul style="list-style-type: none"> • Stress on water resources • Soil erosion and loss of productive capacity • Pesticide use • Eutrophication of aquatic environments • Loss of biodiversity • Crop residues and other solid wastes • Atmospheric emissions
Environmental Issues in Livestock Production
<ul style="list-style-type: none"> • Waste management • Wastewater • Air emissions • Hazardous materials management • Ecological impacts • Animal diseases
Environmental Issues Associated with Aquaculture
<ul style="list-style-type: none"> • Threats to biodiversity • Contamination of aquatic systems • Hazardous materials
Environmental Issues Associated with Water Management Activities
<ul style="list-style-type: none"> • Final disposition of dredged materials
Small-scale Construction or Renovations

3.2 Subproject Exclusions

A list of subprojects that **will not be** financed by the IADP are given in Table 2. The criteria for the subproject types on this list are based on the probable environmental impacts of the subprojects. With the available implementation experience, it is apprehended that local capacity may not be adequate to manage the environmental impacts of the subproject types in the list. However, it should be noted that the list is not immutable and can be modified in the light of experience when demonstrable capacity develops to manage the environmental impacts of the subprojects. Subprojects with any of the attributes listed in Table 2 will be ineligible for support under the IADP (referred to as negative list).

Table 2. Subproject Type Excluded from IADP

ENVIRONMENTAL ATRIBUTES
Water Management
1. Rubber dams

Sanitation and Waste Management
1. New or significant expansion of activities with negative health impacts to nearby water sources or population.
2. New or significant expansion of disposal sites for animal wastes requiring involuntary public participation e.g. poultry farm wastes creating obnoxious odour.
Natural Resource Management
1. Drainage of traditional wetlands for agricultural use.
2. Subprojects requiring pesticides that fall in WHO classes IA category
3. Activities involving significant conversion or degradation of critical natural habitats.

3.3 State of the Environmental Resources and Relevant Issues in the Country at large and in the Target Areas

Initially the project is expected to cover districts in Rangpur Division (i.e., Rangpur, Kurigram, Nilphamari and Lalmonirhat districts) in the north and Barisal Division (i.e., Barisal, Patuakhali, Barguna and Jhalokathi districts) in the South. However, it is possible that in future the project may be extended to other areas of the country as well in phases. So, it is necessary to keep in mind the general variation in the environmental conditions expected in different parts of the country. A brief description of the important environmental resources and environmental issues are given in this section⁸.

3.3.1 Physiographic and Land-use Pattern of Bangladesh

Bangladesh is located between 20°34' and 26°38' N, and 88°01' and 92°41' E. The area of the country is 147,570 square km with a coast line of about 700 km in length. The land is flat to the extent of about 80% intersected by numerous rivers and their tributaries. The land area has a general slope of 1°-2° (5-10cm/km) from north to south. The soils in the flat areas mostly consist of recent alluvium. The rest 20% of the area consists of uplands (~8%) and hill areas (~12%). The uplands consist of Barind Tract in the north western part, Madhupur Tract in the central part and the Lalmai Hills in the east. The upland soils are derived from old Pleistocene sediments and are typically reddish or brownish in color. The hill areas consist of Chittagong Hill Tracts, hill ranges of northeastern Sylhet and hills along the narrow strip of Sylhet and Mymensingh Districts. The hill soils are derived from tertiary rocks, unconsolidated tertiary and Pleistocene sediments. Most of the land in the country is used for agriculture.

Land use is generally classified into five categories as agricultural, forest, cultivable waste, current fallow and as 'not available for cultivation'. The category of 'not available for cultivation' consists of mainly of urban, rural settlements and industrial land. **The project area in the South is coastal and have environmental issues (i.e., tidal surge, salinity) quite different from the North which include largely flood plains and some uplands. The difference in respect of Physiographic and Land-use patterns should be recognized in subproject planning.**

3.3.2 Hydrology

Bangladesh is the largest delta in the world formed by the Ganges, the Brahmaputra, and the Meghna river systems. This delta is characterized by flat terrain interlaced with the intricate system of rivers and tidal channels, which carry an enormous quantity of sediment-laden water downstream. The three major rivers have a huge catchment area of 1,554,000 sq km, spreading, over five countries, namely, Bhutan, Nepal, China, India, and Bangladesh. There are about 700 rivers, canals, and streams in Bangladesh, with a total length of approximately 22,155 km, which occupy a riverine area of about 9,384 sq km.

⁸ Bangladesh: State of the Environment, 2001

The main river system occupying the delta is formed by the Ganges and the Brahmaputra, which, while entering Bangladesh, are known as the Padma and the Jamuna, respectively. The Jamuna joins the Padma near Aricha, and flows up to Chandpur where it joins the Meghna and the combined flow is called the Meghna. It comprises a large estuary, known as the Meghna estuary, at the northeastern apex of the Bay of Bengal. The Ganges, primarily a meandering stream, is about 2,600 km long, and flows parallel to the Himalayan range. It is fed mainly by rivers rising in the southern slopes of the Himalayas and enters Bangladesh at the western extremity of Rajshahi region. The Brahmaputra arises in Tibet, and flows in an easterly direction north of the Himalayan range before turning south through the mountains, it then flows west down the Assam valley for a distance of about 700 km, and enters Bangladesh as a wide-braided river, in the Rangpur area. The meandering Meghna river drains the Sylhet Basin and parts of the adjacent Shillong Plateau, and Tripura Hills. The rivers flowing from the hills situated in the southeast of Bangladesh, namely Feni, Karnaphuli, Sangu, Matamuhuri and Naaf flow into the Bay of Bengal. The most important river in this region is the Karnaphuli, which is also the longest at 274 km.

A vast amount of water flows through Bangladesh mostly during June-October. The rivers of Bangladesh also carry huge amounts of sediment, an estimated 24 billion tons/year. These sediments are subjected to coastal dynamic processes generated mainly by river flow, tide, and wind actions. The ultimate result are additional new land in some places due to accretion, forming islands called 'chars' (shoals), and loss of land in some other places due to erosion. Both the Southern and Northern Districts of the proposed IADP are afflicted with these phenomenon. Bangladesh is also richly endowed with numerous perennial and seasonal water-bodies known locally as *haors*, *beels*, *baors*, *khals*, *pukurs* and *dighies*. Beels, and haors are open wetlands while *baors* and *dighies*, constitute closed ones. The *haors* are depressions located between two or more rivers, and function as small internal drainage basins. The lowest points of the *haors* and *beels* are lake-like deep depressions retaining water permanently or for a greater part of the year. The *beels* are usually connected to the adjacent rivers by one or more drainage channels, locally termed as *khals*. *Baors* are oxbow lakes from the old meandering bends of rivers that have been cut off from the main stream. *Pukurs* and *dighies* refer to ponds of various sizes..

Hydrology of a given area is extremely important for any subproject which uses surface or groundwater and may have impact upon water bodies and aquifers. Impact on water resources by any subproject should be carefully considered in subproject planning.

3.3.3 Ground Water

Below the zone of aeration extending from surface to only a few meters below the ground, the soil in Bangladesh is saturated with water. Saturation means that all pore spaces in the soil are filled with water and this zone is defined by a groundwater table. Bangladesh soils consist of unconsolidated sediments and the pore spaces are simply the openings between the grains. Lithologic drill logs show layers of gravel, sands of different grades, silt and clay down to great depths in succession.

Hydrogeologists classify soil layers as to their ability to yield water to wells or springs. A layer which is permeable enough to supply water to wells or springs is referred to as an "Aquifer", while an "Aquiclude" is impermeable and an "Aquitard" tends to be very poorly permeable. The aquifers are sand or gravel layers that may be a few centimeters to many meters' thick. Like other similar areas in the world, the sand intervals which constitute the aquifers in Bangladesh are probably lens-shaped with varying degree of lateral and vertical interconnectedness. This interconnectedness usually decreases with depth. The extent of the of aquifers may vary from a few km² to many thousands of km². So, a large aquifer may easily contain a trillion liters or even more water. Even a small aquifer would probably contain a couple of billion liters.

An aquifer is referred to as confined when it is bounded by aquicludes or aquitards that impede flow into it. The primary source of recharge to the aquifers is assumed to be historic runoff from the rainfalls. Groundwater is in principle renewable but in certain cases the period needed for replenishment is very long (100s to 1000s of years) in relation to the normal time-frame of human activity. For this reason, it is valid in such cases to talk about the utilization of non-renewable groundwater or the 'mining of aquifer reserves'. Water in the confined aquifers can be literally thousands of years old. This is the reason for concern about the aquifer systems and their specific susceptibilities to negative impacts under abstraction stress. For water balance studies three and four aquifer models have been shown to be adequate. However, in reality in many regions of Bangladesh more aquifers can be found stacked on top of one another where from water can be extracted. The hydrogeology of Bangladesh area has been studied for more than fifty years ago and the details are available elsewhere⁹.

Groundwater is a vital natural resource for the reliable and economic provision of irrigation water and potable water supply in both the urban and rural environments. It thus plays a fundamental role in human well-being. Ground waters from both shallow and deeper aquifers are being used extensively for irrigation. However, aquifer depletion and salinity are already issues of concern. It is necessary to exercise caution in the large scale exploitation of confined deep aquifers, as these may be depleted giving rise to serious problems in the future. Recent emergence of the Arsenic problem in groundwater is also an issue but from available information it is still not necessary to put any restriction on irrigation due to presence of Arsenic in ground water¹⁰. However, this issue should be continuously studied to evaluate emerging health problems, if any. A program for testing water for arsenic content should be part of subproject screening before we alter the water body as well as conducting the same test during the course of project implementation.

3.3.4 Ecology

The terrestrial and aquatic ecosystems in the country support a large number of diverse biological populations, both plant and animal. The most important terrestrial ecosystem in Bangladesh is that of the forests. Large varieties of species exist in the forest areas and depend on various biotic and abiotic components of the forest for their survival. The total land under forest in Bangladesh is about 2.56 million ha, which includes officially classified and unclassified state lands, and forestlands accounted for by village forests and tea or rubber gardens. Although a significant part of the existing forest area is designated as State Forest, most of this land is actually barren of tree vegetation. In terms of per capita forestland, Bangladesh ranks amongst the lowest in the world. The forests of Bangladesh have been disappearing at an accelerating rate. The districts within proposed IADP do not contain any forest land and wetlands. There are specific rules and regulations restricting the use of these ecological regions.

The Sundarban forest areas support a very rich and diverse fish fauna of 400 species, 270 species of birds, and over 300 species of plants. It is an important staging and wintering area for migratory shore birds, gulls, and terns. The Sundarbans are the habitat of the Bengal Tiger probably the most notable of Bangladesh's fauna species. However, many small members of the cat family are found throughout the forest areas. Birds and reptiles, wild pigs, deer and otters are the most numerous forest species.

⁹ D. G. Kinniburgh and P. N. Smedley, Arsenic contamination of groundwater in Bangladesh, BGS Technical Report WC/00/19, Vol. 1-4 (2001); UNDP., Groundwater Survey: The Hydrogeological Conditions of Bangladesh, UNDP Technical Report DP/UN/BGD-74-009/1(1982)

¹⁰ M. Khaliqzaman and A. H. Khan, Arsenic Exposure of Bangladesh Population through Food Chain, Report prepared for SEARO WHO, Delhi (2003)
(URL: www.physics.harvard.edu/.../arsenic/arsenic_project_introduction.html)

Wetlands are invaluable components of the environment and bio-diversity in Bangladesh. Bangladesh possesses considerable wetland areas, among which the principal ones are rivers and streams, freshwater lakes and marshes, including haors, baors, and beels, water storage reservoirs, fish ponds, flooded cultivated fields, and estuarine systems with extensive mangrove swamps. The coastal and inland wetlands encompass the vast floodplains and delta system of the Ganges, Meghna and Brahmaputra rivers. The total area of the wetlands in the country has been variously estimated at seven to eight million hectares, or about 50 per cent of the total land surface. The wetlands in Bangladesh are increasingly being recognized as habitat and refuge for a large variety of wildlife, and a safe nesting site for avifauna. The marsh vegetation associated with wetlands also forms important breeding areas for a wide variety of waterfowl, and roosting places for a large number of resident and migratory birds.

The nutrient products of wetlands in Bangladesh are carried by rivers and floodwater, and benefit the systems downstream. The grazing systems in these regions support cattle that recycle nutrients, enrich soil, and are used as draft animals. The plant diversity provides refuge for predators of pests, e.g., snakes, frogs, and certain fish species, and this helps agriculture in general. Bangladesh does not possess adequate infrastructure for sewage treatment and the wetlands function as natural system for the treatment of pollutants.

The wetlands of Bangladesh are being drastically affected by the impacts of the increasing human population. The wetlands are being lost to flood control, drainage and irrigation development. Severe erosion in the catchment areas is causing increased siltation, and having major impacts on the key wetland areas. The exploitation of the

haor wetland ecosystem began due to ever-expanding agrarian settlements, and they are being reclaimed as agricultural land for production of rice. The beels are being drained, and embankments built to save crops from flash floods. These changes in land use patterns have occurred in tandem with a decline in fish and migratory birds. Swamp forests that were once extensively distributed are now on the verge of extermination.

As the projects area covers large areas, some sub projects will reach up to the forest and wetland areas. As subprojects are small, likely impacts of these on the ecology are expected to be minimal. However, impact minimization on ecology should be a cornerstone in subproject design. The Project's water component seeks to promote use of harvested rainwater instead of existing surface or ground water to reduce and avoid stress on these resources.

3.3.5 Environmentally and Ecologically Sensitive Areas

Environmentally sensitive areas are defined as being areas that are of significant value in their natural state, or areas that are of socio-cultural significance or sensitivity. Cultural or historical sites and densely populated urban centers are examples of the latter category. Ecologically Sensitive Areas can be defined as areas that may contain unique features, maintain key natural processes, support endangered, endemic or threatened plants or animals and their habitats, or provide important breeding areas for wildlife. Some Ecologically Sensitive Areas are natural, while others may have been significantly altered by certain human activities. In terms of management, some Ecologically Sensitive Areas will prosper when left undisturbed while others will require intensive management to restore or maintain their natural values.

The ECA 1995 refer to Environmentally Sensitive Areas (called Ecologically Critical Areas in the legislation). According to this legislation, environmental protection is deemed particularly relevant in Ecologically Critical Areas, which are defined as areas where degradation of the environment has reached or threatens to reach a critical state. In sensitive areas, environmental and ecological impacts tend to be more severe than elsewhere, and therefore, extra precautions must be taken to avoid significant environmental impacts. In many cases, this will mean extra investments in mitigation measures, while in some cases these areas will simply have to be avoided, resulting, for example, in the rejection of a subproject proposal or its redesign to avoid particularly sensitive areas.

3.3.6 Physiographical, Ecological and Soil Characteristics of the Project Areas

Southern Region

The three districts of Barisal Division namely Pirojpur, Barguna and Patuakhali are considered as highly disadvantageous for agricultural production due to various climate risks and soil-related constraints affecting crop production systems, fisheries, poultry, livestock and agro-forestry. Land use in the area is diverse and average cropping intensity is low.

The climate risks and soil-related constraints include tidal surge, cyclone, water stagnancy, swelling and cracking clays, poor drainage, heave consistency, poor nutrient status, high intensity of soil salinity (4-30ds/m), river water salinity, underground water salinity etc. A vast area of Barisal Division is affected with salinity of soil (Table 3). The largest area of salt-affected land is situated in the Patuakhali District followed by Barguna, Pirojpur and Barisal Districts.

Table 3. Extent of salt-affected areas in four Districts of Barisal Division¹¹.

District	Area of salt-affected land(ha)
Patuakhali	1,39,000
Borguna	1,04,320
Pirojpur	27,640
Barisal	11,370

Almost the entire area is mostly under single crop (Aman rice) due to low soil fertility, diversity of soil, low organic matter in the soil, limited sweet water for irrigation, lack of improved crop varieties with tolerance to saline and other stress conditions, lack of better farming systems, lack of surface and groundwater irrigation infrastructure and lack of crop diversification. Still then, the area is known as a zone of vulnerabilities as well as opportunities¹².

Northern Region

Out of four Districts under Rangpur Division, Kurigram and Lalmonirhat have highly disadvantaged areas called Active Flood Plains and *Charlands* (Shoals). These areas are physically unstable and subjected to occasional river erosion, deposition of sand, floods, poor communication and inadequate healthcare, education, water supply and sanitation services. Texture of the top layer's soil is characterized by sand, sandy loam, loam, clay loam and clay. Water holding capacity of most soil is poor. PH varies from 4.0-8.9. Cropping intensity varies from 189% to 242%. The major cereal crops include paddy, wheat and maize, major oilseeds and pulses are mustard, sesame, groundnut, lentil, chickpea (gram), black gram, grass pea, pea and cowpea. Along with many kinds of vegetable, potato, major spices like onion, garlic and cumin are widely produced. Cash crops grown are jute and sugarcane.

Agriculture is the only profession of the people of the area. But the agriculture sector of the region cannot play effective role in reducing poverty and food insecurity due to the geographical challenges and regular natural calamities as well as limited attention of the public and NGO sectors. Agricultural activities are mainly based on out-dated technologies as well as more risky than other regions of the country. The land and environmental degradation in the area create serious problem in the livelihood process of the people. All the four districts of the Rangpur Division under the proposed Project are under the threat of flood causing immense negative impact on the production of crops, vegetable, livestock and fisheries.

¹¹ Daily Prothom Alo, 4 April, 2009.

¹² Coastal Zone Policy 2005.

4 . ENVIRONMENTAL ISSUES IN IADP: BASELINE INFORMATION ON BROAD AGRICULTURE

IADP mainly focuses on research at BARI and BRRI, which may not have direct impact on environmental components. But actions taken by farmers based on the advice and guidance provided under any one of the three components of IADP may have environmental consequences. These have been addressed in the following sections. The adverse impacts followed by suggestions on mitigation measures are presented later in the report.

4.1 Agricultural Research:

4.1.1 Loss of Biodiversity

The emphasis on developing varieties with higher yield potentials has led to a situation where local varieties with environment friendly characteristics have been pushed to the sidelines. In the process, a large number of local varieties have already been lost resulting in loss of biodiversity. More and more of these local varieties may become extinct unless steps are taken to preserve their germplasm. In addition, arrangements need to be made to conserve *in situ* genetic resources. NARS breeding programmes need to emphasize the benefits of using these environment-friendly local varieties.

4.1.2 Pest infestation

The development of high yielding varieties has been associated with increased pest infestation requiring increased use of pesticides with all kinds of adverse impacts. Environmental pollution is increasing, soil productivity is declining, beneficial insects are getting wiped out, and water bodies are getting polluted endangering aquatic flora and fauna, the most important of which is open water fisheries. Among many factors, pollution of water bodies by pesticide wash outs is believed to be a major reason for the decline in fish production in Bangladesh. Many pesticides used in Bangladesh are banned or restricted under international agreements. In addition, several studies have shown that inadequate product labeling and farmer's lack of information have led to widespread overuse of dangerous pesticides. No pesticide in the WHO Class-1A category will be used in this project. In fact, pesticide brands having adverse impacts have been banned in Bangladesh and these are shown Annex-6. In addition, farmers lack of knowledge about precautions pertaining to handling of pesticides often creates health problem.

4.1.3 Arsenic Contamination

In Bangladesh, arsenic contamination has been identified in ground water of some districts, which is the major source of water for all types of domestic use including drinking. According to a national survey conducted by DPHE, some 29 million people are exposed to arsenic contamination exceeding 50ppb, and 49 million to levels exceeding 10ppb. Using dose-response data from studies carried out in the Taiwanese population, it has been estimated that about 0.4% of the total burden of disease in Bangladesh may be attributable to exposure to arsenic levels in drinking water in excess of 50 ppb. Use of water with high arsenic content has already adversely impacted human health and some 38,000 potential cases of arsenicosis have been identified.

adequate arrangements are being made to discourage drinking of ground water through awareness creation, supply of surface water, rain water harvest, development and distribution of Arsenic removing contraptions etc. Ground water is the major source of irrigation and entry of arsenic in the food chain is feared due to the extensive use of arsenic contaminated ground water for irrigation. However, as pointed out earlier it is not necessary to impose any restriction on use of arsenic contaminated ground water for irrigation because amount of arsenic entering the food chain from irrigation water is much below the specified limit. The Arsenicosis syndrome occurs in people drinking arsenic contaminated water from irrigation sources.

4.1.4 High Input Requiring Varieties

The level of input use, especially application of chemical fertilizers, has increased tremendously with the expansion of high yielding varieties. The worst aspect of the increased application of chemical fertilizers is their imbalanced use, which is resulting in the decline of soil fertility. Increased dependence on chemical fertilizers is reducing the organic matter content in the soil, which is a major cause of the decline in soil productivity.

4.1.5 Occurrence of Drought

Lately, it is recognized that the damage inflicted by droughts on crop production is greater than the damage inflicted by floods. A dearth of drought tolerant varieties as well as a lack of water management leads to substantial loss of crops in every year.

4.1.6 Sea Level Rise Due to Global Warming

It has been recognized that the sea level will rise due to global warming and Bangladesh is one of the likely victims. It is proclaimed that a substantial area of Bangladesh is expected to go under water due to sea level rise. Since subprojects are not establishing any structures (except for buildings) that are expected to last for more than 5 years from now, there is no need for much consideration of climate change. This EMF recommends that researchers explore climate resistant varieties for adoption and dissemination under the Project as some are already doing.

4.2 Agricultural Extension

4.2.1 Soil Degradation

Soil degradation in the country is taking place for several reasons. Intensive cropping for increasing rice production initiated the process, and now expansion of high yielding varieties with high level of input use is depleting the organic matter content of soil, which is considered essential for sustained soil productivity. Good agricultural soil should contain at least 2% organic matter, mostly in the top 20-25 cm layer of the soil. But in Bangladesh most of the cultivated soils have less than 1.5% while some have less than 1% organic matter. Depletion of the same type of nutrient from the same layer of soil for years together by mono-cropping with rice has also contributed to nutrient mining and soil degradation.

4.2.2 Contamination through Pesticides

Indiscriminate use of all types of pesticides is killing beneficial insects in addition to contaminating the bio-physical environment. Wash out of pesticides is finding their way into the wetlands and water bodies, thus adversely impacting the aquatic flora and fauna. From an environmental perspective, chemically-polluted runoff from fields has contaminated surface and ground waters, damaged fisheries, destroyed freshwater ecosystems and created growing "dead zones" in ocean areas proximate to the mouths of rivers that drain agricultural regions.

4.2.3 Decline in Soil Fertility

Extensive use of chemical fertilizers for intensive cropping has already brought down soil fertility with resultant decline in the yield level of crops. During about the last 15 years, 63-73% of the total fertilizers applied in the field comprised Urea (containing nitrogen) and only 18-20% and 5-15% fertilizers comprised TSP and MP, respectively (BBS). This imbalance in fertilizer use has further aggravated the soil fertility situation. The availability of cow dung for crops production has substantially decreased due to its demand as fuel for the increased population. Compost for agricultural crops could not be made popular. With reduction in the use of mustard oil, the availability of mustard oil cake has also decreased. Whatever quantity of mustard oil cake

becomes available, are used as cattle feed and are no longer applied in the agricultural field. The combined effect of all these factors is a decline in soil fertility.

4.2.4 Soil Salinity

Soil salinity is a problem along the coastal belt, specially in the four southern districts under the proposed IADP and saline soil is increasing due to reduction in fresh water flow from the upstream. The salinity frontier is moving towards the north under the influence of the ingress of saline sea water and reduction in upstream discharge. Soil salinity is increasing also due to expansion of salt beds. Sea level rise due to global warming may create a really alarming situation and large tracts of land may become saline unless mitigation measures are taken.

4.2.5 Pest Infestation

Large-scale expansion of high yielding varieties coupled with intensive cropping has increased pest infestation substantially. Propagation and regeneration of pests have been facilitated by mono-cropping over the years while some species of pests have developed resistance against chemical pesticides due to their indiscriminate and improper application.

4.2.6 Health Hazards from Agro-Chemical Handling

Agro-chemical dealers, especially retailers, are observed to handle agro-chemicals with their bare hands ignoring the danger of infection. Direct contact during weighing and spreading of fertilizers leads to skin diseases while inhaling pesticides during spraying may lead not only to respiratory problems, but to all types of infections as well. An FAO analysis of pesticide composition in Bangladesh has revealed high shares of toxic chemicals that epidemiological studies have found to cause cancer, genetic damage, fetal damage, and severe allergic responses in exposed populations. Substantial anecdotal evidence suggests that pesticide poisoning and ecological damage have become common in Bangladesh.

4.3 Value Chain Development

4.3.1 Fish Biodiversity

Fish biodiversity is on the decline for several reasons some of which are: decline in dry season water area, shrinking of fish spawning grounds, disruption of migratory routes, loss of connectivity between rivers and water bodies, use of destructive fish gear, pollution of water bodies by agro chemicals and large scale operation of kathas (*temporary reserved areas*) in rivers and canals as well as fishing during the breeding season. The IUCN Red Book for Bangladesh suggests that almost 30% of all inland fish species for which data is available are in some danger of extinction. The Red Book reports that 54 inland and estuarine fish species out of the total 266 present in Bangladesh are endangered.

4.3.2 Air Pollution from Poultry and Dairy Farms

Poultry farms built in residential areas pollute the environment, particularly with offensive odours, and render them unfit for human habitation. The same is true for dairy farms set up in residential area.

4.3.3. A brief description of the existing projects in the proposed IADP area but not directly connected with the project.

There are two projects and four programmes being implemented in the proposed IADP area. Their activities are more or less similar to the IADP component's activities. **It is mentioned that the volume of activities of existing projects is much less than the actual demand.** Since every subproject of IADP will

be approved by the Upazila irrigation committee, there is no scope of overlapping of IADP project activities with those of the existing projects.

SL no	Name of project/ program	Project area (district)	Major activities
1	Expansion of irrigation through utilization of surface water by double lifting 2 nd phase	31 districts of Bangladesh including Barisal, Patuakhali, Borguna and Jhalokhati	Re-excavation of canal/ khal, Installation & operation 12.5-25 cusec burge mounted floating pump. 5- Cusec LLP, construction of open channel , small hydraulic structure farmers training etc.
2	Greater Bogra- Rangpur- Dinajpur integrated area development project.	10 districts including Rangpur, Nilphamari, Kurigram and Lalmonirhat.	Re-excavation of canal, Installation of low lift pump, Buried pipe line, Electrification of irrigation equipment, small hydraulic structure etc
3	Rangpur, Nilphamari, district minor irrigation development programe	Rangpur and Nilphamari	Re-excavation of canal, Installation of low lift pump, construction of buried pipe line/ open channel, small hydraulic structure etc
4	Kurigram-Lalmonirhat district minor irrigation development programe	Kurigram and Lalmonirhat	Re-excavation of canal, Installation of low lift pump, construction of buried pipe line/ open channel, small hydraulic structure etc
5	Barisal-Jhalakathi district minor irrigation development programe	Barisal and Jhalakathi	Re-excavation of canal, Installation of low lift pump, construction of buried pipe line/ open channel, small hydraulic structure etc
6	Patuakhali – Borguna district minor irrigation development programe	Patuakhali and Borguna	Re-excavation of canal, Installation of low lift pump, construction of buried pipe line/ open channel, small hydraulic structure etc

4.3.4 Siltation of canals and inefficient irrigation water management:

Irrigation water has been decreasing during the last few years due to siltation of natural water sources like canals, *khals*, etc. These need re-excavation to increase their capacity to hold larger amounts of rain and surface water. On the other hand, a good amount of water is lost due to inefficient mechanisms of water conveyance from the sources to the crop fields through spillage and seepage both. Therefore, re-excavation of the canals, *khals* etc are required and buried pipeline instead of open channel should be installed. However, a number of projects are being implemented in and near the IADP Project area to achieve the above goals. But the efforts are much less than requirement.

All excavated materials must be disposed of in an appropriate site and stabilized either by vegetation, use or in some way to ensure that it does not harm communities. If there is any reason to believe that excavated materials may be toxic or hazardous, such a claim must be investigated and the materials appropriately disposed of so as to not harm communities. Workers handling any toxic or potentially hazardous materials must use personal protective equipment.

4.3.6 Environmental impacts and Mitigation Measures

The following points have been learnt from projects of similar nature functioning in the IADP area.

- (a) Water conveyance loss is very high in the earthen channels.
- (b) Construction of open channel reduces agricultural land.

- (c) The farmers are not well versed with the modern agricultural & irrigation technological knowledge.
- (d) Misuse of water as well as high price of diesel and spare parts are resulting in increased irrigation cost culminating in increased production cost.

To improve the above-mentioned situations, the following mitigatory activities may be undertaken by IADP implementers.

- (a) Construction of water distribution system (buried pipe line) commensurate with upgrading of the skill of the farmers in on-farm water management will reduce wastage of water. Consequently irrigation efficiency will be improved and production cost will be decreased.
- (b) As the farmers will have to purchase irrigation water on hourly / seasonally / yearly basis, there will be no scope of over pumping and misuse of surface/ground water as they will be trained for efficient use of irrigation water.

5. REVIEW OF ENVIRONMENTAL ASSESSMENT AND OTHER RELEVANT LEGISLATION

This section describes relevant national environmental management requirements as well as the World Bank's Safeguards Policies applicable to the IADP and its subprojects. In each case, national and local institutions that will be involved in reviewing and approving subprojects should be identified, along with their respective roles and responsibilities. Responsibilities may include issuing approvals for undertaking a subproject and ensuring compliance to obligatory requirements under laws and regulations.

The World Bank EA category assigned to the Project, and the key issues identified under the safeguard policies are also discussed in this section. A brief description of the relevant World Bank's Safeguard Policies are provided to explain how their requirements will be complied with or used.

A brief review of current practice in subprojects under different programs is also presented. The lessons learnt are integrated in the recommended practices in the present EMF.

5.1 Bangladesh Legal Framework

The requirements for compliance with environmental regulations are laid down by the policy, legal and regulatory framework in the country. A large number of laws related to environmental issues, some dating back to 19th century exist in Bangladesh. The most important of these are the Environment Conservation Act, 1995 (ECA 1995) and the Environment Conservation Rules (under the ECA, 1995), 1997 (ECR 1997). Many of the other laws are cross-sectoral and are only partially related to environmental issues. The relevant laws and regulations related to important environmental issues in Bangladesh are shown in Table 4.

Table 4: Environmental Issues and Relevant Laws and Regulations in Bangladesh

Issues	Laws/Regulations	Enforcing Agency	Regulated/Enforced Items
Water pollution	• ECA, 1995	MOEF/DOE	Promulgation of standards for water quality
	• ECR 1997	”	Promulgation of discharge limits
	• Environmental Court Act, 2000	”	Prosecution of offenders
	• Water Supply and Sanitation Act, 1996	MOLGRDC/ DPHE	Management of water supply and sanitation in rural areas
	• The Local Government Ordinance, 1983	UPs	Control of Environmental sanitation in rural areas

	<ul style="list-style-type: none"> • National Policy for Arsenic Mitigation 2004 	”	
Air pollution	<ul style="list-style-type: none"> • ECA, 1995 • ECR 1997 (amended 2005) • Environmental Court Act, 2000 • Brick Burning Control Act, 1989 (Amended 1992) • Motor Vehicle Act, 1983 	MOEF/DOE ” ” ” BRTA/Police	Promulgation of standards for air quality Promulgation of emission standards for Motor vehicles and industries Prosecution of offenders Prosecution of offending vehicles
Noise pollution	<ul style="list-style-type: none"> • ECA, 1995 • ECR 1997 	MOEF/DOE ”	Promulgation of standards for noise levels
Toxic or hazardous waste pollution Solid waste pollution	<ul style="list-style-type: none"> • ECA, 1995 • ECR 1997 • Nuclear Safety and Radiation Protection Ordinance, 2000 • Industrial Policy, 1999. 	MOEF/DOE ” BAEC MOI	Promulgation of standards and management rules Promulgation of standards and rules for management of radioactive materials Promulgation of standards and management rules
Marine pollution	<ul style="list-style-type: none"> • ECA, 1995 • ECR 1997 • Environmental Court Act, 2000 	MOEF/DOE ”	Promulgation of standards for water quality Promulgation of discharge limits Prosecution of offenders

Table 4 Environmental Issues and Relevant Laws and Regulations in Bangladesh(Contd.)

Issues	Laws/Regulations	Enforcing Agency	Regulated/Enforced Items
Pollution of fisheries	<ul style="list-style-type: none"> • The Protection and Conservation of Fish Act, 1950 • National Fisheries Policy, 1996 	MOLF ”	Promulgation of regulatory measures
Pollution from animal production	<ul style="list-style-type: none"> • Bangladesh Animal Disease Act, 2005 • Bangladesh Animal and Animal Product Quarantine Act, 2005 	MOLF ”	
Pesticides and fertilizers	<ul style="list-style-type: none"> • The Agricultural Pesticides Ordinance, 1971 • National Agricultural Extension Policy, 1996 • National Agricultural Policy, 1999 	DAE ” ”	Approval of permissible pesticides
Forest conservation	<ul style="list-style-type: none"> • ECA, 1995 • ECR 1997 	MOEF/DOE ”	Declaration of ecologically critical areas

	<ul style="list-style-type: none"> • The Forest Act 1927 • National Forestry Policy, 1994 	MOEF/DOF „	Reserve forest, protected forest, village forest
Wildlife conservation and national parks	<ul style="list-style-type: none"> • ECA, 1995 • ECR 1997 • The Wild Life (Preservation) (Amendment) Act, 1974 	MOEF/DOE „ „	Declaration of ecologically critical areas

5.2 Environmental Guidelines for Projects in Bangladesh

As pointed out earlier, the most important of the laws/rules in Table 4 are the ECA 1995 and the ECR 1997. The ECA 1995 is primarily an instrument for the Department of Environment (DoE) and for controlling industrial pollution. The Act also includes ‘Polluter Pay Principle’ in general terms in that as it states "if any particular activity is causing damage to the eco-system, the responsible party will have to apply corrective measures". The ECR, 1997 was promulgated under ECA 1995 to operationalize the enforcement of the Act. The modifications to ECR can be brought about by executive orders requiring no new legislation. Thus, the rules can be modified from time to time when sound technical reasons exist without going through the long drawn legislative process.

Depending on the extent of impact on the environment and industries, projects are classified in four different categories under the ECR 1997. The four categories are: Green, Orange A, Orange B and Red. The procedures for obtaining ‘Environmental Clearance (EC)’ for different categories of projects are also provided in the ECR. Green category industries are to be granted EC within 15 days. The Green Category Schedule does not list specific projects. For other categories, schedules containing lists of industries and projects are provided in the ECR. For Orange A & B and Red category of industries and projects, an application for EC must include a ‘Feasibility Report (FR)’ and an ‘Initial Environmental Examination (IEE)’ report. A Process Flow Diagram and a Layout Plan are also needed for industries. IEE report must include a ‘Terms of Reference’ for the Environmental Impact Assessment (EIA) for Red Category industries and projects. An EIA report is mandatory for final approval and issuing of an ‘Environmental Clearance’ for Red Category industries and projects. The ECR, 1997 lists the contents required for both IEE and EIA reports. The ECR environmental categories for Projects and Industries are listed in Table 5.

The proposed IADP is expected to improve both crop and fish varieties through research which might require introduction of parent or breeding materials from abroad. There are specific and strict quarantine regulations in Bangladesh for controlling indiscriminate introductions of such seeds/ plants/ fries etc. Introduction of eggs for poultry hatcheries and day-old chicks of poultry also have to go the quarantine procedure.. The potential for introduction of pests and diseases along with the introduced species should be minimized by following National and International rules and regulations.

Table 5 - ECR Environmental Categories for Projects and Industries in Bangladesh

Category	Projects/ Industries	Clearance Requirements	WB Category	Comments
Green	<ul style="list-style-type: none"> • No Projects Listed in the ECR (Only Industries) 	None	C	<ul style="list-style-type: none"> • Automatic approval for industries • IADP subprojects are expected to be in this category and these should not require any clearance

Orange A	<ul style="list-style-type: none"> • Small-scale Cattle or Poultry Farms 	IEE, Feasibility Report	B	<ul style="list-style-type: none"> • Some IADP subprojects are expected in this category
Orange B	<ul style="list-style-type: none"> • Medium to Large Scale Cattle or Poultry Farms • Feeder Road or Local Street Construction • Bridge Construction (>100m length) • Public Toilets 	IEE, Feasibility Report	B	<ul style="list-style-type: none"> • A few IADP subprojects are expected to be in this category
Red	<ul style="list-style-type: none"> • Power Plants • Earth Filling • Industrial, Domestic, Commercial Waste • Sewerage Treatment Plant • Hospitals • Water Treatment Plant • Water/Electricity System Extension • Flood Control Dam, Dike Construction or Extension 	IEE, Feasibility Report, EIA	A	This is a category for large scale operations and IADP subprojects are not expected to be in this category

5.3 International Obligations

Bangladesh is party to a number of international environmental conventions, treaties and protocols. These have to be taken into account in the implementation of IADP subprojects where applicable. These agreements are summarized below:

- International Plant Protection Convention, Rome, 1951 (Ratified 1978).
- International Convention for the Prevention of Pollution of the Sea by Oil, London, 1954 (Ratified 1981).
- Convention on Wetlands of International Importance, especially as Waterfowl Habitat, Ramsar, 1971 (Ramsar Convention) (Ratified 1992).
- Convention Concerning the Protection of the World Cultural and Natural Heritage, Paris, 1972 (World Heritage Convention) (Ratified 1983).
- Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, 1973 (CITES Convention) (Ratified 1982).
- Agreement on the Network of Aquaculture Centers in Asia and Pacific (NACA), 1988.
- Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 1987 (Ratified 1990), (London Amendment, 1990) (Ratified 1994).
- Convention on Biological Diversity, Rio de Janeiro, 1992 (Ratified 1994).
- International Convention to Combat Desertification, 1994.
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, Basel, 1989 (Ratified 1993).
- United Nations Framework Convention on Climate Change, New York, 1992 (Ratified, 1994).

Ramsar Convention has probably the most relevance to IADP, as apart from protection of internationally important wetlands (Ramsar Sites¹²), signatories of the convention are bound to adhere to the "wise use of wetlands". Draining and converting wetlands, using these as land-fills for solid waste, polluting them with agro-chemicals or sewage, blocking of streams and rivers, are all examples of unwise use of wetlands that could occur if stringent environmental screenings are not carried out.

¹² Bangladesh has two designated Ramsar Sites, namely part of the Sunderbans mangrove forest and Tangoar Haor. IADP area does not contain any Ramsar sites, however some project areas in the Barisal division are adjacent to Sunderbans.

5.4 World Bank Guidelines

The World Bank has mandatory EA guidelines in the form of Operational Policies (OP). The World Bank has several policies governing environmental assessment (EA) of projects. The OP 4.01, issued in January 1999, is the central document that defines the Bank's environmental assessment requirements. This directive outlines Bank policy and procedures for the environmental assessment of Bank lending operations. Environmental consequences should be recognized early in the project cycle and taken into account in project selection, siting, planning, and design by preventing, minimizing, mitigating or compensating for adverse environmental impacts and enhancing positive impacts. EA includes the process of mitigating and managing environmental impacts throughout project implementation. The Environmental Assessment Sourcebook (1993) and its updates (1996, 1997) provide some technical guidance on these issues. Detailed technical guidance is located in the IFC guidelines¹³ for Annual Crop Production, Aquaculture, Poultry and Mammalian Livestock Production on environmental management, occupational health and community safety. The General EHS Guidelines also provide overarching guidance on construction and general environmental management, occupational health and community safety.

In addition to OP/BP/GP 4.01, the policies **OP 4.09** (*Pest Management*), **OP 4.04** (*Natural Habitats*) and **OP 7.50** (*International Waterways*) are also triggered in this project. There are other directives that cover a number of specific environmental issues which may be applicable in this project depending on sub-project characteristics and location including OP 4.11 (*Physical Cultural Resources*), **OP 4.36** (*Forestry Management*), and **OP 4.37** (*Dam Safety*) although they are not triggered. As the project area covers large regions of the country and many types of activities, some policies may become applicable depending on the situation even if it was not originally triggered where relevant. These guidelines are discussed further in the Environmental Management section of this Framework.

5.4.1 Major Mitigation Measures triggered in IADP.

Since there is possibility of increased utilization of pesticides in the project area due to introduction of high yielding varieties of crops and increased involvement of agricultural machineries including STWs and DTWs, the likelihood of abuses of pesticide application and increase of machinery related problems can be anticipated. Therefore, to safeguard occupational health and safety of Project proponents, the Project will follow the EHS guidelines. These guidelines cover topics ranging from protection during use of machinery and pesticide application.

For promoting safer pesticide and fertilizer management it is proposed to: (i) Create awareness among the farmers about the dangers related to pesticides and the necessity to learn about their potential harm. (ii) Impart training on appropriate methods of storage, handling and application procedures, (iii) To teach preventive measures as well as actions that might be

¹³ IFC guidelines on EHS (2007)

necessary in case of accident (iv) Impart training on application of balanced fertilizers for various crops and fish, (v) Provide easy-to-follow handbooks for following the above principles.

Separate programs for any indigenous peoples (all activities related to the Project will be universally applicable to the majority ethnic groups vis-a-vis the indigenous peoples.

Since distances between STWs and those of DWTs had been determined earlier in most areas of the country and the farmers are more or less aware of these principles, the proponents may be able to discourage farmers from over-pumping of ground water. Over-pumping from surface water will not occur because such activities are done in a limited scale from the harvested rain water for a very short period during the last stage of the Aman rice crop.

Also with respect to the rainwater harvesting activity that will put clay cover on the bottom of water bodies to improve rainwater retention, subproject proponents must reveal whether the water body is natural and what type of aquatic life it contains. The EMF will guard against the clay covering of any important aquatic habitat. This activity is included in the Environmental Screening Form (Annex 2).

Pest Management Safeguard Policy (OP 4.09)

The purposes of OP 4.09 are:

- (i) to ensure good practices that are applied in World Bank financed projects,
- (ii) to avoid excessive use of pesticides, and
- (iii) to promote environmentally sound and sustainable pest management.

Its objectives relevant to this project include:

- (i) To minimize the environmental and health hazards related to pesticide usage,
- and
- (ii) To ensure that pest management activities follow an Integrated Pest Management (IPM) approach.

The overall pest management approach is based on the capacity of the country's regulatory framework and institutions to promote and support safe, effective and environmentally sound pest management. OP 4.09 is triggered as :

- (i) the project is expected to introduce new pest management practices or expand or alter existing pest management practices, and/or
- (ii) the project may lead to substantially increased pesticide use and subsequent environmental and health risks because of the introduction of new crop varieties. In addition, use of pesticides and other agro-chemicals may increase as a result of the enhanced agriculture extension services activities by the DAE.

Under the provision of OP 4.04, projects involving significant conversion or downgrading of natural habitat cannot be supported by the WB, unless the projects include adequate mitigation measures to protect natural habitats to a reasonable extent. The policy OP 4.09 supports safe, effective, and environmentally sound pest management. Under OP 4.36, guidance for forestry projects are provided, detailing policy on commercial logging operations or acquisition of equipment for use in primary moist tropical forests and in forests of high ecological value. Bank finances can only be utilized for preservation as well as light and non-extractive uses of forest resources. Objectives of these activities are to provide for a sustainable stream of direct or indirect benefits to alleviate poverty and to enhance community income and environmental protection. This project (IADP) does not plan to support any sub-projects in forested areas that would trigger the policy OP 4.36.

OP 4.11 (Physical Cultural Resources seeks to protect any cultural objects or structures of importance.

Cultural property

Cultural property includes sites having archeological (prehistoric), paleontological, historical, religious, and unique natural values. Cultural property, therefore, encompasses both remains left by previous human inhabitants (for example, shrines, and battlegrounds) and unique natural environmental features such as canyons and waterfalls. The rapid loss of cultural property in many countries is irreversible and often unnecessary.

The World Bank's general policy regarding cultural properties is to assist in their preservation, and to seek to avoid their elimination. Specifically:

(a) The Bank resources cannot be used in sub- projects that will significantly damage non-replicable cultural property, and will assist only those projects that are sited or designed so as to prevent such damage.

(b) The project resources will be used to assist in the protection and enhancement of cultural properties encountered in Bank-financed projects, rather than leaving that protection to chance.

In some cases, the project is best relocated in order that sites and structures can be preserved, studied, and restored intact in situ. In other cases, structures can be relocated, preserved, studied, and restored on alternate sites. Often, scientific study, selective salvage, and museum preservation before destruction is all that is necessary. Most such projects should include the training and strengthening of institutions entrusted with safeguarding a nation's cultural patrimony. Such activities should be directly included in the scope of the project, rather than being postponed for some possible future action, and the costs are to be internalized in computing overall project costs.

(c) Deviations from this policy may be justified only where expected project benefits are great, and the loss of or damage to cultural property is judged by competent authorities to be unavoidable, minor, or otherwise acceptable. Specific details of the justification should be discussed in project documents.

(d) This policy pertains to any project in which the Bank is involved, irrespective of whether the Bank is itself financing the part of the project that may affect cultural property.

The Procedure for cultural property Management:

The management of cultural property of a country is the responsibility of the government. Before proceeding with a project, however, which prima facie entails the risk of damaging cultural property (e.g., any project that includes large scale excavations, movement of earth, environmental changes or demolition), the project staff must:

(a) Determine what is known about the cultural property aspects of the proposed project site. The government's attention should be drawn specifically to that aspect and appropriate agencies, NGOs or university departments should be consulted:

(b) If there is any question of cultural property in the area, a brief reconnaissance survey should be undertaken in the field by a specialist.

However, according to information available no cultural property issues are expected in the project areas. Any chance find will be dealt with in accordance with procedures outlined above.

For the most part this Project is not expected to be associated with any physical cultural resources because the sub-projects involving excavation (potentially the construction activities for changing earthen channels of water delivery from source to the crop fields through leveled and cultivated land and there is no likelihood of any Chance-find).

OP 7.50 *International Waterways* is triggered by the project due to the fact a) that subprojects may involve waterways that may drain to the Bay of Bengal which the World Bank defines as an international waterway and b) because subprojects may use groundwater from aquifers that may be shared with neighboring countries. The possible impacts on water quality and quantity going to

neighboring riparians would be minor and insignificant and therefore a notification exemption has been requested.

A screening process for all World Bank projects classifies them into one of the three environmental assessment categories. Projects in Category "A" potentially cause significant and irremediable environmental impacts. Category "B" projects cause lesser impacts, which are often essentially remediable or can be mitigated. Category "C" projects can be expected to have little or no environmental impact. Category A projects require a full, detailed Environmental Impact Assessment, which needs to be approved before the Bank can give its support. Category B projects require the implementation of an Environmental Impact Evaluation (EIE), which requires far less detail than an EIA. Category C projects do not require an EIE or EIA.

The IADP has been classified as Category "B" because, as a whole, it may result in only small-scale, and remediable impacts. In practice, most subprojects are likely to belong to Category C. In rare cases, a few subprojects may fall under Category B, and subprojects that fall under Category A will not be eligible for funding under IADP. The equivalence of Bank guideline categories and those of IADP are shown in Table 5.

The present EMF deals with project specific application of Bank policies outlined above. The EMF will be disclosed in the public domain in the country and also in Bank's Info Shop as per World Bank's Disclosure Policy -- in-country and at the Info Shop – prior to appraisal.

5.5 Review of Current Practices in Similar Activities

As part of the preparation of this EMF, a few visits were undertaken to the fields and branch offices of the implementing agencies located in the Project areas as well as attended workshops connected with IADP. The purpose was to assess the present conditions and identify the environmental issues relevant to the subprojects. Table 6 below shows the project areas where field visits were undertaken and a summary of the findings. The experience gathered from these programs have been integrated in the preparation of the present EMF. More details on these consultations and workshops are shown in Annexes 4&5.

Table 6: Project Areas Studied During Field Visits

Sl.	Date	District	Upazila	Union Parishad/ Village/Office	Comments/ Stakeholders
1	March 31, 2011	Barisal	Sadar	Department of Agricultural Extension (DAE) District Office.	Tidal Flood Plain Area/ KII with: Deputy Director . Detail findings in Annex 4.
2	April 1, 2011	Barisal	Sadar	Regional Agricultural Research Station (RARS), BARI, Barisal	Tidal Flood Plain area/ KII with: Senior Scientific Officer. Detail findings in Annex 4.
3.	April 2, 2011	Barisal	Sadar	Workshop on IADP Preparation	Stakeholders included Research Scientists of BARI, BRRI and BINA, Local officers of the four Districts

Sl.	Date	District	Upazila	Union Parishad/ Village/Office	Comments/ Stakeholders
					included in the Proposed IADP belonging to DAE, DLS, DOF, BADC, SCA etc. Detail findings and recommendation are shown in the Annex 4.

Table 6. (Continued) Project Areas Studied During Field Visits

Sl.	Date	District	Upazila	Union Parishad/ Village/Office	Comments/ Stakeholders
4.	April 14, 2011	Rangpur	Mithapukur	Durgapur / Binodpur	Flood plain Area/PRA-cum-FGD with a group of indigenous people. Details in Annex 4.
5.	April 15, 2011	Rangpur	Rangpur Sadar	DAE, District office, DAE Sadar Upazilla office DAE Pirgonj Upazila Office.	KII with DAE officers of various levels eg. DD., District Trg. Officer, A.E.O., SAAO. Details in Annex 4.
6.	April 16, 2011	Rangpur	Rangpur Sadar (Working in 3 Upazilas)	BARI on-Firm Research Center	Senior Scientific Officer. Details in Annex 4.
7.	April 16, 2011	Rangpur	Rangpur Sadar Pirgaccha Upazila	DLO Upazila Livestock Office	Addl. District Livestock officer, Upazila Livestock Officer. Details in Annex 4.

6. SUBPROJECT PREPARATION, APPROVAL AND MONITORING

In this section the process for addressing the environmental concerns through the institutional arrangements and procedures used by the Project for managing the identification, preparation, approval and implementation of subprojects are discussed. The generic steps discussed below (Sections 6.1 through 6.5) are similar for subprojects. It is crucial that the procedures are clearly linked to the project-defined subproject cycle so that they can be readily included in, or referenced from, the Project Implementation Guidelines.

6.1 Subproject Document Preparation

Taking into consideration the learning from different pilots on CDD type projects in Bangladesh, the present IADP has been designed to be closely aligned with the country's elected local government at Union Parishad (UP) level. UP is the lowest administrative unit. It depends on the utilization of existing technical capacities available at the Upazila (UZ) level in the various line departments of the Government. The nine Wards-based (each is composed of three villages) and having at least three women elected members in it, the Union Parishads act as the bridges to the communities. Thus, the overall approach is that the subproject proponents with Regional Project Implementation Unit (RPIU) environmental specialist support, will take steps to address environmental concerns during subproject preparation and these are described here in some detail.

In general, it is expected that the subproject team will work with the Regional Project Implementation Units environmental staff as necessary in preparing their subproject documents to avoid or minimize adverse environmental impacts (see Forms in **Annex-2**). They will use an ER (Environmental Review) checklist (**Annex-2**), together with information on typical project impacts and mitigation measures (**Annex-3**) to carry out this work. The aim of the checklist is to assist communities and extension teams in identifying potential impacts based on field investigations. The information in (**Annex-3**) provides advice on how to avoid or minimize these. The standard approach for community participation methods in the project will be used to address the environmental concerns also.

The ER checklist identifies the potential impacts of the subprojects; describes the measures that can be built into a subproject to address these impacts. The completed ER checklist must be preserved along with other project documentation or any additional reports that may be required (e.g. LEA (form-3 in Annex 2) for category-B subprojects). The checklist contains a certification by the subproject team that all measures required to avoid or minimize adverse environmental impacts are included in the subproject design. The Regional Project Implementation Unit (RPIU) environmental staff will need to check this for reasonability and enforce the negative list. The Project Management Unit (PMU) environmental staff can also assist and review as necessary. In some situations, for the most effective use of resources, it may be appropriate to prepare any needed additional reports (e.g. LEA) *after* a subproject proposal has been approved in principle. In these situations, *a subproject cannot be finally approved and funded until such reports are received and approved.*

It is advisable to avoid the need for special reports (e.g. LEA) since these require extra resources to prepare. However, these studies and reports may be worth the extra effort for an otherwise excellent subproject. In these cases, the subproject committee should discuss the issues involved with the UP authority to confirm the need, and to secure resources to carry out the work.

Some subproject situations mitigation measures will need to be specified more precisely than others, either in the application or as an Annex to it. It is expected that, with project training, the extension teams, with assistance from the PMU and the RPIU environmental specialists, will be

able to assist subproject teams in addressing these situations adequately when preparing their applications and later during project implementation. Such situations may include:

- 1) **A subproject involves changing access to resources in a park or protected area:** The application must describe how affected people had an influential role in planning the subproject and benefiting from it. This particular case would necessitate the involvement of the PMU or RPIU social specialist as well.
- 2) **A subproject may affect a protected area or a natural habitat:** The application must describe how this subproject will avoid causing adverse effects on the area/habitat.
- 3) **A subproject will involve the use of pesticides:** It must be specified that the pesticides used are included in the permitted category.

6.2 Appraisal and Approval

This section focuses on the procedures that will be used when reviewing and then approving subproject applications, for example by the UP level Block Supervisors and then by the Upazila level Agriculture officers. These procedures need to be consistent with applicable national approval procedures. They also need to be integrated into the planned project process of approving subprojects. The roles and responsibilities of various authorities at different levels, as appropriate: RPIU environmental staff, PMU safeguard staff, UP, UZ and subproject committee are illustrated in **Table 7**.

The procedures first specify how the **review authority** determines whether a subproject proposal, along with the completed ER checklist as well as any appropriate and required reports already prepared, can be cleared for approval. The first step is an **appraisal** to determine whether all the relevant information have been provided, and if these are adequate.

Table 7: Environmental Assessment and Management Framework

Milestones	Objectives	Process	Responsibility	Decision/Product
1. Subproject Screening				
Environmental Scoping	Scope subprojects from environmental perspective	<ul style="list-style-type: none"> Review of the subproject proposal with support from RPIU or Extension Resource Team to assign an Environmental Category to it. 	<ul style="list-style-type: none"> Proponent (Subproject team) 	<ul style="list-style-type: none"> Assign Environmental Category to subproject
Environmental Screening	Screen subprojects from environmental perspective	<ul style="list-style-type: none"> Review of the subproject proposal using trained resource persons with support from the RPIU or extension resource team to fill the ER Form for Category 'C'. Review of the subproject proposal using trained resource persons with support from extension resource team and/or RPIU Environmental Specialist to fill the ER Form and produce a LEA report for Category 'B'. 	<ul style="list-style-type: none"> Proponent (Subproject team) Proponent (Subproject team) Proponent (Subproject team) 	<ul style="list-style-type: none"> Completed ER form for subproject proposal Completed ER form for subproject proposal LEA Report for subproject proposal
2. Subproject Appraisal				
Detailed Environmental Appraisal	Appraise environmental components of subproject	<ul style="list-style-type: none"> Review ER with the help of extension resource team and/or RPIU Environmental Specialist in case of category C subprojects Review LEA with the help of trained 	<ul style="list-style-type: none"> RPIU RPIU 	<ul style="list-style-type: none"> Confirmation of Environmental category. Sub-project Appraisal

		extension team and/or Project Environmental Specialist support personnel in case of category B subprojects Conduct site visits to Crosscheck: <ul style="list-style-type: none"> - type of Environmental issues; - magnitude of Environmental issue; - adequacy of Environmental management measures provided; - cost of implementing Environmental management measures; Suggest: <ul style="list-style-type: none"> - modifications to be incorporated in environmental components of the subproject; - appropriate changes in other components of subproject; Finalize environmental components as part of project appraisal report.		Report with decision to: <ul style="list-style-type: none"> - accept project as submitted - accept project with modifications - reject project
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From an environmental point of view, the RPMU Safeguard staff determines if it is satisfied that the subproject proponent and extension team have thoroughly considered all potential adverse effects of the subproject, and included measures in the subproject plan to adequately address them.

If the appraisal indicates that the proposed subproject may have environmental concerns that are not adequately addressed in the proposal, or if the application does not meet certain criteria, the review authority (i.e. RPIU or PMU environmental staff) may require a **field appraisal** before the application can be considered further. It should be emphasized that the criteria in Annex-2 should be updated based on field experience in implementing subprojects. The criteria for a field appraisal report is shown in Table 8.

Based on the appraisal and, if needed, the field appraisal, the RPIU or PMU environmental staff may approve a subproject with recommended conditions and implementation supervision (e.g. erosion control, waste management, safety).

Table 8: Criteria for Requiring a Field Appraisal

Criteria	Field Appraisal
1. A subproject may affect a protected area or a natural habitat. This includes being located in or near a protected area.	A field appraisal determines if the subproject will adequately avoid adverse effects on the protected area or natural habitat.
2. A subproject may have an impact on ecologically sensitive ecosystems (e.g. wetland or marshes). This includes being located in or near an ecologically sensitive ecosystem.	A field appraisal determines the scale and level of impact. The application may need to be revised to describe how the subproject will avoid or minimize adverse impacts to ecologically sensitive areas. This may require a distinct LEA.
3. A subproject will involve or introduce the use of pesticides	A field appraisal determines the scale and level of the concerns and ensures that these are adequately taken care of according to good environmental practice.
4. A subproject may involve, or result in: <ul style="list-style-type: none"> • Diversion or use of surface waters; • Construction and/or rehabilitation of latrines, septic or sewage systems; • Production of waste (e.g. slaughterhouse waste, medical waste, etc); • Improvement of irrigation or drainage systems; • Small dams, weirs, wells, or water points. 	A field appraisal determines the scale and level of potential impact. The application may need to be revised to avoid or minimize potential adverse effects, and may include an LEA.

6.3 Disclosure of Subproject Information

The environmental issues in a subproject should be disclosed with the subproject information if possible and feasible in order to make information available to the public in the spirit of the Bank’s Policy on Disclosure of Information. Communities should be made aware of any project works or activities that may affect them. A Social specialist has been employed to carry out base line studies on IADP impacts on communities within the project area. The Consultant has conducted such studies alongside informing them about the Proposed Project Activities in about 10 Upazilas covering both the Northern and Southern Districts. The Social Management Framework (SMF) report is still under preparation.¹⁴

6.4 Monitoring Of The Project Activities

The Project Director and Technical Coordinators from the eight implementing agencies (BADC, BARI, BFRI, BRRI, DAE, DOF, DLS and SCA) along with experts in various relevant fields, in addition to project management, we also be responsible for overseeing the implementation activities of the Project to facilitate performance monitoring of all Project activities; organize evaluation and impact assessment of the Project, arrange for expert advice and input from consultants; review and compile relevant reports; submit to WB and Project Supervision Committee (PSC) every six months and Annual Progress Reports (APR) within one month of the due date, as well as Audit Report (AR) within six months of the close of the fiscal year.

¹⁴ No information available yet.

6.4.1 Annual Reviews

The scope of work and procedures for carrying out periodic (six monthly/annual/bi-annual) reviews of the implementation of the EMF in the subprojects are specified here.

The purpose of the reviews is two-fold:

- To assess compliance with EMF procedures, learn lessons, and improve future EMF performance; and
- To assess the occurrence of, and potential for, cumulative impacts due to project-funded and other development activities.

The RPIUs will form the Review Teams for each of their regions including experts from the PIU, RPIU, one Independent Specialist from outside Project and the District Agriculture Officer as secretary of the Team. The Review Team, before leaving a Sub-Project office, will share their observations regarding EMF implementation with the various staff members involved in the Sub-Project as well as leave the pertinent advice for them with regard to strict adherence to the EMF provisions and improvement in future.

6.4.2 Annual Reports

Local level project officials (i.e., those identified by the PIUs) will normally be required to report annually on their subproject activities during the preceding year. These annual reports should capture the experience with implementation of the EMF procedures as well as the positive achievements resulting from the Project during the specific Project period. The purpose of these reports is to provide:

- A record of the subproject transactions;
- A record of experience and issues (including environmental issues) running from year-to-year throughout the subproject that can be used for identifying difficulties and improving performance; and
- Practical information for undertaking an annual review.

7. ENVIRONMENTAL MANAGEMENT

This section of the EMF describes how subprojects will respond to the needs for environmental management, including pest management and the conservation of protected areas, natural habitats and forests. The issues addressed in this section, and thus what subsections outlined below are included in the EMF, depends on issues involved. As indicated earlier environmental safeguards policies OP 4.01 Environmental Assessment, OP 4.04 Natural Habitats and OP 4.09 Pest Management are applicable to IADP for Bangladesh but other policies may apply if certain situations arise.

7.1 Environmental Management in Subprojects¹⁴

The subproject planning should strive for plans and designs that avoid creating adverse environmental impacts that have to be explicitly managed. “Environment” is broadly defined to include the natural environment (air, water and land), and human health and safety. Subproject proponents, communities and extension teams (i.e., Sub-Assistant Agriculture Officer) can use the EMF checklist (ER Form) and resource and participatory process to support good environmental planning. If any excavation or construction work is involved in a Sub-Project, then the contractor should follow a set of principles to keep environmental degradation to the most minimum and protect any physical archeological/cultural resources unexpectedly found. A set of guidelines for such a contractor is presented in **Annex-7**.

¹⁴Addresses the requirements of OP 4.01 Environmental Assessment.

For C category subprojects, only ER is required. For C category subprojects, project design ensures that environmental concerns are taken care of and this is verified in the approval process and no action in addition to project implementation should be necessary. Only in the category B subprojects where explicit Limited Environment Assessment (LEA) is required, an environmental management plan (EMP) is to be included. The outline of the contents of an LEA is included in **Annex-3** where Environmental Impacts, Mitigation Measures and Monitoring Measures in subprojects are presented.

Environmental Impacts and Mitigation Measures for agricultural research, agricultural extension and value chain development are presented in **Annex-3, Tables 1, 2 and 3**, respectively. On the other hand, Environmental Monitoring for Agricultural Research and Agricultural Extension are elaborately presented in **Annex-3, Tables 4 and 5** respectively.

Degree of Impact for each of the indicators has to be recorded against a scoring system like small, medium and large. Frequency of such monitoring will depend upon the nature of the indicators e.g. on seasonal, yearly and bi-annual basis. The monitoring exercises might need help of external experts if the RPIU staff is not able to conduct them.

It should be emphasized that an LEA should fit the needs of a subproject and be easy to use. There is no standard format or length. For many small-scale subprojects, it may be no more than a few paragraphs or perhaps just a Table. On subprojects with more significant environmental concerns (e.g. waste management), a more substantive LEA may be warranted to highlight its importance.

The basic elements of an LEA are:

- A description of the possible adverse effects that the LEA is intended to deal with;
- A description of planned mitigation measures, and how and when they will be implemented;
- A program for monitoring the environmental effects of the subproject -- both positive and negative;
- A description of who will be responsible for implementing the LEA measures; and
- A cost estimate and source of funds.

Community participation is essential in preparing an LEA since local knowledge is important in identifying, designing and planning the implementation of practical mitigation measures. It is especially important where the success of the LEA measures depends on community support and action, both in implementing mitigation measures and in monitoring their effectiveness.

7.2 Pest Management¹⁵

The subprojects are expected to have only minor use for nationally approved pesticides and there may not be significant issues of pest management and pesticide use to be addressed in subprojects. Standard local practice on pesticide use can be followed and personnel in the Agricultural Extension office at UZ level can be consulted on this if required. Since OP 4.09 applies in this project, this EMF evaluates pest management issues. As explained earlier no pesticide in the WHO Class-1A category will be used in this project. In fact, pesticide brands based on the dirty dozen have been banned in Bangladesh and these are given **Annex-6**. To ensure that none of the banned pesticides will be used in the sub-projects intentionally, there will be need for training of farmers on which pesticides are banned as well as proper storage, labeling and

¹⁵ OP 4.09 Pest Management; provides much more detailed guidance, and access to pest management and IPM resources

application processes. In addition, the sub-projects proponents will be instructed to observe this issue strictly.

The pest management issues can be involved in a variety of subprojects such as:

- New land-use development or changed cultivation practices in an area;
- Expansion of agricultural activities into new areas;
- Diversification into new agricultural crops;
- Intensification of existing low-technology agriculture systems;
- Development of veterinary facilities, cattle dips, etc.; and
- Control of vector-borne diseases (e.g. malaria).

It should be emphasized that *pests* are defined in the broad sense. In addition to agricultural insect pests and plant diseases, pests also include weeds, birds, rodents, and human or livestock disease vectors. Similarly, the FAO defines *pesticides* as any substance or mixture of substances:

- intended for preventing, destroying or controlling any pest, including a) vectors of human and animal disease, b) unwanted species of plants or animals causing harm during, or otherwise interfering with: production, processing, storage, transport or marketing of food, agricultural commodities, wood and wood products or animal feedstuffs;
- that may be administered to animals for the control of insects, arachnids or other pests in or on their body;
- intended for use as a plant-growth regulator, defoliant, desiccant, or agent for thinning fruit or preventing the premature fall of fruit; and
- substances applied to crops either before or after harvest to protect the commodity from deterioration during storage and transport.

The project will promote IPM as much as possible throughout project activities especially through training activities which will be discussed and agreed during project implementation. Some project activities will already support IPM through research or technology dissemination.

7.3 Protected Areas, Natural Habitats and Forests¹⁶

Natural habitats need to be conserved and protected when planning and implementing subprojects. Protected Areas, Natural Habitats and Forests are land and water areas whose ecological functions have not been essentially modified by human activities. This EMF applies the Bank's policy on natural habitat OP 4.04 by including measures to determine or examine whether a subproject would significantly convert or degrade a natural habitat.

Significant conversion means eliminating or severely reducing the integrity of a natural habitat through long-term change in land or water use. It may include, for example, land clearing; replacement of natural vegetation; permanent flooding; and drainage, dredging, filling, or channelization of wetlands. It can occur as the result of severe pollution or it can result directly from subproject activities or indirectly (e.g. through induced settlement along a road).

Degradation means substantially reducing the ability of a natural habitat to maintain viable populations of its native species.

Subprojects involving the significant conversion or degradation of *critical* natural habitats (including forests) cannot be funded. The following are natural habitats, that are:

- protected by government (e.g. Parks, World Heritage Sites) or by tradition ; *or* have known high suitability for biodiversity conservation; *or*
- critical for rare, vulnerable, migratory, or endangered species.

¹⁶ OP 4.04 Natural Habitats and OP 4.36 Forests.

Bangladesh has two designated Ramsar Sites, namely part of the Sunderbans mangrove forest and Tagoar Haor. IADP area does not contain any Ramsar sites. However some project areas in the Barisal Division are adjacent to Sundarbans. As mentioned earlier (Section 5. 3, International Obligations) Bangladesh is a signatory to the Ramsar Convention, and as a signatory, the country is bound to add here to the "wise use of wetlands". Ramsar Convention is not relevant to IADP since none of its sites are included in the Project Area. The project will also work to ensure that subprojects do not negatively or significantly affect any wetlands that may be in close proximity.

- There are no forests in the Project Area and so the only concern is that any Subprojects that could affect a forest in close proximity, must take measures to avoid significant harm (including conversion or degradation) to the forest.

7.4 SAFETY OF DAMS¹⁷

No dams are envisaged as a sub-project activity at present. However, in future small earthen dams (usually less than 4 meters in height) could be repaired according to traditional local practice. These small dams are usually fish pond embankments. Since occasional tidal surges damage these kind of dams in the Southern Districts such a subproject may be considered useful in a few Upazilas and implemented jointly with other ongoing project in the area.

7.5 Project Coordination and Implementation

The roles and responsibilities for all participants (e.g. communities, local authorities (UP), URT) in preparing, reviewing, approving and implementing subprojects are given in some detail in this section. This includes institutional arrangements for managing the subproject cycle.

7.5.1 Organizational Structure

In order to ensure that the policy obligations and associated procedures in the Environmental Framework (EMF) are operationalized, the IADP organizational support structure for subproject planning, review and implementation is to be appropriately organized. The IADP management will arrange for helping the extension teams in preparing and overseeing the Environmental component of the subprojects by employing Environmental staff at the PMU and RPMUs. The extension teams in the Upazila level will consist of personnel from the line departments such as DAE, DOF, DOL. The team members should be adequately briefed and trained with resource support from the IADP as necessary. The role of the PMU and RPMU Environmental staff (as mentioned above) will be crucial in almost all issues related to the environmental aspects of any subproject. The extension teams will also assist in working with subprojects to implement environmentally sustainable practices and will receive training to that end.

7.5.2 Responsibility Allocation Framework

A majority of the projects to be financed are expected to be environmentally benign projects or those where best practices available can be easily applied (C categories). IADP will have environmental staff in the PMU and the RPIUs that will be responsible for implementing this EMF and for making sure that the Project addresses pertinent environmental concerns.

These staff will be responsible for the following:

PMU Safeguard Staff Responsibilities

1. Provide information, resources (additional information, good environmental practice, etc.) and assistance to RPIU as needed.

¹⁷ OP 4.37 Safety of Dams.

2. Implementation of EMF in the Project as a whole. Adjustment of EMF as necessary to accommodate Project, environmental or other relevant changes or conditions which may not have been originally foreseen in consultation with the Bank.
3. Providing inputs to reports on environmental performance of project as a whole as necessary including the annual reviews, etc.

RPMU Safeguard Staff Responsibilities

1. Provide assistance to subproject proponents in determining environmental issues their proposal faces, what documentation or permitting may be needed, filling out documentation for the Project, providing good environmental practice, etc.
2. Review environmental documentation to ensure project environmental management practices (generally as reflected in the EMF) are implemented.
3. Ensure that excluded activities are not financed.
4. Recommend rejection of any subproject proposal that would cause significant environmental harm unless mitigation can be agreed upon.

IADP management will ensure sensitivity to environmental aspects of various subprojects among the UZ resource teams, so that they can provide competent support at the UP level. This will be done by providing training (through appropriate agencies) to UP and UZ level officials (i.e., Sub-Assistant Agricultural Officers and Upazilla Agriculture Officers) of the DAE and other departments (i.e. Fisheries and Livestock). Attempts should be made to involve local inhabitants wherever possible to ensure local agreement with appropriateness to ensure effective subproject preparation, implementation, operation and maintenance. **Additionally, IADP should maintain a list of consultants from among individuals or organizations who have the full range of expertise to address environmental concerns related to anticipated subprojects. They can be used to address project specific environmental issues as and when necessary for the following:**

- Advising IADP on environmental issues especially the ones that require highly specialized experience such as pesticide management chemical fertilizer management, etc.
- Selective review of ER, LEA and other documents from the proponents for quality assessment; and
- Selective monitoring and evaluation of subprojects.

The service of the consultants at the PMU level may also be utilized to undertake the annual sample environmental audit of all IADP financed subprojects.

7.6 Grievance Redress:

The Project will address these concerns in another document under preparation.

7.7 Construction of office or other facilities .

If any small construction (such as two - roomed office facility for the SAAOs in Wards of UPs) does become essential then these should be simple brick structures without involvement of any Asbestos or Lead paint, refurbishing and any other material causing Environmental problems.

7.8 Need for an Safeguard Specialist in the PMU

For proper implementation of the EMF during implementation of the IADP, there will be need for an Environmental Specialist, even if on part time basis. The TORs of the Specialist will be as follows :

The Environmental Specialist will carry out, among other activities, the following activities:

- 1) Ensure implementation of EMF across the many Project agencies/entities and respond to their questions and needs. This is critical because of the diverse sectors in the Project including

aquaculture, livestock, crops, vegetables, irrigation, etc. This specialist will need to use technical judgment in the application of World Bank Environmental, Health and Safety Guidelines and the EMF to address issues and activities which may not be identified in the current Project description as well as to know when a specific expertise (not his or her own) is necessary for consultation.

- 2) Ensure that excluded activities are not financed or undertaken by the Project.
- 3) Ensure that the various pest management training and activities are conducted with an Integrated Pest Management (IPM) approach. Involves following up on training, research, activities, etc. supplying guidance and feedback to project entities on this as needed.
- 4) Give oversight to selection criteria used by the water component in financing selected WUGs and follow-up on results.
- 5) Conduct Annual Reviews:
 - a. To assess compliance with EMF procedures, learn lessons, and improve future EMF performance; and
 - b. To assess the occurrence of, and potential for, cumulative impacts due to project-funded and other development activities.
 - c. To adapt the EMF as necessary, with Bank knowledge and approval.
- 6) Coordinate with other Project management officials to coordinate environmental activities within the Project implementation as a whole including ensuring the adoption of necessary mitigation measures.

The necessary qualifications as well as desirable qualifications of the Safeguard Specialist of the PMU are given in **Annex 8**.

8. CAPACITY BUILDING AND TRAINING

The environmental sustainability of the IADP that involve funding of multiple, small-scale subprojects is highly and unavoidably dependent on the capacity of communities and local and national authorities to carry out the associated design, planning, approval and implementation work. Thus, to ensure that capacity, it is vital that IADP allocates sufficient resources to training and capacity building especially in the early years. These efforts will not only benefit the IADP, but will also build local capacity to undertake other development initiatives funded locally or by other donors.

8.1 Institutional Capacity Assessment

An assessment of the existing institutional capacity to implement the EMF is presented in this section. It focuses on the adequacy of the institutions identified in Section- 2 to carry out their EMF responsibilities. It assesses, at a minimum, the adequacy of:

- the **institutional structure**, and its authorities at all relevant levels, to address environmental management issues;
- the **number and qualifications** of staff to carry out their EMF responsibilities;
- **resources** to support staff in their work; and
- **knowledge and experience** relevant to carrying out environmental analyses and designing mitigation measures for small-scale infrastructure.
- **past track record of the institution** such as providing clearances on time, enforcing necessary laws, regulations or provisions, etc.

Although the past tract records of research and extension organization involved in IADP on providing clearances on time, enforcing necessary laws, regulations, or provisions are modest

enough, their experience in providing environmental (environmentally protective) support to farmers before might not have been sufficient/ up to the requirement to implement the IADP EMF without proper training and awareness creation. Imparting training to the involved personnel will be necessary for successful implementation of the Project.

At the project proponent level, the institutional capacity to implement the EMF may be limited at the beginning. However, as a part of the institutional capacity building for the project as a whole, Upazila Resource Teams (URTs) -- comprising of professionals of relevant GOB agencies – will be formed and trained in different aspects of the project, including interpretation and implementation of environmental impact management guidelines. As and when required, the UPs can avail the services of the URTs. The trained Upazilla level officials can be utilized to conduct awareness-building type training for members of subproject team and members who would be involved in subproject selection and implementation process (i.e., subproject committee members and concerned citizens).

The Department of Agriculture Extension and other related department have reasonably the strongest presence at the UZ level with varying number of staff members depending on the size of the UZ and cropping intensity at the UZ. The DAE staff includes Agricultural extension workers (i.e., SAAOs), and UZ Agriculture Officer (UAO). DAE staff also have long experiences in planning, designing and implementation of projects similar to what is planned in IADP. Other relevant government departments represented at the UZ level includes Fisheries, Livestock, DPHE, Health, Disaster Management etc, the staff levels being much smaller in these offices. Thus DAE is expected to be the main support plank for the IADP subproject activities. Although general awareness on environmental issues exist among UZ level staff, focused training and capacity building would enhance the EMF implementation capacity substantially on their part. PMU and RPMU environmental staff will be given the resources to carry out the proper implementation of this EMF and observation/consideration of safeguard policies.

8.2 Capacity Building

IADP envisages capacity building at all levels i.e., Wards, UPs, UZs and IADP management as necessary to ensure that the EMF is effectively operationalized. The PMU Environmental staff will also integrate environmentally relevant components to already proposed training efforts throughout the project. The IADP personnel will be exposed to formal training in the management of environmental issues. The training program for various role players (including subproject personnel) will include

- (i) an orientation program on the EMF,
- (ii) Environmental Assessment Processes,
- (iii) Participatory Methodologies, and
- (iv) Project Management and other topics as necessary.

IADP will help improve the effectiveness of local proponents in the management of environmental and social impacts during planning, implementation and operation of proposed investments. Proposed criteria for capacity building for C and B category subprojects are shown in Table 9, which will be used as modules in capacity building at all levels.

Table 9: Capacity Building Criteria for Managing C and B Category Subprojects

Issue	Concern	Eligibility Criteria
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1. Environmentally sound subprojects, complying with agreed EMF policy	<ul style="list-style-type: none"> Realistic environmental standards for planning and implementation. 	<ul style="list-style-type: none"> Proponents effectively decide questions of what mitigation is needed to manage risks, who is eligible for what and determining how much is enough to achieve the standards, for environmental protection.
	<ul style="list-style-type: none"> Effective monitoring of actual mitigation results. 	<ul style="list-style-type: none"> Accuracy and credibility of baseline data and reasonable certainty of detecting and correcting any errors or problems during planning and implementation. To be able to meet standards, the proponents must have sensitive monitoring systems & specific indicators for the adequacy of the mitigation delivered and actual results.
	<ul style="list-style-type: none"> Clear incentives and accountability for all partners. 	<ul style="list-style-type: none"> Proponents have clear statements of task assignments, reasonable corrective consequences for mistakes or failures and unambiguous responsibility and sources of financing to correct problems, and functioning grievance redress systems.
	<ul style="list-style-type: none"> Common awareness and understanding of the above. 	<ul style="list-style-type: none"> Communication to ensure common awareness of standards, monitoring and accountability by those affected, contractors, NGOs, independent consultants, proponents, government agencies and donors.
2. Participatory planning and implementation and inclusion of the poor in project benefits.	<ul style="list-style-type: none"> Sub project prioritization is based on adequate consultation. 	<ul style="list-style-type: none"> Resolution of the proponents in support of the sub – project after public meeting.
	<ul style="list-style-type: none"> Effective accountability to citizens. 	<ul style="list-style-type: none"> Formal endorsement by the community through public hearings and documented periodic reporting of proponents performance to citizens;

Capacity building will enhance the subprojects’ EMF management capacity by allowing real application of the critical practices such as the following:

- Basic practices:** screening impacts, scoping assessments, planning mitigation options, public consultation to assess feasibility and acceptability options.
- Environment:** Project design to minimize environmental impacts and social disruption; restoration of drainage patterns, land use etc; including mitigation measures for impacts during implementation ; monitoring of effectiveness of measures.
- Monitoring and Grievance Redress:** Transparency and public consultation in planning, reporting and supervision and during implementation, documenting land transactions, complaint response record keeping and procedures.

8.3 Training Needs and Plans

The training programs will be coordinated and anchored within the IADP management at the national level. Local and National Institutions and individuals experienced in environmental aspects of subprojects will be called upon to develop and conduct courses on various modules.

The section describes the training needs and plan for the various participants involved in implementing the EMF based, in part, on the institutional assessment described above. The training on EMF may be integrated with social framework and other related training program for cost effectiveness. The objectives of the training under the EMF are to:

- support representatives and leaders of **community groups and associations** to prioritize their needs, and to identify, prepare, implement and manage the environmental aspects of their subprojects;
- ensure that **UP and UZ level officials** have the capacity to assist in preparing subproject proposals, and to appraise, approve and supervise the implementation of subprojects; and
- strengthen local **NGOs and other stakeholders** which may be involved in the public participation in preparing and implementation of subprojects.

Different groups involved in IADP implementation have different training needs in terms of raised awareness, sensitization to the issues, and detailed technical training:

- **Awareness-raising** for participants who need to appreciate the significance or relevance of environmental issues;
- **Sensitization to the issues** for participants who need to be familiar enough with the issues that they can make informed and specific requests for technical support; and
- **Detailed technical training** for participants who will need to analyze potentially adverse environmental impacts, to prescribe mitigation approaches and measures, and to prepare and supervise the implementation of management plans. This training will address such matters as community participation methods; environmental analysis; using the ER checklist, reporting; and subproject supervision and monitoring.

The different training needs that are generally associated with the projects are given in **Table 10**. Based on these needs, a training plan has to be worked out for the life time of the project. The needs for various participants (e.g. government officials, community leaders, farmers, extension teams) should be differentiated as necessary. While some would require general awareness building, more specific training would be needed for others. The table shows the initial training needs as well as the needs for further or “refresher” training. It should include mechanisms for periodically bringing trainees together to examine the need for and design of additional training.

The detailed agenda and specification of resource needs (venue, trainers, materials, etc.) for each type of training activity should be worked out in detail before the training activities are undertaken. Wherever there is a wide-spread need for a particular form of training, especially at the community level, the training-of-trainers (TOT) approach may be undertaken. In the TOT approach, identified groups who have a special role or access to communities are given a combination of technical and pedagogical training, and are provided with manuals and other training aids, so that they can organize their own courses at local levels. In the present case, UZ level technical personnel could be such trainers for UP level subproject personnel and concerned people including those from NGOs.

Table 10: Outline of Different Training Needs for Sub-Project Proponents¹⁸ .

Group	Participants	Venue	Resource persons	Duration	Frequency
District level officials of Line Ministries involved in the Project	Officials from Agriculture, Fisheries, Livestock and other concerned Departments	Central (IADP)	Experts/ Consultants	1- day workshop/training	Year 1 of the Project
				½-day refresher workshop/training	After Year 1 as needed
UZ Resource Team	UZ Officials from DAE, Fisheries, Livestock and other concerned Departments	Central (IADP or at District level)	Experts/ Consultants	1-day workshop/training	Year 1 of the Project
				1-day EMF review workshop/training	Annually after Year 1 and Annual Reviews
Community Leaders/Workers	Block supervisors, UP Chairmen, Members, Secretary and other concerned UP level departmental workers	Local (UZ level)	UZ resource Team Members	1-day workshop/training	As needed throughout the project
Farmers	Selected Farmers, aquaculture subproject proponents	To Be Determined	Experts/ Consultants	To Be Determined/training	As far in advance before subproject activities start

8.4 Resources for Capacity Building

The capacity building and training constitute a separate component of IADP and adequate resources from this component should be allocated to ensure effective implementation of the EMF. (The costs of implementing these plans are included in the subproject budgets. The resources are needed to implement the following items.

- Institutional development activities
- The training programme for communities, extension teams and local authorities to implement their EMF responsibilities
- Allowances for the preparation of subproject LEAs etc.
- Consultant Services

9. ANNEXES

¹⁸ Some of these training needs can be taken care of by integrating environmental components in already planned other trainings.

ANNEX 1: References

1. IFC guidelines on EHS (2007)
2. EMF for NATP (2006)
3. EMF for LGSP (SDF, 2006)
4. EMF Bosnia (2007)
5. ESMF for Bihar Rural Livelihoods Project, India (2007)
6. Project PCN
7. Bangladesh: State of the Environment, 2001
8. D. G. Kinniburgh and P. N. Smedley, Arsenic contamination of groundwater in Bangladesh, BGS Technical Report WC/00/19, Vol. 1-4 (2001); UNDP., Groundwater Survey: The Hydro-geological Conditions of Bangladesh, UNDP Technical Report DP/UN/BGD-74-009/1(1982)
9. M. Khaliqzaman and A. H. Khan, Arsenic Exposure of Bangladesh Population through Food Chain, Report prepared for SEARO WHO, Delhi (2003)
(URL: www.physics.harvard.edu/.../arsenic/arsenic_project_introduction.html)
10. Daily Prothom Alo (Bengali Newspaper), 4 April, 2009.
11. Coastal Zone Policy 2005.
12. IFC guidelines on EHS (2007)
13. Addresses the requirements of OP 4.01 Environmental Assessment.
14. OP 4.09 Pest Management; provides much more detailed guidance, and access to pest management and IPM resources.
15. OP 4.04 Natural Habitats and OP 4.36 Forests.
16. OP 4.37 Safety of Dams.
17. MOA, 1999. National Agriculture Policy, Ministry of Agriculture, GOB Dhaka.

ANNEX 2: Environmental Management Forms

Form 1: Environmental Screening

This form must be filled in by the sub-project proponents

Screening Date:

Name of Union:; Ward No.:

Name of District: Name of Upazila:

Names of Persons Participating in Screening with job title:

.....

.....

Part A: GENERAL INFORMATION

1. Name/location of the Scheme:

.....

2. Scheme benefits:

.....

3. The Scheme is located in an area (Ward or part of a Ward) where residents are:

All mainstream or non-indigenous/tribal peoples

All indigenous/tribal peoples

Majority mainstream or non-indigenous/tribal peoples

Majority indigenous/tribal peoples

1. *Scope of Scheme:* Crop Farming Aquaculture Livestock Farming

2. *Brief description of the physical works:*

.....
.....
..
.....
..

Part B: ENVIRONMENTAL ISSUES

SPECIFICATION STATUS

- | | | |
|---|------------------------------|-----------------------------|
| 1. Encroach onto an important natural habitat | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 2. Affect sensitive ecosystems (if possible and if it is short, a brief explanation of ecosystems would be helpful, such as clay covering a natural pond with important aquatic life) | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 3. Involves use of pesticides | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 4. Diversion or use of surface waters | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 5. New or rebuilt irrigation or drainage systems | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 6. Require the construction of a seasonal dam | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 7. Involves latrines, septic or sewage systems | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 8. Waste generation
(e.g. animal, slaughterhouse waste, etc.) | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 9. If a dam, others located on the same water body create a significant impact. | Yes <input type="checkbox"/> | No <input type="checkbox"/> |

ANNEX 2: Environmental Management Forms

Form 1: Environmental Screening (continued)

- | | | | |
|---|------------------------------|-----------------------------|----------------------------------|
| 11. Residues that may be used as fertilizers: | Yes <input type="checkbox"/> | No <input type="checkbox"/> | In part <input type="checkbox"/> |
| 12. Could cause significant impact on quality or quantity of water to international water body (includes Bay of Bengal) | Yes <input type="checkbox"/> | | No <input type="checkbox"/> |
| 13. Could cause significant impact on quality or quantity of internationally shared aquifer | Yes <input type="checkbox"/> | | No <input type="checkbox"/> |
| 14. Could be impacted by another country's water usage | Yes <input type="checkbox"/> | | No <input type="checkbox"/> |

EVALUATION

1. Remedial measures and any other issues/ Comments:

.....
.....
..

<i>Environmental Category</i> ¹⁹	C <input type="checkbox"/>	B <input type="checkbox"/>	A <input type="checkbox"/>
<i>Needs further Evaluation</i>	Yes <input type="checkbox"/>		No <input type="checkbox"/>

¹⁹ The category assigned here is to be inserted in the subproject summary sheet. Category A projects are likely to have significant adverse environmental impacts, Category B projects are likely to have potential adverse environmental impacts and Category C projects are likely to have minimal, no adverse or beneficial environmental impacts.

Needs LEA (please use the full form first)
]

Yes []

No []



Prepared by (Name & Designation):

Signature:

Date:

Telephone Number:

ANNEX 2: Environmental Management Forms

Form 2: Scheme Implementation Monitoring / Completion Record

This form must be filled in by the sub-project proponent and kept in the scheme file for audit purpose

Subproject Location:

Name of District: Name of Upazila:

Names of Persons Participating in the report preparation with job title :

.....

Name & Location of Scheme:

Part A: General Information on the Sub-project

1. *Scope of the Work:* Crop Farming Aquaculture Livestock Farming

2. *The scheme was implemented during (months):*

3. *The scheme is located in an area where residents are:*

All mainstream or non-indigenous/tribal peoples

All indigenous/tribal peoples

Majority mainstream or non-indigenous/tribal peoples

Majority indigenous/tribal peoples

4. *Brief description of the works initially proposed:*

.....

.....

5. *Brief description of the actual works done :*

.....

6. *If there are differences between the proposed and executed works, they are (briefly):*

.....

.....

7. *The differences have been caused by:*

.....

.....

8. *Environmental Impacts of the sub-project were:*

9. *Community's opinion about the environmental impact of the sub-project implementation (choose one):*

Satisfactory

Marginally satisfactory

Unsatisfactory

ANNEX 2: Environmental Management Forms

Form 2: Scheme Implementation Monitoring / Completion Record (Contd.)

Part B: Grievance/Complaints Redress

(Records must be kept separately for each Scheme)

9. *No. of complaints/grievances on environmental issues in the sub-project:*

Received: Resolved: Sent to higher bodies:

10. *Three of the most important complaints were:*

a.

b.

c.

Part C: Remarks and suggestions, if any, on scheme's adverse environmental impacts and mitigation measures:

Prepared by (Name & Designation):

Signature:

Date:

Telephone Number:

ANNEX 2: Environmental Management Forms

Form 3: Limited Environmental Assessment (LEA) Format for Category ‘B’ Subprojects

(This report has be prepared by a qualified specialist- Preferably by the Environmental Specialist of the RPIU)

1. General Description of the Sub-project

Subproject Name and Location:

.....

Name of Upazila: Name of District:

Names of Persons Participating in the report preparation with job title :

.....

.....

Sub-project Objectives:

.....

.....

.....

Sub-project Components:

.....

.....

.....

2. Baseline Description of the Affected Environment

- Description of the Physical/Chemical Environment (Soil, Water Air etc):

- Description of the Biological Environment (Habitat, Flora, Fauna etc):

- Description of the Socio-economic Environment (Public health, historical sites, infrastructure etc):

ANNEX 2: Environmental Management Forms

Form 3: Limited Environmental Assessment (LEA) Format for Category ‘B’ Subprojects (Contd.)

3. Specification of Expected Negative Environmental Impacts

Impact on the Physical/Chemical Environment (Soil, Water Air etc):

Impact on the Biological Environment (Habitat, Flora, Fauna etc):

Impact on the Socio-economic Environment (Public health, historical sites, infrastructure etc):

4. Mitigation Measures

Cost effective mitigation measures should be identified and measures for their integration into the project design including implementation and monitoring should be recommended.

Report Prepared by (Name & Designation):

Signature: *Date:*

Telephone Number:

Report Approved by (Name & Designation):

Signature: *Date:*

Telephone Number:

ANNEX 3. Outline of LEA contents : Environmental Impacts, Mitigation Measures and Monitoring in Sub-Projects

Table 1. Environmental Impacts and Mitigation Measures For Agricultural Research

Possible Environmental Degradation	Mitigation measurement
Loss of biodiversity	Gene Banks for various crops exists in relevant research institutes such as for rice at the BRRI, for other grain crops, pulses and oil-seed crops at BARI and their facilities are modest.
	Preservation of germ plasm of indigenous varieties, Improvement of indigenous varieties,
	Using the environment friendly characters of indigenous varieties in breeding programs,
	Facilitation of germ plasm preservation by local agencies.
Increased pest infestation	Integrated pest management
	Development of pest tolerant varieties
	Development of technologies like grafting for increased pest tolerance
Arsenic contamination	Use of surface water for irrigation where possible
High input requiring crops	Improvement of indigenous varieties having moderate yield potentials with low input requirement
	Mixed fertilizer use for balanced, nutrients
	Integrated Plant Nutrients System (IPNS)
Drought	Development of drought tolerant varieties
	Integrated water resources management (IWRM)
	Development of software for drought management
Soil salinity	Development of salt tolerant varieties
	Preservation of brackish water (in creeks) having salinity level within crop tolerance limit for irrigation in the pre-monsoon season

ANNEX 3: Outline of LEA Contents : Environmental Impacts, Mitigation Measures and Monitoring in Sub-Projects

Table 2. Mitigation Measures for Agricultural Extension

Possible environmental degradation	Mitigation/ Enhancement Measure
------------------------------------	---------------------------------

Soil degradation	Preparation and application of compost
	Addition of organic matter like animal manures including cow dung and farmyard manures, green manure, oilcake, industrial organic wastes, homestead waste etc
	Preparation and application of vermin-compost.
	Incorporation of residues of leguminous crops into the soil after harvesting pods and nuts
	Biological nitrogen fixation (BNF)
Declines in soil fertility	Balanced fertilizer application
	Use of mixed fertilizers for balanced nutrients
	Crop diversification
	Use of bio-fertilizers
Soil salinity	Use of duck weed for removing soil salinity
	Flushing soil with pre-monsoon rain water
	Shrimp-rice farming system
	Green Manure
	Discouraging ground water abstraction for shrimp farming
Pest infestation	Use of varieties tolerant to pest infestation
	Crop diversification
	Integrated pest management ²⁰
	Planting multiple varieties with varying susceptibility to pests
Health hazard from handling Agro-chemicals	Training of farmers on proper spraying, storage and handling techniques
	Use of bio-pesticides
	Use of gloves and masks

²⁰ Please refer to the World Bank Operational Policy on Pest Management (OP1.09) for details of IPM.

ANNEX 3: Outline of LEA Contents : Environmental Impacts, Mitigation Measures and Monitoring in Sub-Projects

Table 3. Mitigation Measures for Value Chain Developments

Possible Environmental Degradation	Mitigation Measures
Exotic species	Strict observance of quarantine regulations
	Selection through a screening process with particular emphasis on disease susceptibility
	Development of local species with disease resistance
	Development of policy on import of exotic species
Decline in fish biodiversity	Maintaining fish migratory routes
	Propagation and conservation of endangered species in the ecosystem
	Stocking interventions at sites where fish species diversity has seriously declined
Environmental pollution from poultry and dairy farm	Awareness and training on hygienic procedures of poultry and dairy farms management
	Adoption of proper hygienic procedures in poultry and dairy farms

**ANNEX 3. Outline of LEA Contents: Environmental Impacts,
Mitigation Measures and Monitoring in Sub-Projects (contd.)**

Table 4. Environmental Monitoring: Agricultural Research

Sl. No	Environmental issue	Indicator	Base line change	Degree of impact *
1	Biodiversity	Status of gene Bank		
		Number of varieties preserved		
		Number of local varieties used in breeding program		
		Number of varieties preserved <i>in situ</i>		
2	Soil Quality	Organic matter content		
		Soil pH		
		Soil texture		
		Infiltration rate		
		Types of compost		
		Types of bio fertilizers		
		Soil nutrient status		
3	Pest control	No. of pest tolerant varieties developed		
		No. of bio-pesticides developed		
		Status of IPM technology		
4	Soil Salinity	Salinity tolerant species released		
5	Arsenic contamination	Development of mitigation measures		

* Small is less than 25%, moderate is between 20-50% and large is more than 50%.

ANNEX 3. Outline of LEA Contents: Environmental Impacts,

Mitigation Measures and Monitoring in Sub-Projects (contd.)

Table 5. Environmental Monitoring: Agricultural Extension

Sl. No	Environmental issue	Indicator	Base line change	Degree of impact * (None, Positive, Small Moderate, Large)
1	Biodiversity	No. of local varieties grown		
		No. of hybrid varieties grown		
2	Soil Quality	Area use in compost		
		Area under green manure		
		Area under bio fertilizer		
		Area incorporating plant residues in soil		
		Quantity of chemical fertilizer used by type		
		Area under diversified cropping pattern		
3	Pest control	Area under IPM		
		Quantity of chemical pesticides used		
		Quantity of bio pesticides used		
		No. of dealers/ retailers using gloves and masks		
		No. of persons using masks while spraying agro chemicals		
4	Soil Salinity	Area under rice-shrimp farming practice		
		Area under boro rice with preserved brackish water		
5	Arsenic contamination	No. of families adopting rain water harvesting		
		Area switched over from ground water to surface water		
		No. of families availing mitigation measures		

* Small is less than 25%, Moderate is between 20-50% and large is more than 50%.

ANNEX 3. Outline of LEA Contents: Environmental Impacts, Mitigation Measures and Monitoring in Sub-Projects

Table 6. Conflicts arising from Environmental Impacts and their Resolution

	Potential Environmental Effects	Tick Relevant	Mitigation measures	Tick relevant	Responsible person
1	Land use conflicts		Avoid projects sites that require <ul style="list-style-type: none"> • Resettlement²¹ • Displacement of other important land uses • Encroachment of historical cultural or traditional use area • Encourage use of existing depressions, hollows and ditches • Limit areas converted to ponds • Good pond design and construction and maintenance to avoid pre-mature abandonment 		
2	Water supply conflicts by: <ul style="list-style-type: none"> • Social and economic disruptions to existing community water management practices and relationship • Conflicting demand on surface or ground water supplies 		<ul style="list-style-type: none"> • Ensure adequate community participation in the planning and operation of the project • Site ponds to avoid disrupting existing/ traditional use of water • Develop ponds with other activities to combine water use 		
3	Creating habitat for disease carriers such as mosquitoes and snails and increasing the prevalence of water related disease e.g. malaria, schistosomiasis		<ul style="list-style-type: none"> • Assess ecology of disease carriers in the project area • Employ suitable privation and mitigation measures including education of local people • Monitor disease occurrence and public health indicators and 		

²¹ Includes economic resettlement (i.e. when individuals are deprived of their livelihood as a result of the project). For example if a dam is proposed that would prevent or affect the long-standing fishing traditions in downstream communities.

			take corrective measures as needed.		
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ANNEX 3. Outline of LEA Contents: Environmental Impacts, Mitigation Measures and Monitoring in Sub-Projects (contd.)

Table 6. Conflicts arising from Environmental Impacts and their Resolution (Continued)

	Potential Environmental Effects	Tick Relevant	Mitigation measures	Tick relevant	Responsible person
4	Loss of ground cover and erosion at project sites		<ul style="list-style-type: none"> • Restrict area cleared for ponds • Construct ponds during dry season • Stabilize exposed soil with grasses and other ground cover • Ensure good drainage and erosion control around ponds 		
5	Pollution of surface waters with aquaculture wastes		<ul style="list-style-type: none"> • Keep fish densities at moderate levels to reduce disease risk and need for antibiotics • Pump air through the water to speed up decomposition • Release pond water into water body with adequate dilution and dispersal capability. • Dilute pond water prior to release 		

ANNEX 4: Reports on Consultations with Stakeholders and Potential Beneficiaries

Date	Place	Type of meeting	Participant groups	Consultation aspects	Issue highlighted
WORKSHOPS					
March 20, 2011	Bangladesh Agricultural Research Council Conference room, Dhaka	Stakeholder discussion	Officers of MOA, officers of DAE, BADC, Research Institutes, Ag-Universities, SCA,DLS, DOF etc.	Concept & objectives of the project, probable implementation process as conceived by would be implementing agencies	
March 23, 2011	Rangpur-Dinajpur Rural Development Conference room	Stakeholder discussion		Do	Details in Annex 5
April 2, 2011	BRAC Training & Resource Center, Barisal	Stakeholder discussion	In addition to the above, field level representatives of DAE, DLS, DOF, BADC, BARI, BRRI, BINA, SCA, BADC, Crops, Livestock, Fisheries and Women farmers (Landless, small & marginal farmers less represented) and Social & environmental consultants of WB	Project concepts, objectives, components, Problem identification, suggestion for mitigation in each sub-sector.	Participants were grouped at random into three groups for the three broad components of IADP: Technology Generation, Technology Adaptation and Water Management. Three Groups reports were prepared by three group of three participants. Problem identification and mitigation procedures were suggested.

ANNEX 4: Reports on Consultations with Stakeholders and Potential Beneficiaries (Continued)

Date	Place	Type of meeting	Participant groups	Consultation aspects	Issues highlighted
KII AT FIELD LEVEL ESTABLISHMENTS OF AGRICULTURAL AGENCIES					
March 31,2011	DAE office, Barisal	KPI	Debangshu Kumar Saha Deputy Director, District Agricultural Office	Overall problems of agricultural production in the proposed project area & possible mitigation measures, problems in technology transfer. Future prospects.	<ul style="list-style-type: none"> • Soil salinity is the main problem • Salinity in soil and in water • Salinity problem is worse in dry season, tolerable in rainy season. • Vast area remains fallow during dry season. • Salt-tolerant varieties of rice & other crops necessary. • Salinity is most acute in Patuakhali and Pirojpur Districts, less in Borguna, not much problematic in Barisal District. • Manpower shortage • Lack of Logistic support • No prospect of environmental degradation is envisaged due to the proposed Project implementation.

ANNEX 4: Reports on Consultations with Stakeholders and Potential Beneficiaries (Continued)

Date	Place	Type of meeting	Participant groups	Consultation aspects	Issue highlighted
KII AT FIELD LEVEL ESTABLISHMENTS OF AGRICULTURAL AGENCIES					
April 1, 2011	Regional Agricultural Research Station (RARS) of BARI, Rahmatpur Barisal	KPI	Dr. Saleh Ahmad Principal Scientific Officer. Anjan Kumar Das Scientific Officer	Agricultural constraints in the four districts to be covered by the proposed IADP, and any possibility of Environmental Degradation that might occur due to Project implementation.	<ul style="list-style-type: none"> • Salt-tolerant rice varieties having tolerance to different grades of salinity needed. • Re-excavation of some canals are highly essential. • Adaptable should be a continuous process cropping sequence to be developed for avoiding high conc of salt at the dry season. • Sluice gate operation should be continuous process, otherwise water logging occurs • IADP research component should be prepared to analyze soil samples from privately operated STW command areas. • Sand deposit on agricultural land occurs in the Nazirpur Upazila of Pirojpur District. Construction of new bund / Repair of old one required • Fertility of soil decreasing , OM replenishment required. • Training of farmers in pesticide use to be strengthened. • No prospect of environmental degradation is envisaged due to the proposed Project.

ANNEX 4: Reports on Consultations with Stakeholders and Potential Beneficiaries (Continued)

PRA AT THE COMMUNITY LEVEL					
Date	Place	Type of meeting	Participant Group	Consultation aspects	Issue highlighted
April 14, 2011 Afternoon	Village Binodpur UP. Durgapur Upazila Mithapukur Dist. Rangpur	FGD	A group of Indigenous people (Oraon tribe)	Cultural identity, Access to resources, Livelihoods, Agricultural activities: - Crops - Livestock - Fisheries Concerns of being adversely affected by IADP implementation or excluded, environmental issues, Mitigation measures	• Described below *

*

- The tribe is culturally different from the majority ethnic group.
- Their access to resources is highly limited.
- Highest educational qualification of the farmers is class III. Majority illiterate.
- Profession of most of these households is partly farming in their small pieces of land and partly as agricultural laborers in other farmers' fields.
- Landholding varies from 0.05 to 0.55 acre of land.
- 3 out of 35 households do not grow any crop.
- Suffer from 'Monga' –(seasonal hunger) i.e. during September to November covering 1.5 months before the harvest of Aman rice.
- Profession: 27% Crop agriculture, 8% Aquaculture, 2% Transport worker, 1% Small trading, 7% Services and the rest are full time agricultural labours.
- Women in economic activities
 - 95% of adult women are engaged in income earning activities (farming and labour).
 - Major agricultural activities: rice & maize cultivation in own/share cropped land.
- Land ownership pattern of the farmers:
 - Household not owing homestead land 5%
 - Household not owing cultivable land 60%
 - Household owning cultivable land below 0.05 acres
 - Marginal farmers (0.05-0.49 acres) 35%
 - Small farmer (0.5-2.49) only 3 in number
 - Large farmer (7.5 acres and above) 0%
- Production of major crops, crop specific problems and their mitigation measures

Crops grown in the winter season include: Maize: 30%, Boro rice (HYV): 65%, Potato, Vegetable, Mustard: 3%, others: 2%. Maize cultivation results in the highest economic benefit due to its less cultivation cost, less irrigation cost, highest yields/ unit area of land

(3200 Kg/acre) and good price. But the main problem is that Shallow Tube wells become dry during February-Mach due to drying-off of the aquifers. Sinking of Deep Tube Wells in appropriate places (on the basis of distance from one DTW to another, slop of land etc) may solve the problem.

As per their opinion, Resettlement Plans and Indigenous development Plans will not be necessary. However, if at all required at any place, will be developed with due urgency.

ANNEX 4: Reports on Consultations with Stakeholders and Potential Beneficiaries (Continued)

KII AT FIELD LEVEL ESTABLISHMENTS OF AGRICULTURAL AGENCIES					
Date	Place	Type of meeting	Participant groups	Consultation Aspects	Issue highlighted
April 15, 2011	District Agriculture Office, Rangpur	M.A.Q. Shaikh Environment Consultant	M. Hasanur Rahman, Deputy Director, Rangpur District. M. Firoz Ahmed, Plant Protection Specialist, Rangpur. Gobinda Adhikary, SAAO, Rangpur Sadar. Mohammad Khaled, SAAO, Rangpur Sadar. M.Mahbubur Rashid, A.E.O; Pirgonj Upazila District. Rangpur.	Manpower adequacy----- Operational---- projects Shortcomings:	<ul style="list-style-type: none"> • Inadequate, vacant posts, • 8 in number Some pockets of Mithapukur and Bodorgonj Upazilas do experience lowering of ground water level; Sadar, Pirgonj, Pircaccha and Gangachara Upazilas have some water-logging; Sand deposits occurring in some parts of Gangachara, Kaunia and Pircaccha Upazilas; Fertility degradation not much since OM is replenished once a year; overuse of pesticide in vegetable, optimum in Rabi crops, less in Aman; shortage of Boron, Nitrogen, Potash, Sulphur, Manganese. Intensive training of farmers needed, IPM/ICM to be introduced. Prospect of negative impact through IADP Implementation: None

ANNEX 4: Reports on Consultations with Stakeholders and Potential Beneficiaries (Continued)					
KII AT FIELD LEVEL ESTABLISHMENTS OF AGRICULTURAL AGENCIES					
Date	Place	Organized by	Participants	Consultation Aspects	Issue highlighted
April 16, 2011 (Forenoon)	District Livestock Office (DLO), Rangpur	M.A.Q. Shaikh Environment Consultant	M.Shamsul Alam Additional District Livestock Officer, Rangpur M. Saidur Rahman, Upazila Livestock Officer, Pirgaccha Upazila, Rangpur	Manpower adequacy----- Logistic support----- Community Extn. Agents for Livestock (CEAL)-----	Inadequate Very Poor Very useful but not employed permanently. Should be bought under full time service without delay.
April 16, Afternoon	On-Farm Research Division (OFRD), BARI	M.A.Q. Shaikh Environment Consultant	Dr. Mazharul Anwar Senior Scientific Officer, OFRD, BARI	Manpower Adequacy----- Fertility status-- Autonomy----- Prospect of----- negative impact through IADP implementation.	Inadequate Depleted, specially O.M.Zn, Boron, Manganese, Overuse of Urea sometimes also pesticide. Mitigation: Trg. Required for optimum use of fertilizer & pesticide. Slightly Inadequate None None

ANNEX 5: Reports on Consultation Workshops for Sub-Project Identification

“Integrated Agricultural Development Program for Agro-ecologically Constrained and Economically Depressed Areas”

Report on Consultation Workshop for Project Identification

REGION: RANGPUR

Background:

Agriculture in Bangladesh is extremely important due to its role in food security, employment and livelihood. Over the last three decades cereal production has increased from about 10 million tons in 1970s to about 30 million tons, but still a substantial proportion of rural households continue to experience chronic as well as transitory food insecurity, women are more in this category than men. A variety of factors contribute to household food insecurity, including lack of access to land for cultivation, lack of employment opportunity, loan repayment obligation, exclusion from social safety net programs and vulnerability to natural disasters.

The major livelihood strategy in rural Bangladesh is subsistence agriculture either through agriculture production activities, agriculture labor or both. The country is very prone to hazards and climate change has already caught national and international attention. Cyclones, tidal surges, tornadoes are now more often and droughts in certain areas are common. The geographical location and geo-morphological conditions of Bangladesh have made the country one of the most vulnerable ones to climate change.

The project is focused on specific agro-ecological areas including the salt-affected tidal surge areas in the south (Barisal, Patuakhali, Barguna and Jhalakathi), flash flood and drought-prone areas in the north (Kurigram, Rangpur, Nilphamari and Lalmonirhat). Agricultural production in these areas is severely constrained. For instance, at present farmers can cultivate only one rice crop per year in the tidal surge and flash-flood prone areas, production is highly vulnerable to weather conditions (with typical yield losses of between 20-40%), and productivity is low partly because available (mainstream) technology and agronomic practices are not adapted to these field conditions. Consequently, livelihood options are limited, and household level poverty and food insecurity is high.

Project approach is to break out the low-equilibrium trap in these areas through a set of complementary interventions — in the sense that each intervention enhances the returns on other interventions — that together constitute an integrated strategy for the agricultural development of these areas.

The objective of the project is to enhance the production and productivity of crop, fisheries and livestock subsectors. It will be achieved through the generation and production and release of more productive and locally adapted crop varieties,

technologies, enhancing availability of quality seed/ breeding material at the small farm level and providing relevant production support, improved irrigation and water (surface) management.

The government accords high priority to agricultural development in these areas and the latest budget attempts to address some of these issues. Given the severe funding shortfall, however and the government have allocated about US \$ 17.60 million for the project. Another 50 million will be available from Global Agriculture and Food Security program Trust Fund.

The investment component of the project will be supervised by the World Bank and FAO will supervise the activities of the Technical Assistance component.

Overall Project Structure:

1. The proposed project will consist of four inter-related components: (i) technology generation; (ii) technology adoption; (iii) water management and (iv) capacity building and technical assistance.
2. The direct beneficiaries of the project will be about 350,000 farmers, especially the small and marginal farmers in more challenging agro-ecological zones. Approximately 25% of the direct beneficiaries are expected to be women farmers. Beyond these, there are other indirect beneficiaries like other farmers who will, following demonstration effects over time, adopt technologies and practices used by project-supported farmers and rural agricultural labourers.
3. The achievement of the project objective will be measured mainly by the actual farm-field level yield increases in crop, livestock and fish production (resulting from the use of new varieties, better quality seeds, and improved water management and agronomic practices).

To find out specific project activities stakeholder's opinion is one of the main tasks to act the project fruitful in implementing stage. In this project it had been organized two regional workshops for detail chalk out of activities. Rangpur region is one of that. The current problem of that Agricultural arena and recommendations from the root level stakeholders are listed as component wise of this project.

Technology Generation:

New technologies demand always make agricultural development fruitful and a step ahead to meet up food security and safety. The various kind of demanding upcoming technologies are as follows:

For **rice** they need :

- a) Development of drought/cold/submergence tolerant variety
- b) Development of pest resistant variety
- c) Development early T. Aman variety
- d) Development of short duration variety for Boro season.

e) Development short duration and high yielding variety for Aus rice.

For Wheat they suggested development of short duration, heat tolerant variety, in case of maize their demand is for development short duration and dwarf hybrid varieties. The next crop is pulses.

Mung bean, Grass pea, Cowpea and Chickpea are selected in this regard. For Mung bean

- Development of high yielding variety
- Development of waterlogged tolerant variety
- Development of Insect resistant variety
- Development of pulses planter is needed.

In case of Grass pea the demand goes for development of high grain as well as fodder yielding variety. For Cowpea, development of HYV variety is needed. In Chickpea development of HYV and disease had been suggested by the farmers and other stakeholders.

For Oil Seed Crops mustard, Groundnut, Sesame to be explored. In case of **mustard**

- Development of less urasic content variety
- Short stature variety
- Development of more oil content variety
- Development of low cholesterol variety
- Development of post harvest processing technology is needed.

For ground-nut,

- Development of high quality seed;
- Development of three seeded pod variety
- Development of short duration variety
- Development of high yielding variety
- Pod rot resistant variety is needed

Lastly for **sesame** farmers opinion

- Development of water logged tolerant variety;
- Development of short duration variety
- Development of high yielding variety.

According to farmers demand, the identification workshop also suggested some Techno-agro-management packages. Those are as follows:

- Development of fertilizer management packages for pulses & oilseed for drought prone areas.
- Development of acidity management packages for sustainable crop production.
- Improvement of soil health through integrated fertilizer management on the basis of cropping pattern.
- Development of integrated pest management packages for pulses and oil seeds.
- Development of technology on Sorjon cropping system as a means of combating environmental change, crop diversification and integration of farming with crop, fish and livestock.
- Development of early flood escape technology through different agronomic management practices.
- Development of efficient water use technology for adaptive crops.

- Development of water logging escape/management technology for mung bean and sesame.

The second part of Technology generation related to fisheries new technology. All stakeholders recommended for the fisheries requirement are:

- Improvement of local variety.
- Nursery system development.
- Establishment of fish sanctuary.
- Food management and use of potato as fish feed.
- Development of short and quick growing fish varieties.
- Brood management.

Technology Adoption:

In case of technology adoption crop, livestock and fisheries sector had been included. All stakeholders pointed out present problems of those three sectors and then they suggested some recommendations to overcome according to their locality demanded sectors.

Those problems and recommendations are as follows:

Crop Sector (Problems and Recommendation)

Problems

- Organic matter in soil reduces.
- High and medium High land turn into acidic very fast ($P^H = <5$), that's why production decreases 20%-40%.
- Underground water reduces day by day.
- Maximum lands of this region are sandy and sandy loam soil type, that's why irrigation water loss to 20%-30%.
- Farmers are reluctant to adopt new technology.
- Cultivation of Tobacco during Rabi season is too much harmful for soil health.
- Shortage of good quality seed.
- Indiscriminate use of Agricultural land.
- Crop zoning absent.
- Soil health testing facilities are inadequate

Recommendation

- FYM, Compost preparation, cropping pattern change will be the solution of low organic matter. (some cropping pattern suggested)
- Using Dolomite in soil could reduce soil acidity significantly.
- Training should be at community level.
- Cropping pattern should be changed in suggested areas.
- Production and supply of quality seed.
- Seed growing villages should be introduced.
- Extension should be in group approach.
- Agricultural credit is needed in some cases with low interest rate.

- Agricultural land use should be in proper way.
- Crop extension packages should be spread by composite way.
- Group can be homogenous and heterogeneous (Crop + Livestock + fisheries).
- Buy back procedure could be helpful for farmer's new technology adoption.
- AwD method could be helpful in this region.

Fisheries Sector (Problems and Recommendations)

Problems

- Water retention capacity reduced due to Drought
- Seasonal water-body (culture period 4-6 months)
- Siltation due to erosion of soil
- Contraction of water-bodies due to drought
- Temperature fluctuation
- Conversion of wetland/water-body to agricultural land
- Un-availability of quality fish seed in time
- Un-availability of quality fish feed at affordable price
- Genetic degradation of culturable species
- Low water/soil productivity
- Squeeze/blocking of fish migratory route
- Destruction of grazing & breeding ground
- Use of hazardous agro-chemicals
- In-adequate fish preservation/ processing/ marketing facilities
- Access to existing irrigated water supply system
- Implementation of regulatory measure in fish hatchery/fish feed/agro-chemicals/ food safety
- Lack of government subsidy on fish feed/seed/electricity/ agro-chemicals
- In-adequate need based technological training
- Ownership & leasing system of public water-bodies
- Conservation & protection of indigenous species
- Establishment and management of fish sanctuary
- Enforcement of fish acts
- In-adequate coordination among the stakeholders
- In-adequate women participation in fisheries interventions
- Shortage of technical manpower & logistics.

Recommendations

- Expansion of floodplain aquaculture
- Group training (heterogeneous) approach
- Expansion of rice-fish farming
- Water retention capacity to be increased
- Short-term fast growing species to be introduced
- Re-excavation of degraded water-bodies
- Hydrolic structure (spill way, fish pass, etc) to restore water-bodies for biological management

- Wetland/water-body to be conserved
- Timely quality fish seeds to be ensured
- Quality fish feed at affordable price to be ensured
- Genetic degradation is to be mitigated
- Water/soil productivity to be increased
- Fish migratory route is to reestablished

- Grazing & breeding ground is to be protected
- Hazardous agro-chemicals to be avoided
- Fish processing/marketing facilities to be developed
- Access to existing irrigated water supply system
- Implementation of regulatory measure in fish hatchery/fish feed/agro-chemicals/ food safety
- Government subsidy on fish feed/ seed/ electricity/ agro-chemicals
- Need based technological training
- Easy Ownership & leasing system of public water-bodies
- Conservation & protection of indigenous species
- Establishment and management of fish sanctuary
- Enforcement of fish acts
- More coordination among the stakeholders
- Capacity building of public & private fish seed multiplication farms

Livestock Sector (Problems and Recommendations)

Problems

- Lack of appropriate training
- Low production and productivity
- Incidence of parasitic infestation
- Lack of vaccination
- High Calf mortality
- Lack of health service
- Malnutrition of animals
- High feed price, non cultivation of fodder.
- High price of Day Old Cckicks
- Inappropriate diagnosis facilities
- In-adequate health campaign
- Quality of anthelmintic questioned
- In-adequate credit facilities and high interest
- Low product price
- Incentive for infrastructure setting

Recommendations

- Formation and strengthened of community based organization group for profitable animal rearing
- Proper training at community level in the groups

- Establishment of community livestock extension worker
- Anthelmintic campaign
- Vaccination campaign
- Ensure calf/kid nutrition, vaccination and anthelmintic to selected high yielding varieties
- Health campaign
- Fodder demonstration plot to be established
- Demonstration farm of dairy, sheep, goat and poultry establishment at selected community
- Genetic improvement through selection and preventing inbreeding
- Organized community marketing system
- Increase production and supply of chicks

Water Management Sector (Problems and Recommendations)

For **water management** component people of Rangpur region were very much aware of identifying current water scarcity problem and their solutions. Water is one of the main constraints of this areas agricultural development. Optimum use of water and efficient and maximize use of surface water is the main activities of current water problem solutions. Stepwise other problems and recommendations are as follows:

Problems

- Siltation of canal makes less water reserving capacity.
- Drying of ponds due to sandy soil.
- Problem is preparation of Irrigation channel due to uneven topography especially in char area.
- Insufficient number of water control structure for sufficient reservation of water.
- Conveyance loss due to long distance from main source to crop field.
- Poor knowledge of farmers about On-Farm water management.
- Water logging in some area.
- Conflict among the farmers due to socio economic conditions
- Higher production cost due to high price of irrigation spares parts and diesel.

Recommendations

- Re-excavation of River, Khal, Ponds & Nala.
- Construction of hydraulic structure like cross dam/submerge weir/slucice gate etc. In the excavated canal for conservation of water.
- Installation of sprinkler/drip irrigation system.
- Improvement of water conveyance system like buried pipe line, pre-cast line channel, flexible hose pipe etc.
- Improvement of drainage system in water logged areas.
- To create supplementary irrigation through conservation of rain water by re-excavation of public khal/nala/pond etc.
- Portable fractional pump with flexible hose pipe for irrigation.
- Installation of low lift pump.

- Electrification of irrigation equipment on priority basis.
- Water quality test for irrigation.
- Solar pump installation.
- Demonstration of earthen channel improvement by mixing of clay/cow dung/compost in the channel bed.
- To disseminate on farm water management technology to the water users/farmers through training
- For efficient use of irrigation water AWD tools should be used in rice field.
- Developing awareness about optimum use of water for crop production
- Group formation for irrigation scheme.
- Fee collection for O&M.
- Increasing water retention capacity of the ponds by mixing of crops/cow dues/compost in the pond bed

In short these are the overall findings from the sub-project identification workshop held in the Rangpur region on 22nd March, 2011.

“Integrated Agricultural Development Program for Agro-ecologically Constrained and Economically Depressed Areas”

Report on Consultation Workshop for Sub-Project Identification

REGION: BARISAL

Background:

Agriculture in Bangladesh is extremely important due to its role in food security, employment and livelihood. Over the last three decades cereal production has increased from about 10 million tons in 1970s to about 30 million tons, but still a substantial proportion of rural households continue to experience chronic as well as transitory food insecurity, women are more in this category than men. A variety of factors contribute to household food insecurity, including lack of access to land for cultivation, lack of employment opportunity, loan repayment obligation, exclusion from social safety net programs and vulnerability to natural disasters.

The project is focused on specific agro-ecological areas including the salt-affected tidal surge areas in the south (Barisal, Patuakhali, Barguna and Jhalakathi), flash flood and drought-prone areas in the north (Kurigram, Rangpur, Nilphamari and Lalmonirhat). Agricultural production in these areas is severely constrained. For instance, at present farmers can cultivate only one rice crop per year in the tidal surge and flash-flood prone areas, production is highly vulnerable to weather conditions (with typical yield losses of between 20-40%), and productivity is low partly because available (mainstream) technology and agronomic practices are not adapted to these field conditions. Consequently, livelihood options are limited, and household level poverty and food insecurity is high.

Project approach is to break out the low-equilibrium trap in these areas through a set of complementary interventions — in the sense that each intervention enhances the returns on other interventions — that together constitute an integrated strategy for the agricultural development of these areas.

The objective of the project is to enhance the production and productivity of crop, fisheries and livestock subsectors. It will be achieved through the generation and release of more productive and locally adapted crop varieties, technologies, enhancing availability of quality seed/ breeding material at the small farm level and providing relevant production support, improved irrigation and water (surface) management.

The government accords high priority to agricultural development in these areas and the latest budget attempts to address some of these issues. Given the severe funding shortfall, however and the government have allocated about US \$ 17.60 million for the project. Another 50 million will be available from Global Agriculture and Food Security program Trust Fund.

The investment component of the project will be supervised by the World Bank and FAO will supervise the activities of the Technical Assistance component.

Overall Project Structure:

1. The proposed project will consist of four inter-related components: (i) technology generation; (ii) technology adoption; (iii) water management and (iv) capacity building and technical assistance.
2. The direct beneficiaries of the project will be about 350,000 farmers, especially the small and marginal farmers in more challenging agro-ecological zones. Approximately 25% of the direct beneficiaries are expected to be women farmers. Beyond these, there are other indirect beneficiaries like other farmers who will, following demonstration effects over time, adopt technologies and practices used by project-supported farmers and rural agricultural labourers.
3. The achievement of the project objective will be measured mainly by the actual farm-field level yield increases in crop, livestock and fish production (resulting from the use of new varieties, better quality seeds, and improved water management and agronomic practices).

To find out specific project activities stakeholder's opinion is one of the main tasks to act the project fruitful in implementing stage. In this project it had been organized two regional workshops for detail chalk out of activities. Rangpur region is one of that. The current problem of that Agricultural arena and recommendations from the root level stakeholders are listed as component wise of this project.

Technology Generation:

New technologies demand always make agricultural development fruitful and a step ahead to meet up food security and safety. The various kind of demanding upcoming technologies are as follows:

Rice

1. Development tidal submergence saline tolerant boro variety
2. Development of tidal saline tolerant variety
3. Development early T. aman variety
4. Development of short duration variety
5. Development of short duration and high yielding variety for aus rice.

Wheat

1. Development of short duration, heat tolerant and salt tolerant variety

Maize

1. Development short duration and dwarf hybrid varieties

Pulses

Mungbean

1. Development of salt tolerant, disease resistant and water logging tolerant variety

Grasspea

1. Development of salt tolerant, high grain as well as fodder yielding variety

Cowpea

1. Development of salt tolerant, HYV and disease resistant variety

Chickpea

1. Development of salt tolerant, HYV and disease resistant variety.

Oil Seed Crops

Mustard

1. Development of salt tolerant, short duration, dwarf and late seeding variety

Groundnut

1. Development of salt tolerant, short duration and high yielding variety

Sesame

1. Development of salt tolerant, short duration, water logging tolerant variety.

Techno-agro-management packages

1. Development of fertilizer management packages for pulses & oilseed for saline areas
2. Development of salinity management packages for sustainable crop production.
3. Improvement of soil health through integrated fertilizer management on the basis of cropping pattern
4. Development of integrated pest management packages for pulses and oil seeds
5. Development of technology on Sorjon cropping system and Gher cropping system in AEZ-13 as a means of combating environmental change, crop diversification and integration of farming with crop, fish and livestock
6. Development of salinity escape technology through different agronomic management practices
7. Development of water harvest technology for the coastal saline area
8. Development of efficient water use technology for adaptive crops
9. Development of waterlogging escape/management technology for mungbean and sesame

The second part of Technology generation related to fisheries new technology. All stakeholders recommended for the fisheries requirement are:

- Improvement of local variety.
- Nursery system development.
- Establishment of fish sanctuary.
- Food management and use of potato as fish feed.
- Development of short and quick growing fish varieties.

- Brood management.

Technology Adoption:

In case of technology adoption crop, livestock and fisheries sector had been included. All stakeholders pointed out present problems of those three sectors and then they suggested some recommendations to overcome according to their locality demanded sectors.

Those problems and recommendations are as follows:

Crop Sector (Problems and Recommendation)

Problems

- Scarcity of quality seed.
- Soil health degradation rapidly.
- Underground water reduces day by day.
- Farmers are reluctant to adopt new technology.
- Illegal use of Agricultural land.
- Crop zoning needed.
- Soil health testing facilities are not available.

Recommendations

- FYM, Compost preparation, cropping pattern change will be the solution of low organic matter. (some cropping pattern suggested)
- Training should be in community level.
- Cropping pattern should be changed in suggested areas.
- Production and supply of quality seed.
- Seed growing village should be introduced.
- Extension should be in group approach.
- Agricultural credit is needed in some cases with low interest rate.
- Short duration, submerged, saline tolerant variety should be needed.
- Agricultural land use should be in judicial way.
- Crop extension packages should be spreaded in composite way.
- Group can be homogenous and heterogeneous (Crop + Livestock + fisheries).
- Buy back procedure could be helpful for farmer's new technology adoption.

Fisheries Sector (Problems and Recommendation)

Problems

- Un-availability of quality fish seed in time
- Un-availability of quality fish feed at affordable price
- Genetic degradation of culturable species
- Shortage of seeds of local/indigenous variety (singh, magur, koi, etc.)

- Squeeze/blocking of fish migratory route
- Use of hazardous agro-chemicals
- In-adequate fish preservation/ processing/ marketing facilities
- Temperature/salinity fluctuation
- Hard access to credit facilities
- Non Access to existing irrigated water supply system
- Implementation of regulatory measure in fish hatchery/fish feed/ agro-chemicals/ food safety
- Lack of government subsidy on fish feed/ seed/ electricity/ agro-chemicals
- In-adequate need based technological training
- Multi-ownership of water-body
- Govt. leasing system of public water-bodies
- Conservation & protection of indigenous species
- Establishment and management of fish sanctuary
- Less Enforcement of fish acts
- In-adequate coordination among the stakeholders
- In-adequate women participation in fisheries interventions
- Production inputs to poor/marginal farmers
- Shortage of technical manpower & logistics

Recommendations

- Timely quality fish seeds to be ensured
- Quality fish feed at affordable price to be ensured
- Genetic degradation is to be mitigated
- Expansion of rice-fish farming (where feasible)
- Short-term fast growing species (pangus, tilapia, koi, etc) to be introduced
- Re-excavation of degraded water-bodies
- Hydrolic structure (spill way, fish pass, etc) to restore water-bodies for biological management
- Hazardous agro-chemicals to be avoided
- Fish processing/marketing facilities to be developed
- Implementation of regulatory measure in fish hatchery/ fish feed/ agro-chemicals/ food safety
- Subsidy on fish feed/seed/electricity/ agro-chemicals
- Need based technological training
- Ownership & leasing system of public water-bodies
- Wetland/water-body to be conserved
- Fish migratory route is to reestablished
- Grazing & breeding ground is to be protected
- Hazardous agro-chemicals to be avoided
- Fish processing/marketing facilities to be developed
- Access to existing irrigated water supply system
- Implementation of regulatory measure in fish hatchery/fish feed/agro-chemicals/ food safety
- Subsidy on fish feed/seed/electricity/ agro-chemicals
- Need based technological training

- Ownership & leasing system of public water-bodies
- Conservation & protection of indigenous species
- Establishment and management of fish sanctuary
- Enforcement of fish acts
- Credit facilities for fisheries interventions to be accelerated
- Pond dyke to be improved to address the flash-floods
- More coordination among the stakeholders
- Group training (heterogeneous) approach
- Production inputs to poor/marginal farmers
- Capacity building of public & private fish seed multiplication farms
- Institutional capacity to be strengthened

Livestock Sector (Problems and Recommendations)

Problems

- Lack of appropriate training
- Low production and productivity
- Incidence of parasitic infestation
- Lack of vaccination
- Calf mortality
- Lack of health service
- Malnutrition of animals
- High feed priced Non availability of HYV fodder.
- High price of Day Old chicks
- Inappropriate diagnosis facilities
- In-adequate health campaign
- Quality of anathematic questioned
- In-adequate credit facilities and high interest
- Low product/market price
- Incentive for infrastructure setting

Recommendations

- Formation and strengthened of community based organization group for profitable animal rearing
- Proper training at community level in the groups
- Establishment of community livestock extension worker
- Anathematic campaign
- Vaccination campaign
- Ensure calf/kid nutrition, vaccination and anathematic to selected high yielding varieties
- Health campaign
- Fodder demonstration plot to be established
- Demonstration farm of dairy, sheep, goat and poultry establishment at selected community
- Genetic improvement through selection and preventing inbreeding

- Organized community marketing system
- Increase production and supply of chicks

Water Management Sector (Problems and Recommendations)

For water management component people of Barisal region were very much aware of identifying current water scarcity problem and their solutions. Water is one of the main constraints of this areas agricultural development. Optimum use of water and efficient and maximize use of surface water is the main activities of current water problem solutions. Stepwise other problems and recommendations are as follows:

Problems

- Siltation of canal makes less water reserving capacity.
- Insufficient number of water control structure for sufficient reservation of water.
- Conveyance loss due to long distance from main source to crop field.
- Poor knowledge of farmers about On-Farm water management.
- Water logging in some area.
- Conflict among the farmers due to socio economic conditions
- Higher production cost due to high price of irrigation spares parts and diesel.

Recommendations

- Re-excavation of River, Khal, Ponds & Nala.
- Construction of hydraulic structure like cross dam/submerge weir/sluice gate etc. In the excavated canal for conservation of water.
- Installation of sprinkler/drip irrigation system.
- Improvement of water conveyance system like buried pipe line, pre-cast line channel, flexible hose pipe etc.
- Improvement of drainage system in water logged areas.
- To create supplementary irrigation through conservation of rain water by re-excavation of public khal/nala/pond etc.
- Portable fractional pump with flexible hose pipe for irrigation.
- Installation of low lift pump.
- Electrification of irrigation equipment on priority basis.
- Water quality test for irrigation.
- Solar pump installation.
- Demonstration of earthen channel improvement by mixing of clay/cow dung/compost in the channel bed.
- To disseminate on farm water management technology to the water users/farmers through training
- For efficient use of irrigation water AWD tools should be used in rice field.
- Developing awareness about optimum use of water for crop production
- Group formation for irrigation scheme.
- Fee collection for O&M.

In short these are the overall findings from the identification workshop held on Barisal region on 2nd April 2011.

ANNEX 6: List of Banned Pesticides in Bangladesh

Sl. No	Name of pesticide	Registration Number	Name of Company
	1. Diazinon	14G AP-08	Shetu Corporation Ltd.
	2. Bizaguard	2P AP-09	Ciba-Geigy (Bangladesh) Ltd.
	3. Roxion	40EC AP-11	International Services (Bangladesh) Ltd
	4. Dankavapon	100 AP-13	Shetu Corporation Ltd.
	5. Damphin	2P AP-19	Ciba-Geigy (Bangladesh) Ltd.
	6. Diazinon	90L AP-20	Ciba-Geigy (Bangladesh) Ltd.
	7. Damphin 950EC	AP-25	Ciba-Geigy (Bangladesh) Ltd.
	8. Dichlorovos	AP-27	Bayer (Bangladesh) Ltd.
	9. Cureterr 3G	AP-30	Bayer (Bangladesh) Ltd.
	10. 2,4-D Na Salf	AP-34	Bayer (Bangladesh) Ltd.
	11. Folithion ULVC 98	AP-36	Bayer (Bangladesh) Ltd.
	12. Methybron	AP-38	Excell trading Co.
	13. Heptachlor 40WP	AP-39	Krishi Banijjya Protishthan
	14. Chlordane 40 WP	AP-40	Krishi Banijjya Protishthan
	15. Aerovap 100 EC	AP-41	Liza Enterprise Ltd.
	16. Aerodriel 20EC	AP-42	Liza Enterprise Ltd.
	17. Aeromal 57% EC	AP-44	Liza Enterprise Ltd.
	18. Padan 10G	AP-52	Data Enterprise Ltd.
	19. Fenitrothin 98	AP-53	Farm Chemical corporation Ltd.
	20. Carbin 85 WP	AP-54	Farm Chemical corporation Ltd.
	21. Diamal 57EC	AP-55	Farm Chemical corporation Ltd.
	22. Detia Gas EXT	AP-56	Farm Chemical corporation Ltd.
	23. Dichlovos 100	AP-57	Farm Chemical corporation Ltd.
	24. Methyl Bromide 98	AP-58	Farm Chemical corporation Ltd.
	25. Malathion 57EC	AP-68	BPI Ltd.
	26. Cureterr 3G	AP-69	Bayer (Bangladesh) Ltd.
	27. Dieldrin 20EC	AP-73	Shell Company of Bangladesh Ltd.
	28. Bidrin 24WSC	AP-74	Shell Company of Bangladesh Ltd.
	29. Malathion 57EC	AP-78	Burma Eastern Ltd.
	30. Vapona	AP-79	Shell Company of Bangladesh Ltd.
	31. Bidrin 85WSC	AP-80	Shell Company of Bangladesh Ltd.
	32. Diealdrin 50WP	AP-82	Shell Company of Bangladesh Ltd.
	33. Dieldrin 40WP	AP-83	Shell Company of Bangladesh Ltd.
	34. Furadan 3G	AP-85	FMC International S. A.

35. Actellic 2% Dust	AP-99	Bangladesh Manufacturers Ltd.
36. Quickphos	AP-102	Agrani Traders
37. Torque 550g/l	AP-115	International Service Bangladesh Ltd.
38. Ridan 3G	AP-131	Rupali Sangstha Ltd.
39. Bkzne 14G	AP-135	B. K. Traders Ltd.
40. Aerocypermethrin	AP-137	Liza Enterprise Ltd.
41. Karmex	AP-145	BEXIMCO Agrochemicals Ltd.
42. Carbaryl 85Wp	AP-147	Shetu Corporation Ltd.
43. Agridhan 3G	AP-154	Shetu Corporation Ltd.
44. Techo 2% Dust	AP-157	Alco Pharma Ltd.
45. Manex II	AP-163	Shetu Corporation Ltd.
46. Phyto MZ-80	AP-164	Liza Enterprise
47. Uniflow TM Sulphur	AP-167	Shetu Corporation
48. Fenkil 20EC	AP-169	Agrani Traders
49. Sunfuran 3G	AP-171	Shertu Corporation Ltd.
50. Hekthion 57EC	AP-178	Farm Chemicals Corporation Ltd.
51. Poligor 40EC	AP-180	Farm Chemicals Corporation Ltd.
52. Melbromid 98	AP-185	Horizon Trade Ltd.
53. Mebrom	AP-186	Bengal Wings Trade Ltd.
54. Agrine 85WP	AP-187	Edgro (Pvt) Ltd.
55. Drawizon 60EC	AP-190	Keeco Pesticides Ltd.
56. Gastoxin	AP-195	Bright Corporation
57. Cekumethrin 10EC	AP-219	Premier Traders
58. Cythrin	AP-220	Bari and company Ltd.
59. Cekuthoate 40EC	AP-225	Premier Traders
60. Arifos 20EC	AP-229	Bari and company Ltd.
61. Malathion 57Ec	AP-230	Sabrina Trading Corporation.
62. Cardan 5G	AP-234	Bari and Company Ltd.
63. Diazinon 14G	AP-236	Liza Enterprise Ltd.
64. Rizinon 60EC	AP-239	Bari and Company Ltd.
65. Zincphosphide	AP-258	Liza Enterprise Ltd.
66. Davison Glyphosate	AP-266	Shetu Pesticides Ltd.
67. Morestan 25WP	AP-269	BEXIMCO Agrochemicals Ltd.
68. Manzate 200	AP-301	Auto Equipment Ltd.
69. Dimecron 100Sl	AP-301	Novratis (Bangladesh) Ltd.
70. Pillarcron 100SL	AP-148	Shetu Pesticides Ltd.
71. Benicron 100WSC	AP-06	Sabrina Trading Corporation.
72. DDVP 100W/V	AP-03	ACI Formulations Ltd.
73. ChemoDDVP	AP-245	Chemfil Bangladesh Ltd.
74. DDVP 100EC	AP-151	Mcdonald Bangladesh (Pvt) Ltd.
75. Nogos 100EC	AP-26&274	Novratis (BD) Ltd.
76. Phosvit 100EC	AP-46	Data enterprises Ltd.
77. Daman 100EC	AP-325	Petrochem (B) Ltd.
78. Azodrin 40WSC	AP-336	BASF Bangladesh Ltd.
79. Nuvacron 40SL	AP-18&275	Novratis (Bangladesh) Ltd.
80. Megaphos 40SL	AP-175	Mcdonald Bangladesh (Pvt) Ltd.
81. Phoskil 40SL	AP-339	United Phosphorous (Bangladesh) Ltd.
82. Kadette 40WSC	AP-284	BISCO Pesticides & Chemical Corporation
83. Monophos 40WSC	AP-328	Alpha Agro Ltd.

	84. Monodrin 40WSC	AP-07	Sabrina Trading Corporation
	85. Corophos 40SL	AP-342	Corbel International Ltd.
	86. Lufpos 40SL	AP-388	ACI Formulations LTD.
	87. Amcordin 40SL	AP-340	Atherton Imbros Co. Ltd
	88. Vitacron 40SL	AP-341	Shetu Marketing Co.
	89. Monotaf 40WSL	AP-331	Auto Equipment Ltd
	90. Tamaron 40SL	AP-188	Haychem (B) Ltd.
	91. Polythion 50EC	AP-32	Haychem (B) Ltd.
	92. Macuprex 65%	AP-65	Bayer Crop Science
	93. Zithiol 57EC	AP-126	Rohn Polenk Bangladesh.
	94. Delapon Na-85	AP-66	Rohn Polenk Bangladesh.
	95. Enthio 25EC	AP-64	Rohn Polenk Bangladesh.
	96. Zolone 35EC	AP-67	Rohn Polenk Bangladesh.
	97. Rentokill CC Type 75%	AP-221	Getco Limited
	98. Paramound CC Type	AP-300	B. D. Associate and Company.
	99. Darsbun 20EC	PHP-5	Auto Equipment Ltd.
	100. Darsbun 20EC	PHP-85	Auto Equipment Ltd.
	101. Diazinon 60EC	AP-23	Syngenta Bangladesh Ltd.
	102. Mortin King Mosquito Coil	PHP-54	Reckit and Benckiser
	103. Mortin Mosquito Coil	PHP-101	Reckit and Benckiser

Internationally banned chemicals in 122 countries including Bangladesh:

The internationally banned chemicals are known as Persistent Organic Pollutants (POP). POPs include nine pesticides (Aldrin, Chlordane, DDT, Dieldrin, Endrin, Heptachlor, Hexachlorobenzene, Mirex and Toxaphane). Mirex and toxaphane never entered into Bangladesh. Two other chemicals (Furans and dioxins) which are by-products of other chemical processes are also banned.

7. Environmental Guidelines for Contractors

The following guidelines should be included in the contractor's agreements:

- Installation of the work site on areas far enough from water points, houses and sensitive areas.
- Sanitary equipments and installations
- Site regulation (what is allowed and not allowed on work sites)
- Compliance with laws, rules and other permits in vigor.
- Hygiene and security on work sites
- Protect neighboring properties
- Ensure the permanence of the traffic and access of neighboring populations during the works to avoid hindrance to traffic
- Protect staff working on work sites by supplying the appropriate Personal Protective Equipment and taking reasonable precautions as detailed in the World Bank Environmental, Health and Safety Guidelines especially the General Construction Section.

- Soil, surface and groundwater protection: avoid any wastewater discharge, oil spill and discharge of any type of pollutants on soils, in surface or groundwater, in sewers, drainage ditches or into the sea.
- Protection of the environment against noise: reduce work site noise likely to seriously disturb neighboring people.
- Protect the environment against exhaust fuels and oils
- Protect the environment against dust and other solid residues
- Waste management: install containers to collect the wastes generated next to the areas of activity.
- Degradation/demolition of private properties: inform and raise the awareness of the populations before any activity of degradation of goods. Compensate beneficiaries before any demolition.
- Use a quarry of materials according to the mining code requirements
- Compensation planting in case of deforestation or tree felling
- No burning of waste and trash on the site
- Speed limitation of work site engines and cars
- Allow the access of Public and emergency services
- Organize the storage of materials on the public highway
- Parking and displacements of machines
- Footbridges and access of neighbors
- Install signage indicating works and provide notice to community residents.
- Respect of cultural sites. Stop work and notify authorities if a cultural object is found.
- Reclamation of the sites at the end of the works
- Dispose safely of asbestos
- Consider impacts such as noise, dust, and safety concerns on the surrounding population and schedule construction activities accordingly;
- Protect soil surfaces during construction;
- Ensure proper drainage.

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