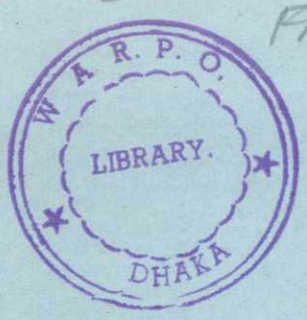

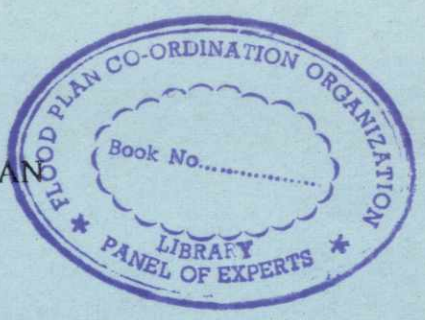

BANGLADESH FLOOD ACTION PLAN

DISCUSSION PAPER ON INSTITUTIONALIZING THE EIA PROCESS FOR WATER SECTOR PROJECTS

ENVIRONMENTAL STUDY (FAP 16)

Prepared for

The Flood Plan Coordination Organization (FPCO)
of the
Ministry of Irrigation Water Development and Flood Control

October 1993

ISPAN
IRRIGATION SUPPORT PROJECT FOR ASIA AND THE NEAR EAST
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PREFACE

The 1989 Group of Seven Meeting in Paris endorsed the setting-up of the Flood Action Plan (FAP) in 1989 for a five-year period 1990-95, and stipulated that every project in the plan will have to be, technically, economically, financially, and environmentally sound. Subsequently, the criterion "socially sound" was added at the first Donor Conference on FAP in January 1990.

The environmental requirement necessitated the setting up of a Plan Component known as the Environmental Study (FAP 16), to specifically assess the issues and environmental impacts of water development projects and produce guidelines so that these adverse impacts are mitigated or avoided in the planning, design, and operation of FAP projects. FAP 16 produced EIA Guidelines in 1991 and carried out several EIA case studies and special studies to test them under Bangladesh conditions. This learning experience and additional information was gathered together and an EIA Manual for the Water Sector was drafted. FPCO has accepted the EIA Guidelines and Manual, and issued them for the guidance of all other FAP components in October 1992.

Nationally, the dominant environmental issue is equitable sharing and management of the waters of the Ganges, Brahmaputra and Meghna-Barak river basins in the dry season, and regulation of flooding caused by these rivers and extremely high local rainfall during the monsoon period. To be completely effective, flood management projects identified by FAP have to be designed in the context of these major river basins, as will dry season salinity control, fisheries, surface water irrigation and navigation improvement projects.

FAP generated projects will be implemented over the next 20 years and therefore the institutional system for carrying out environmental assessment and monitoring on a regular basis has to be agreed upon within the Government of Bangladesh and set in place to meet national development goals. The valuable contribution the EIA Guidelines and Manual can make to environmentally sustainable water resources development will not realize its potential unless there is an appropriate institutional framework for operationalizing the EIA process, not just for FAP but for the whole water sector. The new system will require institutional development, which is a process of establishing and strengthening the capability of organizations to accomplish their mission, sustain that capacity and have the capability to evolve over time in response to changing environmental demands and requirements.

This report proposes means to strengthen the institutional mechanism for carrying out environmental assessment work on a systematic basis at all levels in government. It suggests how the project processing system can be modified to incorporate environmental assessment requirements. The primary purpose of this report is to focus discussion on who should be involved, how institutionalization may be achieved, and a timetable for implementation.

ACKNOWLEDGEMENTS

This report was the result of a team effort by FAP 16 (Environmental Study) coordinated by Keith Pitman, Chief of Party, ISPAN. This final discussion draft was produced jointly by Keith Pitman and Haroun Er Rashid.

Stan Hirst, former Team Leader of FAP 16 and Haroun Er Rashid, Co-team Leader, prepared the initial draft report in August 1993. They and Dara Shamsuddin, under the general direction of the Flood Plan Coordination Organization (FPCO), undertook a long series of interviews and discussions with many agencies and organizations associated with the environment and water development in Bangladesh in order to obtain the information used in this report.

ISPAN would like to acknowledge the fruitful discussions and help received from officials at the Ministry of Irrigation, Water Development and Flood Control; Risalat Ahmed, Director General of the Department of Environment; A.Z.M.Nasiruddin, Secretary Ministry of Fisheries and Livestock; Senior Officials in the Agriculture and Water Division of the Planning Commission; Liaquat Hossain, Member Planning, Bangladesh Water Development Board; Director General, Water Resources Planning Organization; Q.I Siddique, Chief Engineer, Local Government Engineering Department; Faculty members of Bangladesh University of Engineering and Technology; Dr.Quasem and other Fellows of Bangladesh Institute of Development Studies; USAID Bangladesh; Steve Nakashima of CARE (Bangladesh); officials of the Association of Development Agencies In Bangladesh; PROSHIKA (MUK) and PROSHIKA (Comilla); and Masud Ahmed and Dr. Salimuzzaman, institutional experts, who are members of the FPCO Panel of Experts.

GLOSSARY

Baseline studies - work done to collect and interpret information on the status and trends of the environment likely to be affected by a development action.

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

Environmental impact - a change in the state or functioning of an environmental resource or component caused by the action(s) of a physical intervention including development projects. It should be distinguished from the impact to resources or components caused by natural factors, e.g., floods.

Environmental Impact Assessment (EIA) - the systematic study, assessment, and reporting of the impacts of a proposed program, plan, or project, including a plan for dealing with negative impacts.

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

Initial Environmental Evaluation (IEE) - environmental assessment undertaken for a regional- or prefeasibility-level study for identifying and assessing possible environmental impacts.

Important Environmental Components (IECs) - 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 regime.

Preliminary Environmental Review (PER) - an initial review to determine whether a proposed project affects Import Environmental Components (IECs) or is in contravention of legislation or international conventions and treaties concerning the environment.

Sustainable development - 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 (adapted from the Brundtland Commission, 1987).

ACRONYMS

ADB	Asian Development Bank
BARC	Bangladesh Agricultural Research Council
BIDS	Bangladesh Institute for Development Studies
BIWTA	Bangladesh Inland Water Transport Authority
BWDB	Bangladesh Water Development Board
CPP	Compartmentalization Pilot Project
DOE	Department of Environment
DPEC	Departmental Project Evaluation Committee
DPHE	Department of Public Health Engineering
ECNEC	Executive Committee of National Economic Council
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ERD	Economic Relations Division, Ministry of Finance
ERMTC	Environmental Research, Management, and Training Center
FAP	Flood Action Plan
FCD	Flood Control and Drainage
FCD/I	Flood Control, Drainage, and Irrigation
FPCO	Flood Plan Coordination Organization
GOB	Government of Bangladesh
IEE	Initial Environmental Evaluation
IMED	Implementation, Monitoring, and Evaluation Division (Ministry of Planning).
IEC	Important Environmental Components
LGED	Local Government Engineering Department
MIWDFC	Ministry of Irrigation, Water Development, and Flood Control
MOEF	Ministry of Environment and Forest
NCS	National Conservation Strategy
NACA	Network of Aquaculture Centers in Asia and the Pacific
NEMAP	National Environment Management Action Plan
NGO	Non-governmental Organization
PATC	Public Administration Training Center
PER	Preliminary Environmental Review
PCP	Project Concept Paper
PPP	Preliminary Project Proposal
PP	Project Proforma
SRDI	Soil Resources Development Institute
TOR	Terms of Reference
TAPP	Technical Assistance Project Proforma
USAID	United States Agency for International Development

Chapter 1

INTRODUCTION

1.1 Background

Following widespread major floods in 1987 and 1988, the Government of Bangladesh (GOB) identified floods as a major economic, social, human, and environmental problem. Accordingly, in 1989 the World Bank was asked to develop and coordinate a five-year (1990-95) Flood Action Plan (FAP). The FAP aims to identify, plan, and construct projects that are technically, economically, financially, socially, and environmentally feasible. The FAP represents the first time that the government has committed itself to examining engineering projects for their environmental impact. As a result of this commitment, the Ministry of Water Development and Flood Control (MIWDFC), through the Flood Plan Coordination Organization (FPCO), has taken the lead in incorporating environmental assessment and management into its project formulation process.

Concern about the effects of water development projects is overdue; reviews of the state of the environment in Bangladesh have cited water development projects as a major cause of environmental change. Although such projects are designed to change the environment, no water sector project implemented in Bangladesh to date has been subject to environmental impact assessment (EIA) before construction, and many have been found to have produced adverse environmental impacts that were unanticipated during project formulation and design. Moreover, only some of the projects currently planned have been subject to EIA, and the quality of that examination has been very uneven because no national standards had been set for the process.

It is only in the past five years that environmental planning and management has come to the forefront of national development. The catastrophic floods of 1987 and 1988 led to international concern about the continued and sustainable development of Bangladesh as embodied in the Paris G7 Communique of July 1989:

> *It is a matter of international concern that Bangladesh, one of the poorest and most densely populated countries in the world, is periodically devastated by catastrophic floods....We stress the urgent need for effective coordinated action...in order to find solutions to this major problem, which are technically, financially, economically and environmentally sound.*

Following the spirit of the G7 communique, the FAP made special provision to incorporate G7 criteria into water sector project planning for FCD and FCD/I projects and produced three sets of guidelines to implement this policy, they are:

- Guidelines for Project Appraisal (July 1991)
- Guidelines for Environmental Impact Assessment (October 1992)
- Guidelines for People's Participation (March 1993)

In parallel with these changes in the water sector, in 1988 the Ministry of Environment and Forest (MOEF) was established and led the conversion of

the Department of Pollution Control into the Department of Environment (DOE). DOE has agreed that FPCO EIA Guidelines should be adopted nationally for water sector development as they are consistent with the Bangladesh National Environmental Policy (GOB 1992) and in line with the Rio Earth Summit declaration of June 1992.

1.2 Aims of the Report

The objective of this report is to outline the present state of environmental assessment and institutional arrangements for it in Bangladesh; identify revisions to the procedures for project formulation, design, and approval to ensure that environmental examination is ensured; provide a timetable for implementation; and suggest modifications to the current institutional arrangements for this task.

This report addresses four major issues on which consensus is required to ensure smooth adoption of the environmental assessment process:

- enabling legislation;
- the policies and guidelines necessary to apply the legislation;
- the agencies responsible for implementation of the policies and guidelines; and
- the personnel and resources required.

1.3 Institutional Setting

Until 1973 there was no separate establishment or legislative provision related to or responsible for environmental pollution or management in Bangladesh. The Directorate of Public Health Engineering (DPHE, set up in the 1950s) was responsible for constructing community water supply and sewage disposal systems. With the realization of the importance of water pollution control, GOB passed a "Water Pollution Control Act" in 1973. This Act authorized projects to control surface and groundwater pollution under guidance and supervision of the DPHE.

In 1977, GOB promulgated the "Environment Pollution Control Ordinance" that was implemented through a new Environmental Pollution Control Board (EPCB). Subsequently, EPCB was merged with all other environmental agencies and projects to be reconstituted as the Department of Environment Pollution Control (DEPC) in 1985.

Recurrent natural disasters, and increased concern regarding ecological and environmental issues at home and abroad, convinced the GOB to take action to improve environmental and natural resources management. A separate Ministry for Environment and Forest (MOEF) was formed in 1989 and the Department of Environment and Pollution Control was renamed and reconstituted as the Department of Environment (DOE).

The DOE is the national agency responsible for environmental planning, management, and monitoring. It also works as the technical arm of the MOEF. In addition, its major responsibilities are:

- coordinating environmental assessment and monitoring;
- undertaking assessment and monitoring tasks such as on-site surveillance of development projects and follow-up monitoring to decide if environmental improvement measures are effective;
- preparing reports for submission to planning and implementing agencies;
- promoting environmental awareness through public information programs; and,
- controlling and monitoring of industrial pollution.

DOE has prepared National Environmental Quality Standards, and National Environmental Guidelines for Industries that await GOB Gazette notification. It also has drafted an Environment Protection Bill that is being considered by GOB for submission to Parliament. If enacted, this bill will provide the framework to authorize environmental assessment and protection and mitigation measures. It also mandates the issuing of codes or guidelines, and states that ecosystems threatened with serious degradation will be declared ecologically critical. The water sector will have to operate not only

within the framework of the proposed act but also in compliance with a large volume of other legislation that bears on, and creates precedents for, the use and management of water resources (Appendix 1).

Clearly the MOEF has primary responsibility for formulating environmental policy and ensuring that the various environmental guidelines listed above conform with the policy and with subsequent legislation. The process by which the DOE will be linked with line agencies, NGOs, and others who will conduct environmental research, make assessments, and implement conservation measures is not yet formalized. Indeed, one of the objectives of this paper is act as a catalyst in the formalization process. While the FAP has identified many of the environmental issues affecting FCD and FCD/I project proposals including—floodplain capture fisheries, for example—MOEF, through the DOE, should coordinate and guide sectoral as well as national environmental research, planning, and conservation. A major part of the coordination role will be to objectively review sectoral, regional, and project environmental impact assessments carried out either by line agencies or private sector consultants, and assist the Planning Commission in screening and processing the environmental components of development projects.

A fully trained cadre of planners, administrators, and environmental practitioners in Bangladesh is prerequisite to establishing a workable and sound institutional mechanism for environmentally sustainable development. This paper puts forward recommendations for training at different levels of the government, ranging from awareness seminars for senior administrators to technical training at graduation and on induction to service. It is also vital that the private sector's training needs are addressed; failure to do so will force continued reliance on foreign technical assistance to meet the environmental conditionalities placed on projects by donors.

Chapter 2

NATIONAL ENVIRONMENTAL POLICY

The Constitution of Bangladesh embodies, among other fundamental principles, conservation of national cultural traditions and heritage and protection of national monuments, objects, or places of special artistic or historic importance or interest. The constitution also provides that no property shall be compulsory acquired, nationalized, or requisitioned save by authority of law and with compensation. These policies and principles need to be taken into consideration at several stages of the EIA of water sector projects.

Bangladesh is a member of United Nations Environment Programme (UNEP) and South Asian Cooperatives of Environment Programme (SACEP). In 1985, GOB organized and Chaired SACEP's Second Governing Council meeting in Dhaka and in 1988-91 a Bangladesh representative was Director of SACEP. MOEF through DOE maintains active and effective links with International Environmental Information System (INFOTERA), Global Environmental Monitoring System (GEMS) and Environmental Unit of ESCAP. With the cooperation of SACEP, ESCAP, and MOEF with DOE, several national agencies and NGOs have organized several symposiums and workshops on key environmental issues and took an active part in different international meetings, seminars and workshops on environment.

Bangladesh is a signatory of the Rio Declaration on Environment and Development, the Convention on Biological Diversity, and the Ramsar Convention, and other international agreements (Appendix 2) and has made a commitment to more focused protection of the environment. The Rio declaration states categorically that the only way to have long-term economic progress is to link it with environmental protection. It also clearly enunciates that in order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it. In the chapter on protecting and managing fresh water resources it says that unwise use of water resources has led to many problems that are the result of an environmentally destructive development model. It points out that there is widespread failure to understand the linkage between various forms of development and their impact on water resources:

> *Better water management will require innovative technologies, including the improvement of indigenous technologies, to make full use of limited water resources and to safeguard the water from pollution. It will require that water management be integrated into national economic and social policies, including planning of land use, utilization of forest resources and the protection of mountain slopes and river banks.*

By acceding to the Rio Declaration, the Government of Bangladesh also agreed in principle to Agenda 21, an extensive guide to policy-making.

The Convention on Biological Diversity mandates that signatory nations shall, among other actions, use environmental impact assessment—with public participation—on projects that threaten biological diversity in order to avoid or minimize damage.

In accord with these principles, the Environment Policy of 1992 (GOB 1992) has identified six general objectives, of which the following are applicable the water sector:

- **Water Development, flood control, and irrigation:** environmentally sound and sustainable development and management of water development, drainage, and irrigation projects involving both surface and groundwater; maintaining the inland waters free from pollution; arranging for EIA prior to implementation of water development and management projects; removing adverse environmental effects of previous water resources management and flood control projects.
- **Agriculture:** agricultural development and self-sufficiency in food is to be achieved through conserving the agricultural resource base through judicious use of appropriate development and management technology.
- **Fisheries:** protecting, conserving, and developing fish habitat; developing fisheries without adversely affecting the mangrove and other ecosystems; re-evaluating of those FCD/I projects found to cause adverse effects on fisheries resources.
- **Land:** adopting and extending environmentally and ecologically sound land use practices and conservation of soil fertility; preventing land erosion and strengthening the land reclamation program; preventing soil salinity and alkalinity.
- **Forests, wildlife, and biodiversity:** forest conservation and afforestation programs in order to maintain ecological balance; conserving wildlife and biodiversity; research program; exchange program of knowledge and experience; conserving and developing national wetlands and migratory bird sanctuaries.

By adopting these five objectives for the water sector, the GOB's Environmental Policy also implicitly supports the recent World Bank policy statement that the primary goal of water resources development is "to ensure the sustainability of the water environment for multiple users as an integral part of a country's economic development" (Water Resource Management Policy, World Bank, 1993 p.41).

The Environmental Policy will be further strengthened by the National Conservation Strategy (NCS) that is now before the government for approval. The NCS strongly argues the case for sustainable development of Bangladesh's resources:

> *Development activities primarily mean exploitation of natural resources, but sustainable development will make it incumbent on the present generation benefiting from the inherited life support system, to repair the damages caused in the past and spare the resource base for regeneration and use of the future generations as well.*

The NCS identifies the need for an appropriate institutional framework to fulfil this need and pinpoints the importance of EIA in decision-making:

> *Institutional issues dominate the planning process. There is the urgent necessity to get planners out of the cocoons that have enveloped them—for no fault of theirs—and compel them to have a fuller vision. New approaches to interagency coordination become a key element to rational resource use. It is vital that dialogue be initiated at an early stage among competing users and environmental impact assessment is a mechanism for achieving rationality in decision-making. Principles of ecology go hand in hand with economic criteria in the final analysis.*

The country does not as yet have a set of government-approved procedures for the whole range of environmental impact assessment and auditing, although there is unanimity on the need to undertake such assessments during project work.

This paper proposes procedures for institutionalizing environmental assessment and management within the planning process in general, and the water sector in particular. Such assessments are essential because they:

(a) allow project designers, implementing agencies, and donors (if any) to address the issues in a timely and cost-effective manner;
(b) reduce the need for donor-imposed project conditionalities involving the environment (often a major issue between the government and donors) because appropriate measures can be incorporated into the project design and alternatives to the proposed project can be considered;
(c) help avoid costly delays in implementation.
(d) provide a formal mechanism for coordinating environmental activities among agencies and for addressing the concerns of affected people and NGOs;
(e) identify ways of improving projects environmentally by preventing, minimizing, mitigating, or compensating for adverse impacts; and
(f) provide an environmental management plan to ensure sound project implementation and operation.

Institutionalization of environmental assessment (hereafter referred to as the EIA process) is necessary because at present the EIA process is *ad hoc* and piecemeal. As shown in Figure 1, the EIA process initiated within FAP is only a small part of a very much larger issue. If the EIA process is incorporated within the existing project processing and implementation procedure, then the result will be economic development on a more sustainable basis.

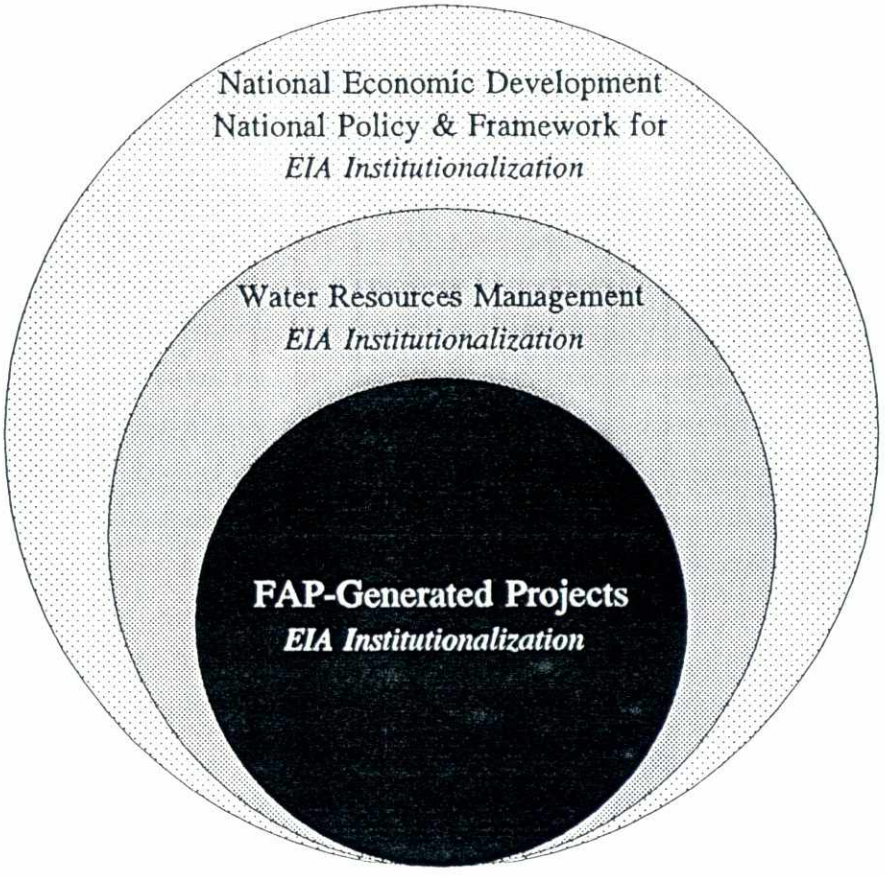

Figure 1 The Institutionalization of EIA

Chapter 3

THE EIA PROCESS

3.1 Objectives of EIA

The main objectives of EIA are to identify and quantify environmental impacts of proposed plans, programs, and projects thereby:

- assisting decision-makers and their constituents to make informed decisions about project development alternatives and resource allocation;
- providing quantitative environmental information so that potential adverse impacts can be avoided in project and program design;
- providing a basis for developing management measures to avoid or reduce negative impacts; and
- providing an environment management plan (EMP) for the project.

EIA is an integral part of multiple-resource development planning and feasibility planning for projects. It provides for an assessment of the biophysical, economic, and social impacts of proposed projects as well as the likelihood that such impacts will occur. It provides for the participation of local groups in identifying impacts, assessing their significance, and formulating strategies to manage negative impacts and enhance those that are beneficial. EIA accomplishes its purpose by providing decision-makers with the best quantitative information available regarding the intended and unintended consequences of particular investments and alternatives, the means and costs to manage undesirable effects, and the consequences of taking no action.

EIA should neither disrupt nor impede development but should enhance benefits derived from development. EIAs ensure that projects are constructed and operated in an environmentally sensitive way and do not negatively affect the functioning of essential environmental processes. Long-term sustainability of resource conservation, the rational utilization of resources, and human well-being are primary goals. In addition to identifying and describing environmental impacts that a proposed project would likely cause if no environmental protection measures were included, the EIA should:

- specify the necessary environmental protection measures;
- ensure that these are included in the overall project design and feasibility study; and
- ensure that the project management will include an EMP.

EIAs can also be undertaken on a regional or sectoral basis. A regional or sectoral EIA can reduce the time and effort required for project-specific EIAs in the same region or sector, by identifying issues and collecting and analyzing baseline data. Regional EIAs are desirable when a number of development activities are planned or proposed for a relatively small geographic area, e.g., one of the five FAP hydrologic regions in Bangladesh. Regional EIAs contribute to the efficiency of project preparation by reducing the time and effort spent on project-specific impacts of multiple projects planned in the same sector. In the context of the FAP, several regional planning tools are being designed to assess the impact of FCD

and FCD/I, an example being the FAP 25 Flood Management Model for the North Central Regional Study (FAP 3). Regional EIAs can, in some areas, substitute for some components of project-specific EIAs by producing guidelines and criteria for the design and implementation of projects.

A national EIA also should be undertaken to understand and quantify the cumulative effects of projects that are simultaneously being implemented in several regions. This will lead to a rational selection of project alternatives that avoid adverse impacts or enable their mitigation. EIAs should also be conducted in areas of specific concern and for projects like the Jamuna Bridge river training works and associated roads and the Brahmaputra left embankment. The impact of these projects on downstream flood hazard and sedimentation, particularly below the bridge site and in the Padma River should be closely scrutinized.

The need for regional and national EIA of planned changes in the hydrology of the major rivers is particularly important since more than 90 percent of Bangladesh's dry season surface water resources flow from India. The environmental impact on Bangladesh of unilateral diversion of these rivers, particularly the Ganges, Teesta, and the headwaters of the Meghna, calls for an objective examination to ensure an optimal and equitable solution for water sharing in all three rivers basins. Given the national impact of these diversions on many sectors of the economy, institutionalizing the EIA process is imperative to ensure environmentally sustainable development in the context of the separate river basins of the Ganges, Brahmaputra, and Meghna rivers.

3.2 Emphasis in EIA

Sound EIA in water sector projects will enable reliable assessments of environmental impacts likely to result from proposed projects. This will result in:

- reliable field data on the background environment and on various environmental relationships in the field;
- validated relationships between environmental components and resources and the predicted impacts, appropriate under local conditions; and
- consideration of impacts on all targets considered sensitive or critical under the prevailing conditions and value systems.

Participation of affected communities at various stages of the assessment will be essential because reliance on the judgement of local people, knowledgeable officials, and other interested parties will be the principal way of obtaining information.

3.3 EIA in Project Planning

EIA is a planning tool that will be used together with the project prefeasibility and feasibility studies to ensure that the project plan is environmentally as well as economically sound and therefore represents the best approach to planning in order that development will be sustainable. A project plan that is optimal from both environmental and economic perspectives will have a higher benefit/cost ratio and economic rates of return than a plan that is unresponsive to environmental needs, especially when long-term as well as short-term effects are considered.

3.4 Project Screening for EIA

The objective of project screening is to determine beforehand the nature and extent of the EIA to be carried out. Screening matches the level of effort in the EIA to the expected extent and severity of the anticipated impacts. Projects may be classified into categories based on type, location, environmental sensitivity, project scale, and the nature and magnitude of the potential impacts. Full EIAs are required for some project categories, while only limited investigations are specified for lesser categories.

Projects requiring full EIAs are those considered likely to have significant adverse impacts that may

be irreversible, diverse, or have effects that are broad spectrum, multisectoral, sector-wide, and/or precedent-setting. Projects not requiring full EIAs are those with potential impacts likely not to be as sensitive, numerous, major, or diverse, and for which remedial measures can more easily be designed, or projects that have been built many times in the past with well-documented effects that are well understood, well anticipated, and well managed by available mitigation means. Institutional structures should be in place and able to deal with such impacts.

It is standard practice to use an agreed list of environmental criteria to screen projects for their likely impact and the depth of the EIA required. The experience to create such screening process currently does not exist in Bangladesh, although it is clearly needed in order to meet the country's special needs in this area. Until such time as this experience does exist, it is difficult to envision an appropriate list of criteria for project screening on a national level. All donor agencies have their own criteria for environmental screening of the projects they finance. The World Bank, for example, in Operational Directive 4.00, classifies project proposals into one of four categories (see box). Since donor criteria will usually have to be met regardless of the screening process applied by the GOB, it might make sense for Bangladesh to pattern its own criteria after those of one of its major donors. Such screening and categorization requires the objective judgement of independent assessors outside the project design and implementation process. Most FAP projects under consideration are not small enough in scale or potentially benign enough in the nature of their impacts to be considered for anything less than a full EIA. These projects involve major social issues and complex hydrological problems and associated environmental and social effects. It is too early to make *a priori* judgement on the environmental impacts of any project until the required skills and experience are developed in-country.

3.5 Stages of EIA

In the context of the FAP, and in the water sector in general, EIA will be applied at two main stages of detail—pre-feasibility and feasibility.

Pre-feasibility-level assessment addresses regional planning options for water resource development

World Bank Screening Criteria: Operational Directive 4.00 Annex A3

Projects/components should be screened after identification and assigned to one of the following categories based upon the nature, magnitude, and sensitivity of environmental issues:

Category A: Environmental analysis (EA) is normally required as the project may have diverse and significant environmental impacts. Out of 21 project types falling in this category, eight relate to large scale water sector projects which include: River Basin Development; Irrigation and Drainage (large scale); Resettlement; Land Clearance and Leveling; Reclamation and New Land Development; Aquaculture (Large scale); Urban Water Supply and Sanitation (large scale); and Port and Harbor Development.

Category B: More limited environmental analysis is appropriate, as the project may have specific environmental impacts. Of the 13 categories listed the three water sector areas identified are Aquaculture and Mariculture (small scale); Irrigation and Drainage (small scale); and Rural Water Supply and Sanitation.

Category C: Environmental analysis is normally unnecessary.

Category D: Environmental projects, for which separate EAs may not be required, as environment would be a major focus of project preparation.

through preparation of an Initial Environmental Evaluation (IEE). The main thrust at this stage is to assess regional resources and the effects of past interventions, examine the likely project environmental linkages and interactions, establish the range and potential magnitude of impacts, identify the key regional environmental issues, compare the environmental consequences of project alternatives, and develop an effective people's participation program. The same types of impacts as would be assessed during the feasibility stage are considered but at more general levels of detail and at larger scales of resolution.

Following pre-feasibility studies, the decision-makers may choose to:

- proceed with feasibility studies and a detailed EIA that indicates that project impacts are acceptable and/or manageable; or
- proceed with feasibility studies and a detailed EIA on a modified project to reduce unacceptably high levels of adverse impacts; or
- reject the project because the nature and magnitude of the impacts are shown to be unacceptable for any of the following reasons: technically unsound, environmentally damaging, socially harmful, or financially or economically inviable.

Even though the project as formulated may be rejected, the facts revealed by the EIA are not wasted as they may lead to a different concept for developing the area and they will add to the nation's knowledge of its environment.

Feasibility-level EIA provides a basis for:

- detailed impact assessments of selected project options;
- mitigation planning to reduce biophysical and social impacts;
- planning compensation for unavoidable impacts;
- planning enhanced project performance;
- establishing a monitoring program; and
- ongoing people's participation in project construction, operation, and maintenance.

3.6 Relationship of EIA to Technical and Economic Feasibility

In comparative levels of study detail and decision-making, EIA should parallel the engineering and technical studies and economic evaluations in order to guarantee that environmental evaluations and audits are linked closely with:

- engineering evaluations, so that effective project modifications and environmental management can be developed; and
- economic evaluations, to ensure that both environmental benefits and losses of the project as well as the costs of environmental management are accounted for in the cost-benefit analyses.

3.7 Integrated Assessments

An integrated assessment of alternative structural and non-structural development options should be made and alternatives ranked. Preferred options should be identified and justified on the basis of technical and economic soundness and long-term environmental resource sustainability and acceptability. The assessment should clearly set out the criteria and methods used in the evaluation of alternatives. Preferred options should be realistically appraised on the basis of past experience and performance of similar developments in the region.

3.8 Environmental Management Objectives

The main land and water management objectives for long-term national, regional, and project development should be identified and quantified and the environmental appropriateness assessed. The development options should be identified, the main linkages to existing environmental conditions should be described, and resource use and management systems appraised. The main environmen-

tal constraints to development, especially involving further water management, flood control, drainage, and irrigation should be identified. Explicit appraisal should be made of the environmental sustainability of present land and water resource management and future management with the projects in place. This appraisal should consider existing trends in population size, growth, agricultural development, habitat destruction, changes in the value of land and soil resources, pollution, and other relevant factors.

The water management problems of Bangladesh cannot be tackled only at the national level, since 90 percent of the water flowing through the country originates outside its boundaries. A regional perspective is therefore very important for Bangladesh, and development of water resources should take a basin-by-basin approach. This predicates that regional water resources development planning and development, and environmental assessment, should be designed in the context of strategies for developing river basins.

The NCS outlined an implementation strategy for 20 major sectors, some of which are directly relevant to water sector development. Appendix 3 of this paper lists 32 recommendations directly affecting water resource development that should be considered during IEE or EIA. Institutions designing resource use must now move from single-objective planning to multiple-objective planning and thereby take account of intersectoral impacts.

3.9 Levels of Effort in EIA

EIA is an integral part of the planning process, which is cross-sectoral in nature, and should consequently be undertaken by the multidisciplinary team according to the resources expected to be affected by the proposed action. For flood control projects, for example, the team should comprise regional and local planners, engineers, hydrologists, agronomists, biologists, sociologists/social anthropologists, economists, and other disciplines deemed necessary.

Levels of effort required for assessment will vary according to:

- whether the study is at the regional planning, pre-feasibility, or feasibility level;
- the size of the area being studied;
- the complexity of the area under study;
- the amount of background information available;
- the experience of the study team members in undertaking EIAs; and
- the amount of study support available from other study components.

The skills and various levels of effort required in the study team are described in detail in the FAP EIA Manual (FPCO 1992). The level of cross-sectoral coordination and cooperation is illustrated by institutional responsibilities identified during the EIA of the FAP 20 Compartmentalization Pilot Project (CPP), as shown in Table 1.

Projects that include rivers or would affect supply of water or disposal of liquid wastes to rivers or groundwater would also require the cooperation of BIWTA, *pourashavas*, municipalities, port authorities, the private sector, commerce, and industry.

Table 1 Proposed Institutional Responsibilities in the Implementation of the FAP 20 Tangail Compartmentalization Pilot Project (CPP)

Agencies Involved	Mitigation/Compensation/ Enhancement/Extension program/Monitoring
Department of Agricultural Extension; SRDI; Department of Environment	Balanced use of fertilizer and insecticide. Intensified agricultural extension work in the project area.
Department of Public Health Engineering;	Increased number of tubewells for drinking, cooking, and bathing for people and livestock.
Department of Agricultural Extension; Department of Environment; Local Government Institutions	Integrated Pest Management program to reduce use of pesticide/insecticide and maintain surface water quality.
BARC; Department of Environment and Department of Forest; Local Government Institutions	Increased HYV cultivation; increased cropping intensity; increased vegetation yield from homestead by planting more economically profitable trees and vegetables/fodder.
FAP 20; Fisheries Department; Department of Agricultural extension; Department of Environment	Inclusion and monitoring of "fish friendly" regulators; integrated farming of rice/fish with training of farmers; increased culture fisheries production.
Ministry of Land; BWDB; Proposed Water Users Groups; NGOs	The proposed "*beel*" concept to be integrated with *khas* lands and *jalmahals* that are presently leased out. These are to be taken out of the leasing system and reserved as Common Property Resources and habitat for species diversity.
FAP 20; Roads and Highways Department, Local Government Institutions	Better road communication, particularly metalled road inside the project; where possible allow for vehicles to cross over the structures. Cross-over arrangements also apply to structures blocking the navigation routes.
Ministry of Land; FAP 20; BWDB	Water management to retain specified minimum amount of water in the *khas* land *beels* during the dry season; preventing of *khas* lands being settled as agricultural land.
BWDB; FAP 20; NGOs	Culture fisheries coops or associations for landless with the help of NGOs.
BWDB; Deputy Commissioner, Tangail; Ministry of Land, Ministry of Law and Justice	Financial compensation expedited; provision for paying interest on compensation money for delayed payment.

Source: FPCO/ISPAN 1992 (c): FAP 16 EIA of CPP Project

Chapter 4

INSTITUTIONALIZATION

The FPCO, through FAP 16, has taken the lead in developing standard systems and procedures for reflecting concerns for practical environmental management in the water sector. It has prepared EIA Guidelines and an EIA Manual and has also begun systematic training of the Bangladesh Water Development Board (BWDB) staff and other government, NGO, and private sector professionals to review IEE/EIA work. Environmental concerns now feature prominently in FAP projects, and the government and donors are committed to take them into account in future projects.

It is now generally recognized that water resource development has to be both multidisciplinary and multisectoral, which means the planning process has to be given even greater importance to the assessment of project or program impact on the environment. Figure 2 illustrates the fact that the water sector, while complex, is only a part of a

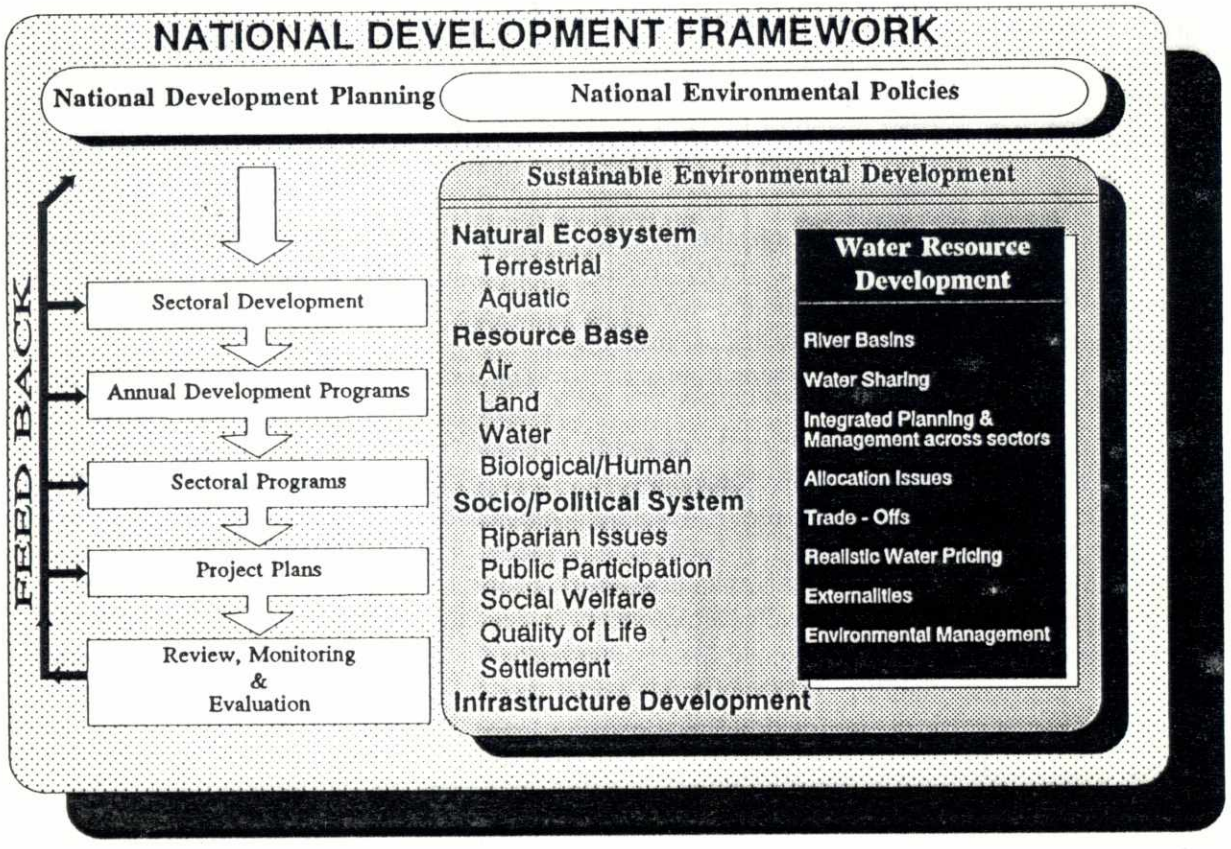

Figure 2 The National Development Framework

much broader system for sustainable environmental development. Having recognized the need for planning and environmental assessment for all development proposals, both the FPCO and the BWDB are now setting up EIA cells in their organizations. All development work affects several sectors at the same time, therefore other agencies in the water sector are expected to take up the EIA process and integrate it into their planning system as well. The main problem is not only conceptualizing and justifying projects, but ensuring that they are robust and pass all the several stages of fitness for inclusion in the national development plan as a viable project.

4.1 Procedures for Project Processing

Managing the selection process for viable water sector projects should be seen as a part of the environmental management system for the entire economic development process. In this context, the procedure for project processing needs consideration, because the timing and nature of environmental management interventions will depend on modifying current procedures for project processing and approval.

The project process (Figure 3) formally begins when the concerned ministry/organization submits a Preliminary Project Proforma (PPP) to the Planning Commission and Economic Relations Department (ERD). The PPP format at present contains no questions on environmental impact.

The Planning Commission's views on the proposal are communicated to both the initiating ministry and ERD. If the project is acceptable in principle, the sponsoring ministry, with help of ERD, will, if the project is donor-funded, undertake preliminary discussions with the prospective donor. On receipt of assurance of aid (through ERD), the ministry will prepare the PPP. If no donor funding is involved, ERD is kept informed but obviously does not have to process any request.

The PPP has to indicate if the project requires a prefeasibility or feasibility study. If so, the study will be processed under a Technical Assistance Project Proforma (TAPP). Feasibility studies are normally funded by the donor agency, or if technical assistance funding comes from some other source, the donor will act as the executing agency. Thus, the World Bank may act as executing agency for project feasibility technical assistance funded by UNDP, but it subsequently funds project implementation.

Pre-feasibility and feasibility studies, pre-appraisal mission reports, and the appraisal report of the development partner are all to be completed before the PPP is rewritten in more detail into the Project Concept Paper (PCP). The PCP will have to incorporate the main finding of the prefeasibility or feasibility study. The PCP is the principal document on the government side.

The PCP will have to incorporate expected impact of the project on the environment, as well as on women and other socioeconomic groups, particularly those below the poverty line. It will be circulated to, among others, Ministry of Environment and Ministry of Women's Affairs, and any other ministry likely to affected by the proposed project. All ministries concerned (including Environment) will be required to send their comments to the Planning Commission within 15 days. Concurrence with the project proposal will be assumed if no comment is received within 15 days.

The PCP is then reviewed in light of the comments received in an inter-ministerial meeting headed by the Member, Planning Commission. (This meeting is a re-introduction of the Project Evaluation Committee meeting that was dispensed with in 1990.) If any modification is considered necessary or if some relevant data or information is missing, the PCP can be sent back to the ministry for revision. The PCP, along with the comments and recommendations of the sub-ministerial meeting, is then submitted to the Executive Committee of the National Economic Council (ECNEC) for consideration/approval. Upon approval, the responsible ministry puts up a Project Proforma (PP) that spells out in detail the PCP

CURRENT PROCEDURE FOR PROJECT PROCESSING

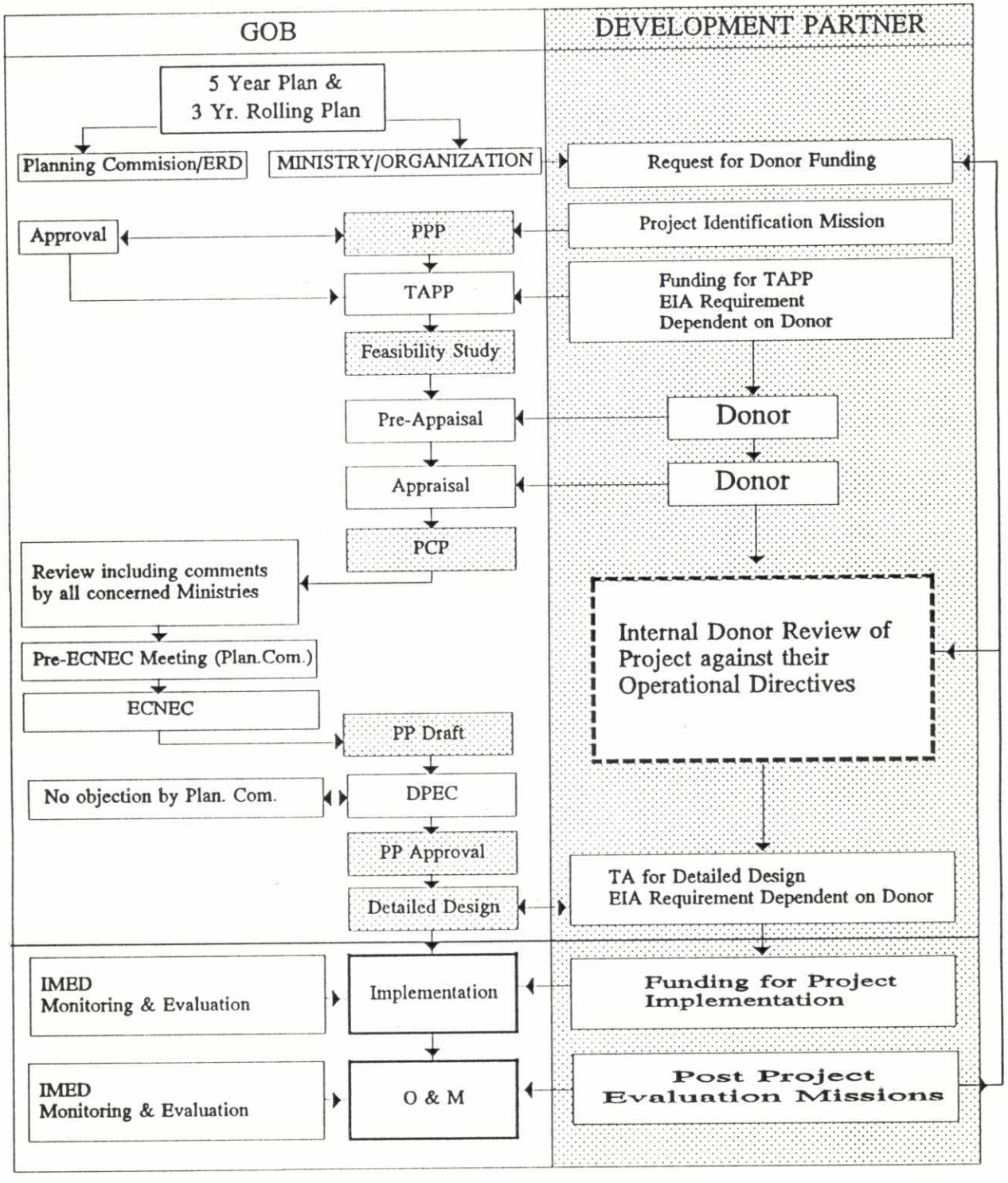

Figure 3 Current Procedure for Project Processing

approved by ECNEC. If technical assistance is required, the PP becomes the basis for the Technical Assistance Project Proforma (TAPP).

The Departmental Project Evaluation Committee (DPEC), headed by the Secretary of the Ministry, finalizes the PP. If Planning Commission finds that the PP as approved by DPEC has deviated in any manner from the ECNEC-approved PCP, then approval for implementation is held up until necessary revisions are made.

4.2 Institutionalization of EIA in the Water Sector

It is essential that the EIA process be institutionalized in the whole development planning and investment process. To that end, the development of sound and timely institutional mechanisms for environmental assessment and management in the water sector is of vital importance. Institutionalizing the EIA process in the water sector may lead to the integration of environmental concern in the entire development planning system. It must be recognized that any attempt to separate the EIA system from integrated planning will only result in the marginalization of environmental issues.

The FPCO, through the efforts of FAP 16, has endeavored to institutionalize the EIA process within FAP. The EIA process has significance beyond FAP and indeed beyond the water sector. Institutionalization of the EIA process within the development planning process is the ultimate objective. A beginning has been made within the MIWDFC, and this is expected to widen the process further within the water sector, including DPHE, BIWTA, Ministry of Agriculture, and the Ministry of Fisheries and Livestock.

The relationship of each of these processes is illustrated in Figure 2. Institutionalizing EIA for government water sector projects can be seen as a part of the follow-up to the FAP studies. The FAP has provided FPCO with the opportunity to develop its GPA EIA Guidelines an EIA Manual, and Guidelines for People's Participation. This has been a significant achievement, since nothing comparable has so far been done in other sectors. The FAP has also mandated that all projects be environmentally sound, thus compelling project formulators to take environmental impact into account. Although only a beginning has been made, it is acknowledged that the MIWDFC has taken a lead role in following the EIA process. Without a framework for the EIA process as a component of overall national resource development, however, there cannot be meaningful EIA work. FAP, in turn, is only one component of water resources planning, development, and management in Bangladesh. The FAP cannot stand alone; it has to be seen in the context of the entire water sector, in which dry-season demand for water, and the needs of sectors other than agriculture, assume particular importance.

Over the past three years FAP to a large extent has been an exercise on its own, but now it has to be integrated into the overall development perspective plan for the country. Given the increasing importance of EIA in project work, the lead taken by the water sector to carry out environmental assessment should place it favorably when competing for scarce resources. The parameters of water sector development are defined by the National Development Plan and the objectives of the two must coincide. That will require prioritization of development options in the context of limited investment resources; water sector projects which can conclusively demonstrate environmental soundness and potential for sustainable development will clearly be well placed to compete.

Chapter 5

ENSURING ENVIRONMENTAL ASSESSMENT IN FUTURE PROJECT FORMULATION

The Planning Process should integrate environment concerns from the very beginning, as illustrated in Figure 4. This has been stated as a goal many times, but even now only a few projects are subjected to environmental assessment, and then only after the project has been formulated. This is happening because of a lack of guidelines, trained professionals, and an institutional framework. Environmental concerns must be considered before the PPP has been written. At the very identification stage, an environmental management practitioner should be asked to go through a checklist based on appropriate guidelines that include existing legal provisions. Such a Preliminary Environmental Review (PER) should be carried out before the PPP is sent to Planning Commission for approval. It is not yet a standard GOB practice, and PER guidelines should be drafted and approved as a prerequisite for institutionalizing the EIA process.

More in-depth environmental examination, an IEE or EIA, should be carried out between PPP approval and the submission of the PCP (Figure 3). For most projects this is also when the pre-feasibility and feasibility studies are undertaken and when donors carry out their pre-appraisal(s) and appraisal. Very often a TAPP guides this work, thus, it is very important that the terms of reference (TOR) for the pre-feasibility study explicitly mention the IEE to be carried out, its objective, resources available to carry it out, and its duration. If the IEE finds that an EIA is needed, then the TOR of the feasibility study should explicitly mention this.

The TOR of the required IEE or EIA should be approved jointly by the ministry concerned, the DOE and the Planning Commission.

Environmental concerns remain even after the PPP is approved, when many projects are designed in detail. The task of ensuring that the detailed design does not violate the parameters set by the IEE/EIA is up to the ministry concerned. Once implementation of the project begins, however, the IMED should primarily be responsible for ensuring that the environmental protection, mitigation, and management provisions incorporated into the project are followed. The environmental task of IMED does not end with implementation, but carries on as long as the government of Bangladesh is responsible for operation and maintenance. In some instances it may be necessary to build joint DOE-IMED teams for this purpose.

For private sector projects the role played by IMED should be the responsibility of DOE. This will be ensured if the draft Environment Protection Bill is approved. Until this bill is enacted there are many laws regarding fisheries, forestry, and water development that provide partial safeguards. The DOE can use these laws to shape its response to private sector initiatives.

5.1 Proposed Environmental Assessment Interventions

INCORPORATION OF EA & EM INTO THE PROJECT PROCESS

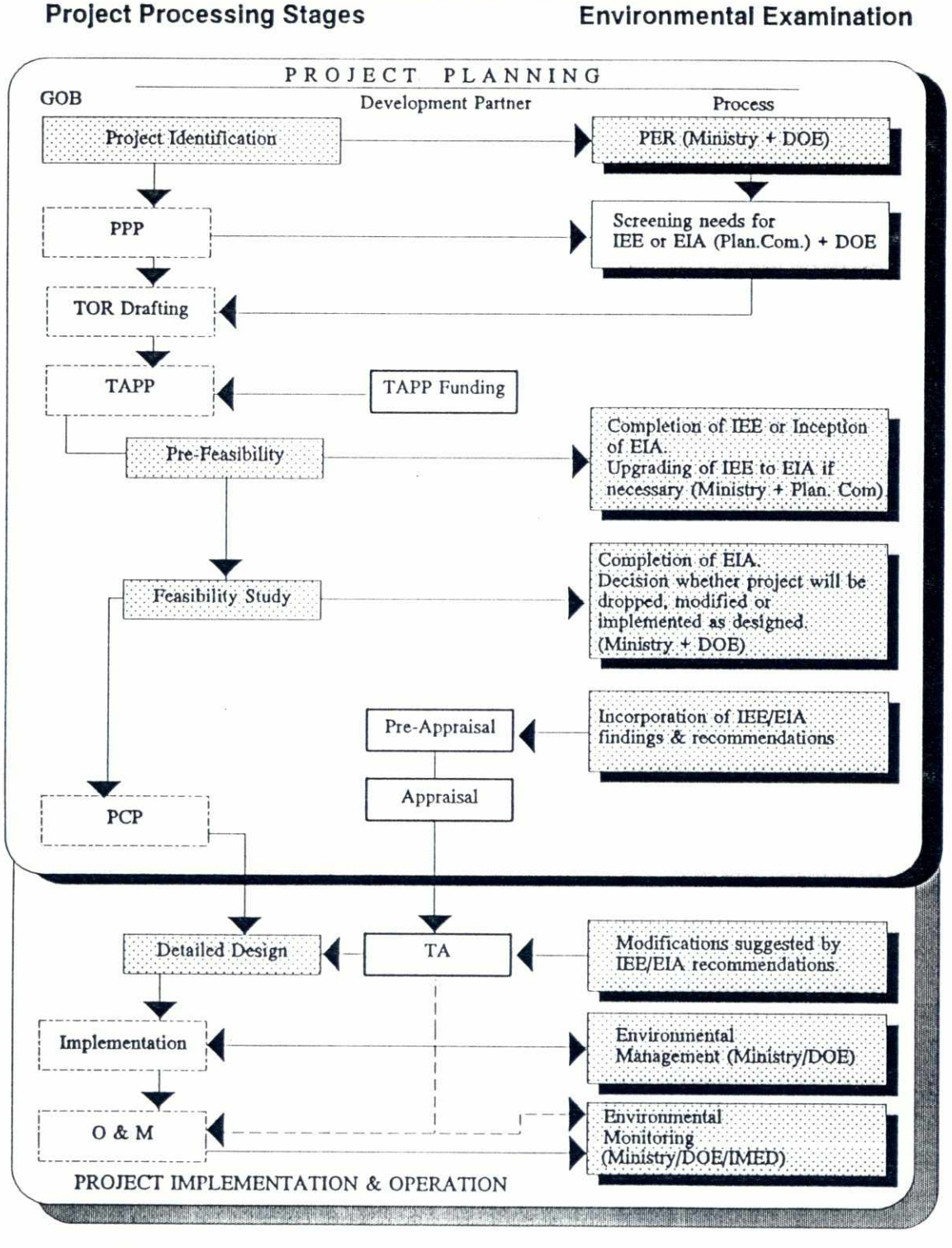

Figure 4 Incorporation of EIA and EM into the Project Process

The environmental assessment process may involve one or more of the following :

(a) Preliminary Environmental Review (PER)
(b) Initial Environmental Examination (IEE)
(c) Environmental Impact Assessment (EIA)
(d) Implementation of Environmental Management Plan (EMP).

Preliminary Environmental Review (PER): The PER consists of an examination of the project idea to determine whether it is consistent with the Environment Policy, the conservation strategy as defined in the NCS, and the standards set down in the proposed Environment Protection Act. This review should be undertaken before drafting the PPP. The value of the PER will be to exercise the minds of the proposal formulators regarding environmental impact, answer two questions an environment that will be added to PPPs, and facilitate drawing up the feasibility study TOR.

Since the PPP document at present does not ask for anything about the environment, it will be necessary to add the following questions in future PPPs:

> (1) Is it consistent with environment protection measures laid down in the Environment Policy, the National Conservation Strategy, (and the Environment Protection Act 1993, if approved)?
> (2) Does the implementation of this project contravene any legal provision of existing acts (listed in Appendix 1)?

A checklist can be prepared to assist in determining whether a project idea is likely to be in contravention of existing legislation regarding the environment. It is expected that the Ministry concerned will consult DOE at the PER stage. If the answer to either of the two questions is in the affirmative, then the proposing ministry should redesign the project components. If the answer is in the negative, then the proposing ministry could complete the PPP and submit it to the Planning Commission.

At the PPP stage the proposal is reviewed by the Planning Commission, and it would be appropriate to train persons there to be able to review PERs. If EIA cells can be set up in each of the four sector divisions of the Planning Commission, then they could carry out the PERs for all PPPs submitted to their sector. They may also consult DOE in specific cases.

Initial Environmental Examination (IEE): Unlike the PER, this examination is fairly broad in scope. If an IEE is needed, it should be carried out during the pre-feasibility study, and therefore, provision for IEE should be kept in the TAPP. Not all projects will require an IEE, and the decision of whether or not an IEE is required should be made by Planning Commission in consultation with the DOE.

Where a pre-feasibility study is not called for, but an IEE may be needed, the Planning Commission can ask for an IEE before the PCP is drafted. Very often a PCP will be prepared on the basis of a pre-appraisal mission report. If IEE has not been carried out earlier, it should be part of the pre-appraisal work. If an IEE has been carried out, the pre-appraisal team will have to consider whether it is sufficient or needs to be expanded and whether a full-fledged EIA will be needed. The decision as to which course will be taken is up to the Planning Commission and the ministry concerned.

A copy of every IEE report should be sent to DOE, which will make its comments available both to the ministry concerned and to the Planning Commission. It is therefore expected that PCPs of projects affecting the environment will be accompanied by at least an IEE report when they are put up for consideration in the pre-ECNEC meeting.

Environmental Impact Assessment (EIA): A full-fledged EIA may consume 5 to 15 percent of the project feasibility costs and take six months to two years to complete. For projects affecting biological resources a proper EIA cannot be done in less than 12 months or a full life or hydrologic cycle. For these and other reasons EIA work should begin immediately after PPP approval.

Since the time between PPP and PCP is usually more than a year, there should be ample time to complete full-fledged EIAs. The term "full-fledged" has been used here to distinguish it from what has been called rapid EIA, which is really an expanded IEE. Short-circuiting of the proper EIA process should be discouraged, however, and rapid EIA should be discontinued as soon as the requisite manpower and facilities are available.

A decision as to whether or not an EIA will be carried out could be made during PER or as a result of an IEE. A decision to conduct only an IEE could be changed during feasibility or pre-appraisal to carry out an EIA. The PER should be able to sort out those projects needing only IEE. The TOR for the feasibility study should contain provision for IEE or EIA and the specific TOR for either option should be vetted by the DOE.

The above process suggests that donors should not carry out an economic and financial appraisal unless the EIA (or IEE) report is available. Some donors have EIA guidelines of their own, and these may be more or less binding than those of GOB. It is expected, however, the IEE/EIA for water sector projects will conform with legislation regarding various environmental concerns and the EIA Guidelines approved by FPCO.

5.2 The Role of The Planning Commission

The PPP should be examined and given preliminary clearance by the Planning Commission. Therefore, the commission should have the professional capability to carry out PER and to decide whether the proposal requires an IEE, or a full-fledged EIA, or can proceed without any detailed environmental examination. In case either a full-fledged EIA or a waiver of environmental examination is requested it should require vetting by DOE, which should anyway be involved in drafting the study TOR.

To enable the Planning Commission to carry out its obligation it is necessary that it have:

(a) guidelines and criteria to standardize review and screening of environmental projects; and
(b) officials with environmental review capability in each of the four sector environment units in the Programming Division.

Each of the four divisions processing projects could train at least three persons for their environment cell, and the Environment Unit in the Programming Division may have four to six persons trained in review of EIA, since they have to process up to 500 proposals each year.

There is also a role for IMED, which is responsible for monitoring project implementation and evaluating performance. To achieve this, all officials in IMED should be trained to be able to monitor environment management requirements, so that they not only review progress in environment mitigation but can also make independent assessment of the physical impact when on field inspection. This will require a specially designed training program relying mainly on case studies and field visits. In this particular aspect of their work there should be coordination and exchange of information between IMED and DOE. There may be cases where IMED and DOE may have to field joint teams to carry out monitoring work.

5.3 The Role of the Department of Environment

The DOE plays a pivotal role in the newly defined framework for environmental investigation and examination. The department conducts IEE/EIA for industrial projects when requested by entrepreneurs who need environmental clearance at the behest of the Ministry of Industries or the Board of Investment. Such clearance is likely to become mandatory when the Environment Protection Bill is passed in Parliament. Given DOE's limited manpower and specialization in water quality and waste processes, most of its present capability will be fully engaged in dealing with industrial projects. This capacity will need to be extended to

other sectors if national environmental monitoring becomes a major function.

All water sector projects currently are sent to DOE for their comments. In the near future, however, DOE may not be able to build up sufficient capability to effectively review, and monitor, all the water sector projects because of staffing constraints. While the responsibility for conducting appropriate environmental study in the water sector (using private sector consultants in collaboration with donor agencies) should lie with the proposed EIA cells of the FPCO/BWDB, the main burden of synthesizing the environmental reviews of water sector projects will fall primarily on the Planning Commission. One of the roles of the DOE will be to assist the Planning Commission environment cells in following the environmental guidelines.

DOE is the principal agency for protecting the environment. It will therefore play a very important role in the water sector. As regards the EIA process, in the water sector DOE could have the following functions:

(a) Assisting MIWDFC in making PER of project concepts;
(b) Advising the Planning Commission whether proposed projects need IEE or EIA, or can be given a waiver;
(c) Assisting MIWDFC in drafting TOR for IEE/EIA;
(d) Commenting on completed IEE or EIA;
(e) Providing technical assistance to MIWDFC in reviewing and evaluating proposals for environmental studies from consultants;
(f) Reviewing and commenting on PCP for the consideration of the ECNEC;
(g) Assisting the executing agency in reviewing the environmental soundness of the detailed project design;
(h) Assisting IMED in monitoring and evaluating the projects;
(i) Assist in formulating and evaluating training programs; and
(j) Ensuring that, where possible, environmental information and data are collected to national standards and in a manner that ensures continuity and institutional memory.

5.4 Private Sector Involvement in IEE/EIA

Environmental examination reports (IEE or EIA) are expected to be produced by consulting firms, NGOs, or academic and professional bodies following GOB, ministerial, or donor guidelines as the project dictates. It is also essential that realistic resources and time schedules are allocated for these tasks. To reduce dependency on foreign consultants it is essential that IEE/EIA capability be built up in the private sector so that the necessary environmental assessment and management reports can be produced to a high level of professionalism. The formulation of such reports require specialist inputs of different duration to be scheduled through a critical path. Government departments are not expected to have in-house expertise to deal with such a variety of disciplines or with flexible hiring procedures. The private sector can, however, deal with this situation effectively. Unfortunately, IEE/EIA capability is extremely limited in the private sector in Bangladesh, and most of the work being produced is in the nature of rapid reviews or cursory examinations or under the supervision and management of foreign consultants.

The private sector needs persons of proficiency. There are two ways in which the required number of professionals can be built up:

(a) through on-the-job training of those with basic qualifications, and experience in a relevant subject; and
(b) through formal academic courses to educate students in environmental management, with special emphasis on IEE/EIA capability.

The private sector should be given incentives to support initiatives that increase the environmental

capability as it will enable them to compete effectively in a growth industry. If professional firms of environmental practitioners flourish, they will in turn provide a market for the graduates and diploma holders of academic institutions.

An Environmental Research, Management, and Training Center (ERMTC) may be established to function as the national research center, institutional memory, and repository for environmental data and information rather on the lines of BIDS. This could also provide a facility for short-term and specialist training. The ERMTC is needed at early date, to coordinate and promote training on environmental issues for both the government and the non-government sectors and use it to orient their personnel to carry out environmental work. The Ministry of Environment and Forest and the Department of Environment, along with the donors/development partners and the NGOs could sponsor such a center.

5.5 Actions to be Taken in the Water Sector

All water sector projects are expected to be subject to environmental assessment. FPCO and BWDB are both setting up EIA cells, so that all proposals are examined for their impact on the environment. These cells are expected to consist of the following types of professionals: planning engineers, hydrologists, hydraulic design engineer/modelling experts, irrigation/drainage engineers, environmental scientists, social scientists, natural resource economists, agriculture and soil experts, terrestrial ecologists, aquatic ecologists, and limnologists.

The cells will carry out Preliminary Environmental Review (PERs) and draft the Terms of Reference for IEEs and EIAs. They will monitor the work of consultants engaged to conduct the environmental assessment work and review their reports. In the course of their work they will have to work closely with the DOE, the Planning Commission, and IMED. The formation of the EIA cells is a very important step and should be consolidated by (i) a comprehensive training plan and (ii) a series of baseline studies in different ecological areas to give realistic field training for the problems likely to be encountered. These EIA cells could consult with the Local Government Engineering Department (LGED), which has an environment training program, and with various local government bodies that will be affected by the FAP or other water sector projects. This coordination will lead to synergistic improvement in environmental knowledge and impacts of differing interventions.

A comprehensive training plan should contain the following :

(a) a series of seminars for senior-level management to raise their awareness about environmental issues;
(b) a number of workshops to teach mid-level management how to set Terms of Reference for IEE/EIA consultancies and how then to review their reports;
(c) workshops to make planning and design engineers aware of environmental concerns; and
(d) seminars for BWDB field staff to make them aware of the causes and results of environmental degradation and possible mitigation measures.

As explained earlier, EIA work also needs participation of the Planning Commission and the private sector. In order to get the Planning Commission to conduct objective examination of environmental proposals and assessments of FPCO and BWDB it will be necessary to train the personnel of the proposed EIA cells in four divisions of the commission and at IMED. The Planning Commission may also consider initiating a comprehensive training plan along the lines outlined above.

Private sector professionals also need to be trained. Various consulting firms are now turning out IEE or EIA reports, but their quality and scope fall short of the desired level. It is expected that the private sector will do the actual IEE/EIA work in the field and write reports in conformity with the TORs agreed upon with FPCO/BWDB. Two types of training work will be required:

(a) a series of workshops for professionals of various disciplines on the EIA guidelines and manual and other documents (e.g., NCS, NEMAP, Ramsar Conventions, various acts) that have to be taken into account in environmental work; and
(b) a course for those who are likely to be team leaders.

While these people generally learn by doing the job, their work will be more systematic if they go through a course based on case studies, which includes exercises on TOR preparation, personnel and financial management, and familiarization with requirements of project work with major donors (World Bank, ADB, USAID, etc.).

Training of private sector personnel is generally outside the scope of any government agency. Training can be arranged through various institutions and with the collaboration of ERMTC, universities, and development institutions like BIDS. There is also a need for environment-related training for professional bodies and associations. The GOB needs to make a policy decision on the initial support it will extend to the private sector to enable it to meet likely demand.

In addition to training, essential baseline studies are needed. Environmental management work is often incomplete because of flawed and/or poor quality and unreliable data. More studies are needed regarding linkages between engineering interventions and their impacts on ecosystems of major importance such as fisheries; or sedimentation regimes on navigation and irrigation water supplies. A number of such studies have been suggested in various FAP regional studies, the 26 special studies of FAP 16, and the Fisheries Study (FAP 17). A number of studies have been carried out by ISPAN/FAP 16 on disease vectors, fisheries and nutrition, the impact of silt enrichment on floodplain soils, and the impact of flooding on the riverine charlands and their inhabitants. A set of project-related case studies is now required to improve the training programs. More studies along these lines are urgently needed to increase comprehension about the dynamic environmental situation, which is essential if EIA work in the water sector is to achieve sustainable development. As many of the required studies lie outside the expertise of FPCO, DOE should be the coordinating institution for baseline studies and environmental research.

5.6 Environment Management Training

The capability for conducting full-scale EIA, as previously noted, is very limited in Bangladesh. A review conducted for this report revealed that there may be a dozen professionals capable of designing and synthesizing full EIA reports. Most of these people are in academia or government, whereas the most acute need for such professionals is in the private sector. The private sector will need the capability to carry out IEE and EIA for both private and public sectors of the economy. That there is an unfulfilled need was obvious when consulting firms and NGOs showed great interest in sending their personnel to the workshops on EIA review held by FPCO/ISPAN from July through September 1993.

An environmental management practitioner is someone who has contributed to the management of natural resources through participation in EIAs, environment impact mitigation, and field research, as well as the conduct of impact management training. At present two academic levels and four professional levels of environmental management proficiency are needed.

Level 1: A level of awareness about environmental management could be imparted to students taking an environment course as an elective in their first degree. Some universities may even decide to make such a course mandatory for all degree students.

Level 1a: Environmental awareness training can also be given to administrators during their training in the BCS Academy. Most of these students are fresh out of universities and therefore the level of training has to be kept close to that of Level 1.

Level 2: A degree course in environmental management is desirable, but it could only be a second degree. All students intending to get this postgraduate degree should have a first degree in some subject with relevance to environmental planning management (e.g., civil engineering, environmental engineering, natural sciences, geography, geology, economics).

Level 3: The senior decision-makers in both the government and the private sector require an awareness course to help them understand the concerns of environmentalists and the need to avoid environmental degradation.

Level 3a: Senior decision-makers in the private and public sectors get refresher courses in administration at the Public Administration Training Center (PATC). An environment awareness workshop could be offered as an added feature of the administration courses.

Level 4: The reviewers of EIA reports, mainly mid-level government officers, but also including appropriate personnel from financial institutions, require proficiency in understanding IEE and EIA reports and capability of suggesting mitigation or modifications in proposed projects. These persons require training in EIA review.

Level 5: The professionals working in IEE/EIA exercises should have an appreciation of the role of other disciplines in environmental management. They should also be able to design their own investigations to strengthen the complementary work being done by professionals of other disciplines. For all these professionals likely to work in IEE/EIA there is the need for courses on environmental team work.

Level 6: Team leaders capable of designing IEE/EIA, managing other professionals, and synthesizing and presenting final reports are in short supply. Selected persons can be trained, and some of them may emerge as capable environmental team leaders. Generally, environmental team leaders will come from Level 5 personnel. Potential team leaders can be offered courses or workshops emphasizing on-the-job skill development.

Chapter 6

WORK PLAN

The primary objective of this report is a work plan to achieve the formal incorporation of environmental examination (PER, IEE, or EIA) and management (EMP) into the development planning and monitoring process. Nineteen initiatives have been identified as shown in the table below. A modified set of instructions for project processing will be required. The initiative for this change should be taken jointly by the Ministry of Irrigation Water Development Flood Control and the Ministry of Environment and Forest and the work plan, when agreed, implemented through FPCO and DOE.

Initiative		Time Frame
1.	Inter-ministerial consultation on the study proposals	December 1993-January 1994
2.	Workshop on study proposals	February 1994
3.	Revision of study proposals and preparation of document for new project procedure	February 1994
4.	Processing of the suggested incorporation of IEE into the project approval system	From February 1994
5.	Drafting parameters for PER and approval PER as a step in IEE	From February 1994
6.	Modification of PPP to include questions on environment	February 1994
7.	Augmentation of water sector personnel in DOE	February 1994
8.	Setting up of EIA cell in BWDB	January 1993
9.	Setting up of EIA cell in FPCO	January 1993
10.	Setting up of EIA cells and unit in the Planning Commission	March 1994
11.	Training Planning Cell personnel on preparation of TOR for IEE/EIA studies by consultants	Starting March 1994
12.	Training of IMED officials on EIA review and monitoring	Starting May 1994
13.	Seminars of senior-level management based on case studies	Starting February 1994
14.	Workshops for planning and design engineers on environmental concerns	Starting June 1994
15.	Seminars for BWDB field staff highlighting the causes and results of environmental degradation and possible mitigation measures.	Starting March 1994
16.	Training on EIA process for professionals in the private sector	Starting June 1994
17.	Academic and other institutions to provide graduate and post-graduate training in EE and EM	Starting July 1994
18.	Supporting baseline studies	Starting December 1993
19.	Setting up Environmental Research, Management, and Training Center	Starting February 1995

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APPENDIX 1
LEGISLATIVE FRAMEWORK AFFECTING ENVIRONMENTAL ASSESSMENT

(Source: ISPAN/FAP 16. An Outline of Policies and Legislation Related to Environment in Bangladesh.

September 1992)

1. Smoke-Nuisances Act, 1905 (Bengal Act III of 1905).
2. The Environment Pollution Control Ordinance, 1977 (Ordinance No. XIII of 1977).

Water resources

1. The East Bengal Embankment and Drainage Act, 1952 (E.B. Act I of 1953).
2. The Bangladesh Water and Power Development Boards Order, 1972 (Presidents Order No.59 of 1972).
3. The Bangladesh Irrigation Water Rate (Amendment) Act, 1990.
4. Territorial Waters and Maritime Zones Act, 1974.
5. Water Hyacinth Act, 1939.
6. Tanks Improvement Act, 1939.

Agriculture

1. The Agricultural and Sanitary Improvement Act, 1920 (Bengal Act VI of 1920).
2. The Agricultural Pesticides Ordinance, 1971 (Ordinance No. II of 1971).
3. The Agricultural Pesticides (Amendment) Act (Act V of 1980).
4. The Seeds Ordinance, 1977 (Ordinance No. XXXIII of 1977).
5. The Pesticide Rules, 1985.

Forestry

1. The Cattle Trespass Act, 1871 (Act No.I of 1871).
2. The Forest Act, 1927.
3. The Sylhet Forest Transit Rules, 1951.
4. The Chittagong and Chittagong Hill Tracts Reserved Forest Fire Protection Rules, 1958.
5. The Attia Forest (Protection) Ordinance, 1982.

Livestock

1. The Livestock Importation Act, 1898 (Act No. IX of 1898).
2. The Glanders and Farcy Act, 1899 (Act No.XIII of 1899).
3. The Cruelty to Animals Act, 1920 (Bengal Act I of 1920).

Land and Soils

1. The Bengal Alluvion and Diluvion Act, 1847 (Act IX of 1847).
2. The Bengal Alluvion (Amendment) Act, 1868 (Bengal Act IV of 1868).
3. The Bengal Alluvial Lands Act, 1920 (Bengal Act V of 1920).

4. The State Acquisition and Tenancy Order, 1952.
5. Land Development Tax Ordinance, 1976.
6. Land Development Tax Rules, 1976.
7. The East Bengal Building Construction (Amendment) Act, 1952 (E.B. Act II of 1953).
8. The Building Construction (Amendment) Act, 1990.

Fisheries

1. The Private Fisheries Protection Act, 1889 (Bengal Act II of 1889).
2. The Tanks Improvement Act, 1939.
3. The East Bengal Protection and Conservation of Fish Act, 1950 (East Bengal Act XVIII of 1950).
4. The East Bengal Protection and Conservation of Fish (Amendment) Act, 1963 (E.P. Act 11 of 1964).
5. The Protection and Conservation of Fish Rules, 1985.
6. The Protection and Conservation of Fish (Amendment) Ordinance, 1982.
7. The Marine Fisheries Ordinance, 1983.
8. The Bangladesh Fisheries Development Corporation Ordinance, 1973.

Wildlife

1. Bangladesh Wildlife (Preservation) (Amendment) Act, 1974 (President's Order No.23 of 1973).

Energy

1. Brick Burning (Control) Act, 1989 (Act No. VIII of 1989).

Industry

1. Petroleum Act, 1934.
2. Factories Act, 1965.
3. Factory Rules, 1979.
4. Mines Act, 1927.
5. The Boilers Act, 1963.
6. The Factories Rules, 1979.

Health, Sanitation and Water Supply

1. The East Pakistan Water Supply and Sewerage Authority Ordinance, 1963 (E.P. Ordinance No. XIX of 1963).
2. Sanitation Act.

Tenancy and Land Administration

1. Transfer of Property Act, 1882.
2. The Easements Act, 1882.
3. Land Acquisition Act, 1894 (Act I of 1894).
4. The East Bengal Acquisition of Waste Land Act, 1950.
5. State Acquisition and Tenancy Act, 1950 (East Bengal Act XXVIII of 1951).

6. Land Administration Manual, 1982.
7. The Land Reforms Ordinance, 1984 (Ordinance No. X of 1984).
8. Chittagong Hill Tracts Regulation Act, 1990.
9. Antiquities (Amended) Ordinance, 1976.
10. Antiquities Act, 1968.

Local Government

1. The Town Improvement Act, 1953.
2. The Municipal Corporation Ordinances for Dhaka Chittagong, Khulna, and Rajshahi.
3. The Local Government Ordinance, 1976 (Ordinance No. XL of 1976).
4. The Pourashava Ordinance, 1977 (Ordinance No. XXVI of 1977).
5. The Union Parishad Act, 1993.

Navigation/Water Transport

1. The Canals Act, 1864 (Bengal Act V of 1864).
2. The Ferries Act, 1885 (Bengal Act I of 1885).
3. The East Pakistan Inland Water Transport Authority Ordinance, 1958 (E.P. Ordinance No. LXXV of 1958).
4. Merchant Shipping (Amended) Ordinance, 1988.
5. The Inland Shipping (Amended) Ordinance, 1989.

Betterment

1. The East Bengal Betterment Fees Act, 1953 (E.B. Act XII of 1953).

Recreation, Park

1. The Public Parks Act, 1904 (Bengal Act No. II of 1904).

Voluntary Organization

1. The Voluntary Social Welfare Agencies (Registration and Control) Ordinance, 1961 (Ordinance No. XLVI of 1961).

APPENDIX 2

TITLES OF TREATIES, CONVENTIONS AND AGREEMENTS OF ENVIRONMENTAL CONCERN AND DATES OF SIGNING BY THE GOB

June 1992	Rio Declaration.
June 1992	Convention on Climate Change.
June 1992	Convention on Biological Diversity.
June 1992	Forest Principles.
Feb. 1992	Convention on International Important Wetland as Waterfowl Habitat (Ramsar Convention).
Feb. 1992	Convention on International Trade in Endangered Species of Wild Fauna and Flora.
Nov. 1990	International Convention on Oil Pollution Preparedness, Response and Cooperation.
Sept. 1990	Convention of the Phycotropic Substances.
June 1990	Montreux Conference on Lake Geneva.
May 1990	Montreal Protocol on substances that Deplete the Ozone Layer.
May 1990	Vienna Convention for the Protection of the Ozone Layer.
April 1990	Agreement on the Network of Aquaculture Centers in Asia and the Pacific (NACA).
Feb. 1988	Convention on Early Notification of a Nuclear Accident.
Jan. 1986	Treaty on Principles Governing the Activities of States in the Exploration and use of the outer space including the Moon and other Celestial Bodies.
Mar. 1985	Convention on the Prohibition of the Development and Stockpiling of Bacteriological (Biological) and Toxic Weapons, and on their Distribution.
Mar. 1985	Treaty Banning Nuclear Weapon Tests in the Atmosphere, in outer space and under water.
Dec. 1982	United Nations Convention on the Law of the Sea.
Feb. 1982	International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties.
Dec. 1981	International Convention for the Prevention of Pollution of the Sea by Oil (as amended on 11 April 1962 and 21 October 1969).
Oct. 1979	Convention Concerning the Protection of the World Cultural and Natural Heritage.
Oct. 1979	Convention on the Prohibition of Military or any other Hostile Use of Environmental Modification Techniques.
Aug. 1979	Treaty on Non-Proliferation of Nuclear Weapons.
Dec. 1974	Plant Protection Agreement for the South East Asia and Pacific Region.

APPENDIX 3

IMPLEMENTATION OF THE NATIONAL CONSERVATION STRATEGY

Issues	Actions	Implementing Agencies
	LAND RESOURCES	
i. National land use policy	Constitution of a commission to draft a policy incorporating: a) An objective statement that a multi-disciplinary approach be used to ensure optimum use of land without degradation. b) Criteria and priorities for land use by competing sectors, e.g., agriculture, forestry, fishery, livestock, industry, human settlement, mining, and communications. c) Restrictions on use of land best suited to agriculture, forest, and fishery for any other purposes and regulation of other uses having significant impact on such land. d) The creation of forest plantations on new accretions in the coastal belt and keeping such land under forest cover until the land is mature for agriculture or grazing. e) Encouragement for reducing or preventing fragmentation of holdings and consolidating small uneconomic holdings. f) Recognition that horizontal expansion of rural and urban settlements is a wasteful use of land. g) Develop firm policy and settlement procedure for *khas* land.	Ministry of Land (MOL)
ii) Prevention of activities that degrade land	Control shifting cultivation, hill cutting, overexploitation of biomass from agricultural fields, practice soil conservation measures when cultivating slopes, avoid year-round irrigation on agricultural land plots.	Ministry of Special Affairs (MOSA) in collaboration with MOA, MOL, MOEF, DAE, FD Hill Tracts Development Board (HTDB), and Zila Parishads of Khagrachari, Bandarban, and Rangamati

(continued)

Issues	Actions	Implementing Agencies
iii) Rehabilitation of degraded land	Land left fallow after abandonment of roads and railway tracks, brickfields, and mining to be rehabilitated for appropriate use considering location, soil, and hydrological regime.	Committee to be formed by MOL
	Constitute a committee to determine appropriate use.	The committee would allocate land to the appropriate government department, which would implement necessary rehabilitation with funds from the agency abandoning the land
	AGRICULTURE	
i) Legislation	Provision that Agricultural Pesticide Ordinance, 1983 be strictly implemented to stop import and use of pesticides discarded in countries of origin.	MOA in collaboration with Commerce Ministry, MOL, MOEF, DAE, and DOE
ii) FCD and FCDI projects	A co-ordination committee to be constituted of representatives of BWDB, DAE, DOF, DOLS, DOE, and agricultural, fishery, and livestock research institutes to formulate food production strategies integrating agriculture and fishery in the FCD project areas during monsoon season.	MOA in collaboration with MOL, MOA, MOEF, and concerned departments
iii) Barind and Madhupur Tracts	a) Water conservation through watershed management and water harvesting.	MIWDFC in collaboration with MOL, MOA, MOEF, and concerned departments
	b) Increasing recharge of the aquifer and soil conservation through afforestation.	MOEF in collaboration with NARS, BADC, DAE, and NGOs
	c) Adoption of dry-land farming practices to cultivate crops with minimal water.	MOA in collaboration with DAE and NGOs
	d) Emphasis on horticulture development.	MOA in collaboration with DAE and NGOs
iv) Integrated Pest Management (IPM)	IPM strategies to be developed to take advantage of cultural practices, rotations, alleopathy, beneficial insect, parasite, and pathogen species, and other biological and generic pest control mechanisms.	MOA in collaboration with NARS, DAE, and NGOs
	FORESTRY	
i) Choice of species	Large-scale plantation of exotics to be avoided and indigenous species are to be used in plantation according to suitability of sites.	MOEF and FD

(continued)

Issues	Actions	Implementing Agencies
ii) Ban on exploitation of forest	Environmentally sensitive and biologically rich areas to be identified and protected for preservation. Management plans to be prepared for protected areas.	MOEF (in collaboration with FD and DOE)
iii) EIA	Carry out Environmental Impact Assessment (EIA) of all ongoing and proposed projects.	MOEF (in collaboration with FD, DOE, and Planning Commission)
	WILDLIFE	
i) Replenishment of habitat	Present trend of converting marshes and other wetlands into agricultural fields to be reviewed by a committee consisting of representatives from the Ministries of Agriculture, Fisheries, and Livestock, Land, Environment and Forests, experts from BAU, and the Zoology Departments of Dhaka, Chittagong, Jahangirnagar, and Rajshahi universities and representatives of the Water Development Board to specify areas to be declared protected.	MOEF in collaboration with MOL, MOA, MIWDFC, NGOs, and concerned departments
ii) Research, education, and public awareness	Eco-tourism to be developed in protected areas to increase public awareness and generate income.	Ministries of Civil Aviation and Tourism in collaboration with MOEF, FD, and Parjatan Corporation
	FISHERIES	
i) Water resources development projects	Evaluate existing projects to identify damages caused to habitat and aquatic fauna and take measures for their mitigation. In future water development projects, assess effect on fisheries treating those fisheries as a resource having financial and socioeconomic value.	MIWDFC in collaboration with MOFL, MOEF, Planning Commission, BARC, BWDB, and DOF
ii) Allocation of areas for fisheries	Allocate deeply flooded areas to fisheries development. Any other form of land use, such as cultivation of deep water paddy, may be done without hampering fish production. *Baors* in the southwest region to be allotted for fish culture only. *Beels* to be maintained as fish habitat and for fish production. Fish sanctuaries to be established in a variety of ecological zones.	MOFL in collaboration with MOL, MIWDFC, MOA, DOF, and DAE

(continued)

Issues	Actions	Implementing Agencies
iii) Shrimp culture	Fix criteria for areas suitable for shrimp culture and allot such land only for that purpose for intensive management.	
	Preserve and create mangrove forest around land allotted for shrimp culture.	MOFL in collaboration with MIWDFC, MOL, MOEF, DOF, and FD
	Establish hatcheries for production of juveniles for shrimp culture and prohibit trapping of floating eggs and juveniles in open waters, as and when adequate shrimp seeds are available through hatcheries.	MOFL and DOF
	Establish ideal farms in each ecological zone as a model and training unit for farmers. Charge a levy on private farming units to finance model farms.	MOFL and DOF
iv) Water pollution	Environment Pollution Act, 1977 to be suitably amended and enforced to prevent the discharge of pollutants into rivers and open waters.	MOEF and DOE to initiate proposal to Law and Justice Ministry
	LIVESTOCK	
i) Allocation of areas for dairy development	All *khas* lands used for cattle and milk production to be reserved as bathan land for dairy production.	MOFL in collaboration with MOL
	GENETIC RESOURCES	
Policy	The Protected Areas System of National Parks, Wildlife Sanctuaries, and Game Reserves to be expanded and properly maintained, since the areas are uniquely rich in biodiversity (see Section 9.4 (i) on wildlife).	Proposed Nature Conservation Department (MOD) in consultation with wildlife scientists
Resource inventory and protection	Open wetlands to be identified and declared as fish and bird sanctuaries.	MOFL in collaboration with MOI, MOEF, FD, and DOF
	Management plans for replenishing and managing wildlife resources in protected areas should be developed as soon as possible.	MOEF in collaboration with proposed MOD, FD, and wildlife scientists

(continued)

Issues	Actions	Implementing Agencies
	WATER RESOURCES	
Environmental Impact Assessment (EIA)		
Development of EIA manual	EIA Manual under preparation by FPCO should be completed as early as possible and adopted after review to evaluate all water development projects at the planning stage.	MIWDFC with support from MOEF
EIA of completed FCDI projects	A thorough and in-depth quantitative assessment of environmental impact of completed FCDI projects to be done to take corrective measures.	MIWDFC with support of MOEF, MOA, MOFL, BWDB, BIWTA, DPHE, and MLG
Surface water	Water quality data collected by BWDB be reviewed for both quality and quantity to upgrade existing data collection network and system.	MIWDFC in collaboration with MOEF, BWDB, DOF, and BADC
Groundwater	Existing data collection by groundwater monitoring stations of BWDB should be evaluated both with respect to water quality assessment and water level fluctuations to develop an effective system for monitoring water level, quality, and quantity.	MIWDFC in collaboration with MOEF, BWDB, DOE, DPHE, and BADC
Water code	Water code to be developed to act as guideline for arbitration, adjudication, and review of issues and problems arising out of activities of water sector agencies and water users.	MIWDFC in collaboration with Planning Commission, MOFL, MOEF, MOA, MOLGRDC, BIWTA, DPHE, WASAs
	Institutional mechanism to be developed for effective implementation of water code.	
	Study to be undertaken to make qualitative as well as quantitative assessment of environmental degradation at the already identified environmentally critical locations to take remedial measures to mitigate adverse impacts and to arrest further deterioration.	MOEF
	Study to be undertaken to quantify the interrelationship between soil fertility and flood water in order to plan environmentally sound projects based on the control of flooding.	MIWDFC in collaboration with MOA, BWDB, and NARS

(continued)

Issues	Actions	Implementing Agencies
	INDUSTRY	
Augmentation of renewable natural resource by industries	Proposal for setting up industries based on renewable natural resources to accompany proposal for augmentation of raw materials required from agriculture, forest, fishery or livestock. Incentives should be given to industries for efforts and expenditures that renew and augment resources.	MOI in consultation and coordination with Planning Commission, MOA, MOEF, and MOFL
	RURAL DEVELOPMENT	
Sustainable resource use	EIA to be introduced for all rural development schemes in the planning stage.	MOEF in collaboration with Rural Development and Cooperative Division (RDC Division)
	TRANSPORT COMMUNICATIONS	
Maintenance of water transport network	Maintenance of navigational channels to maintain flow of passenger and goods traffic.	MOS in collaboration with BIWTA and BIWTC
	NATURAL HAZARDS	
EIA of development projects	Embankment and road construction schemes to be subjected to EIA, particularly to assess their effect on drainage, flooding, and erosion.	Ministry of Environment and Forest (MOEF)
Flood	Warning against flood through constant monitoring of water levels in sensitive rivers. Improvement of technology and expertise.	MIWDFC in collaboration with and with the initiative of BWDB and SPARRSO
Coastal afforestation	Newly accreted land in the coastal belt to be allotted to the Forest Department for afforestation.	MOL with initiative of MOEF and FD
	ENVIRONMENTAL EDUCATION AND AWARENESS	
Training	Training programs should be undertaken for: a) Environmental management specialists. b) Teacher trainers in environmental education. c) Rural women. d) Administrators and planners. e) Journalists and media personnel.	Education Division in collaboration with MOEF, DOE, and NGOs

(continued)

Issues	Actions	Implementing Agencies
	INTERNATIONAL DIMENSIONS	
Cross-boundary flow of pollutants	Monitoring of cross-boundary flow of pollutants at various entry points.	Foreign Affairs Ministry in collaboration with MOEF, MIWDFC, BWDB, and DOE
Genetic Resources	Greater attention to the Ramsar Convention.	Foreign Affairs Ministry in consultation with MOEF, Home Affairs Ministry, and ERD