UNDP

BANGLADESH

ACTION PLAN FOR FLOOD CONTROL

(4)

FAP 26

INSTITUTIONAL DEVELOPMENT PROGRAMME

Project No. BGD/91/007

NEEDS ASSESSMENT SURVEY

FINDINGS AND RECOMMENDATIONS

Project Ref. INT/90/R11
June 1992

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List of Abbreviation

BADC	Bangladesh Agricultural Development Cooperation
BARC	Bangladesh Agricultural Research Council
BBS	Bangladesh Bureau of Statistics
BIDS	Bangladesh Institute of Development Studies
BMD	Bangladesh Meteorological Department
BIWTA	Bangladesh Inland Water Transport Authority
BWDB	Bangladesh Water Development Board
CSO	Chief Scientific Officer
DOE	Department of Environment
DPHE	Department of Public Health Engineering
FAP	Flood Action Plan
FFYP	Fourth Five-Year Plan
FPCO	Flood Plan Coordination Organisation
GOB	Government of Bangladesh
JRC	Joint River Commission
MIWDFC	Ministry of Irrigation, Water Development and Flood Control
MPO	Master Plan Organisation
NWPP	National Water Planning Project
PC	Planning Commission
LGEB	Local Government Engineering Bureau
O&M	Operation and Maintenance
PDC	Planning Data Centre
PIU	Project Implementing Unit
PMEU	Project Monitoring Unit
POE	Panel of Experts
PSO	Principal Scientific Office
RRI	River Research Institute
SO	Scientific Officer
SOB	Survey of Bangladesh
SPARRSO	Space Research and Remote Sensing Organisation
SRDI	Soil Resources Development Institute
SSO	Scientific Officer
SWSMP	Surface Water Simulation Modelling Programme
SWMC	Surface Modelling Centre
TAPP	Technical Assistance Project Proforma
TOR	Terms of Reference
UNDP	United Nations Development Programme
WASA	Water and Sanitation Authority
WARPO	Water Resources Planning Organisation
WRDU	Water Resource Development Unit
WRMC	Water Resource Modelling Centre

1.0 Introduction

The objectives of the FAP 26 component on Institutional Development is to establish the institutional capacities and capabilities for the implementation of the Action Plan. This work involves an assessment of existing concerned institutions and the provision of recommendations for the planning, implementation and management of Action Plan projects. The programme also embraces the implementation of special institutional development activities to implement the recommendations.

So far a Concept Note for FAP 26, outlining the framework for an institutional development programme, was prepared and considered by the FAP Technical Committee. The Concept Note assumes the Flood Plan Coordination Organisation (FPCO) and the Bangladesh Water Development Board (BWDB) as the institutions having a lead role in the implementation of the Plan. Minor roles are expected to be played by other agencies such as the Ministry of Relief and Rehabilitation, Ministry of Livestock and Fisheries, the Master Plan Organisation, the River Research Institute and Local Government Bodies. A special component expected to be addressed relates to the capacity of local consultants and contractors.

A French consultancy mission was fielded in 1991 to prepare a training programme for the Flood Plan Coordination Committee (FPCO). The report and recommendations was approved by the GOB and the donor, and training of FPCO personnel started in April 1992. Key subjects covered by this training includes project management, mapping and remote sensing as well as in relation to Environmental Impact Assessment. In addition to this the UNDP has provided support to the build up and operation of FPCO under Technical Assistance provisions.

Out of the 26 FAP components, only the TOR and TAPP for the FAP 26 component on institutional strengthening still needs to be formulated and approved.

It is against this background that the Committee decided to have a needs assessment study undertaken to identify the local institutions involved in FAP and their needs for institutional strengthening.

At an early stage, the Consultant found that a close revision of the existing organisational framework had to be made in order to establish a sound foundation for the further identification and formulation of an institution building programme. More time than expected was spent on this effort. The effort has, however, led to a proposal for an appropriate organisational division of the roles and responsibilities in relation to FAP projects for which a general consensus has been expressed.

The conclusions and recommendations carried forward in the report are exclusively those of the Consultant, and may not necessarily comply with the official view of the UNDP.

The Consultant is grateful to the many individuals, projects and organisations, who devoted their scarce time for discussions. The Consultant is particularly grateful to Mr. Khondker A. Hafiz, Assistant Resident Representative of UNDP for his support and moral assistance during the consultancy.

2.0 Summary

2.1 Background

After severe floods in 1987 and 1988 causing extensive damages and loss of lives, national as well as international attention was focused on flood control planning and development. Following these events, the Government of Bangladesh (GOB) formulated the "National Flood Program" (BWDB, November 1988). Subsequently, a comprehensive review of the flood policy was initiated with assistance from the donor community. Two studies: "The Bangladesh Flood Policy Study" and "The Flood Preparedness Study", both financed by UNDP, were completed in early 1989. Other studies and documents were: "The Pre-feasibility Study of Flood Control", "The Eastern Waters Study", and "The Report on Survey of Flood Control Planning in Bangladesh". In addition, the donors expressed interest in assisting Bangladesh and GOB requested the World Bank to assist in developing and coordinating a five year Flood Action Plan (1990-95).

The overall objective of the Flood Action Plan (FAP) is to provide a comprehensive and permanent solution to the recurrent flood problem, thereby creating an environment for sustained economic growth and social improvement. The more detailed objectives are to:

- safeguard lives and livelihoods;
- improve agro-ecological conditions to increase crop production;
- enhance development of public facilities, commerce and industry;
- minimize potential flood damage;
- create flood-free land to accommodate the increasing population;
- meet the needs of fisheries, navigation, communications and public health.

In September 1989, the Government established a National Flood Council and an Implementation Committee to progress the Action Plan.

The Action Plan which comprises 11 Plan Components and 15 Supporting Activities was presented at a donors meeting in London in December 1989. The donors expressed agreement with the basic approach and within a short time all 26 components of the Action Plan had received donor support. UNDP agreed to provide funds for coordination and technical review under the project BGD/90/004: "Flood Action Plan Coordination". The World Bank is coordinating implementation on behalf of the donors.

The current working paper presents the findings of a consultancy to look into the institutional framework for the rooting of FAP activities and to make projections in relation to the need for the required institutional strengthening.

2.2 Conclusions of Analysis and Assessments

From meetings, documents reviewed and subsequent analysis and assessments, the Consultant has reached the following conclusions.

01. The Concept Note prepared for the FAP 26 Institutional Development Programme is not in fully accordance with the current institutional framework available for follow-up actions related to FAP and other water related projects.

02. Flood projects are very similar to other water development projects and they are to be considered part and parcel of the same. Therefore, in an institutional context, they should not logically be separated.

03. It is the opinion of the Consultant that there, in relation to FAP generated projects, is a need for a line ministry organisation to coordinate all the necessary follow-up activities related to data base management, general water resources planning, project preparation and implementation.

04. The coordination organisation should have a multi-disciplinary capacity to handle the complexity of disciplines involved in water development.

05. A battery of institution building efforts have already been made towards different organisations involved in water sector development. The institutional rooting of development projects have been made predominantly in the Bangladesh Water Development Board (BWDB), but a range of other institutions have also received support.

06. The Flood Plan Coordination Organisation (FPCO) has been an efficient organisation in initiating the different FAP component. With FAP now moving fast towards the implementation of the identified projects, the role of FPCO, as a temporary institution and initiator, now seems to be less.

07. The operational nature of the International Panel of Experts does not seem to have in-build institution building measures nor any impact in this direction.

08. The information and data coming out from the FAP studies are of a much wider relevance than to that of flood projects only. Such information is of great significance to general national water planning and to individual project planning.

09. Bangladesh Water Development Board (BWDB) has been identified as the most important institution for the implementation, operation and maintenance of flood and other water related projects. This institution should be strengthened in its capacity as an engineering and project implementation agency.

10. BWDB is likely to be caught in a capacity bottleneck when the implementation of FAP generated project commences. This is related to the organisations own capacity as well as the capacity to recruit consultants.

11. Examples have been seen, where BWDB has undertaken multi-disciplinary analysis in relation to project preparation. Being an engineering organisation, BWDB does not, nor should it, possess the necessary capacity to do this.

12. GOB has called for a higher involvement of consultants and contractors in the provision of turnkey water projects. This induces an organisational capacity gap within BWDB to undertake correct recruitment and supervision of such.

13. The capacity of particularly local consultants to handle this work should be questioned, since previous experience has shown managerial as well as technical shortcomings.

14. The current staffing rules and general work conditions given by BWDB do not meet the requirements to attract and retain qualified staff. The same systems may furthermore render the investment of an institution building programme uneconomic.

15. WARPO does not have any identified roles in relation to FAP. This does not reflect the statutory responsibilities of the organisation today as the national water planning agency.

16. A major role would be expected to be played by the River Research Institute (RRI) within the field of material testing and hydraulic modelling. Some institutional strengthening activities have already been prescribed and donor funding for this is should be sought.

17. Because of the physical location at Faridpur and general facilities offered at RRI, the Institute finds it difficult to attract and retain staff.

18. The present project planning methodology in the water resources sector is mainly top-down. This leaves significant gaps particularly in relation to the operation and maintenance of established structures. When designing institution building activities for lower level organisations, close consultation should be made to the Systems Rehabilitation Project which is currently working at field level with participation in relation to operation and maintenance. Contact should also be taken to the FAP 20 pilot project on "compartmentalisation".

2.3 Recommendations

The Consultant would like to present the following recommendations for consideration:

01. The Concept Note prepared for the FAP Institutional Development Programme should be reviewed to reflect the current national framework of institutions of relevance to water development projects. In particular the roles and responsibilities expected to be undertaken by the Water Resources Planning Organisation (WARPO) should be reviewed.

02. An audit should be made of the institution building efforts already made towards organisations responsible for water sector development. From this experience useful results can be gained and more appropriate institution building efforts defined.

03. Since the data and general information coming out as an output of the FAP studies is of a wider relevance than to that of flood projects only, it should be compiled and made available at national body for water resources.

04. It is recommended that FPCO be phased out and the necessary continuation of its roles of responsibilities be taken over by WARPO.

05. It is recommended that a detailed assessment be made of the workload FAP generated projects would induce on BWDB over the next 5-10 years. Subsequently, it should be determined to which extent BWDB should have the capacity to respond to this and to which extent work could be given to contractors and consultants.

06. An assessment should be made of the capacity and capability of local contractors and consultants in relation to the decision taken by the GOB to contract more turnkey projects in the water sector.

07. There is a need to look into the current staffing rules of the BWDB. The possibility of a more performance related promotion and salary system should be looked into. The existing transfer system for staff should be included in this review. It is recommended that proposals to remedy identified shortcomings in relation to this be agreed to and implemented. This could be part of an institution building activity for BWDB and at the same time a precondition for the same.

08. It is recommended that WARPO be acknowledged as the national multi-disciplinary organisation for the water sector. The institution building programme identified as part of the FAP should cover possible institutional gaps at WARPO in handling this responsibility. The support to WARPO would be expected to be quite extensive.

09. The roles and responsibilities of WARPO in relation to FAP shall be reviewed. This could most appropriately be done in the context of a complete review of the roles and responsibilities of different organisations at different levels. A proposal for the reorganisation of responsibilities, particularly in relation to WARPO, has been formulated in the present report.

10. The need for immediate short term institutional support for WARPO should be identified and the possibility of donor support for this explored.

11. It is recommended that the identified institution building activities prescribed for the River Research Institute (RRI) be embarked upon.

12. An institution building activity for RRI related to staff retention should be identified and embarked upon.

13. It is recommended that the present project planning methodology be changed to, in a much higher extent, to encompass people's participation at all stages of the project planning cycle. The involvement of local authorities should be formalised in the planning process. Initially, it is proposed that Project Implementation Units be established. The representation of such PIU's would be according to the size and complexity of a particular project. A general rule should be to have memberships from the executing agency, the implementing organisation and the local authorities, water user group or other identified local representative bodies.

14. The need for institution building measures in relation to lower level institutions and local authorities should be determined.

15. Some general principles for an institution building programme has been recommended in the report. Such principles include that no expatriate personnel in an institution building activity should occupy established positions, but act as facilitators. High attention should be paid to the sustainability of introduced activities, which should restrict e.g the funding of recurrent expenses.

3.0 Water Development Projects

Taken under one umbrella, water development projects would cover development efforts in relation to irrigation, drainage and flood control. In Bangladesh it is very difficult to distinguish between the three above mentioned "types" of water development projects since they are in fact to be considered as "the other side of the same paper".

Moreover, there is a multitude of different disciplines involved in the successful planning and implementation of water development projects, which in turn implies the involvement of different ministries and of different levels: from water user groups up to the national level.

The efforts done by the Government of Bangladesh in the water sector, with and without the assistance of international donor support, is extensive. The Flood Action Plan is the most recent comprehensive effort made in the sector.

3.1 The Flood Action Plan (FAP)

The Flood Action Plan (FAP) as the name implies, was formulated primarily in response to the severe problems associated with flooding in Bangladesh.

3.1.1 Brief Description of FAP Components

FAP comprises twenty-six components divided into two groups: 11 Plan Components of which 2 are non-structural components and 15 Supporting Activities. It is anticipated that additional projects and studies will be identified in the course of the implementation. The supporting activities are complementary, and support the main Plan Components. They supply the general data base, criteria and guidelines for planning, design, implementation and management of the flood control works and related development. The outputs in form of data bases, studies, guidelines etc. are listed in Annex 1. The list is preliminary and subject to review.

The structural components (FAP 1 to FAP 9B): Regional Studies; Area Studies; Master Plans; Identified Priority Projects, Pre-feasibility Studies, and/or Feasibility Studies from the structural components.

The non-structural components (FAP 10 and FAP 11): The two non-structural components with the objective of improving flood warning and flood preparedness. FAP 10 (Flood Forecasting and Early Warning) is an on-going UNDP project located in BWDB. FAP 11 (Disaster Preparedness Programme) is an "institution building project" located in the Ministry of Relief.

Supporting Activities (FAP 12 to FAP 25): The 14 supporting activities (excluding FAP 26) can be arranged in three groups:

Studies - (6 supporting activities): These are carried out with the specific purpose of producing guidelines and criteria within project management (FAP 12); O&M (FAP 13); flood response (FAP 14); land acquisition and resettlement (FAP 15); environment (FAP 16); and flood proofing pilot projects (phase I of FAP 23).

Pilot Projects - (4 supporting activities): Fisheries (FAP 17); "bottom-up" planning in connection with compartmentalization concept (FAP 20); development of new standards for design through bank protection test works (FAP 21); and active flood plain management (FAP 22). The output of each of these pilot projects would be guidelines and/or design criteria based on test/pilot work in the field.

Special Activities - (4 supporting activities): Topographic mapping (FAP 18); geographic information system (FAP 19); hydrological, morphological and hydrographic data (FAP 24); and coordination of modelling, hydrology design criteria and provision of a flood management model (FAP 25).

The FAP generated activities deriving from the implementation of the structural, and non-structural components, and the supporting activities can be divided into five major groups according to required future activities:

1. Regional Plans, Master Plans, Area Plans
2. Priority Projects/Locations and Feasibility Studies
3. Data Bases, Models and other Planning and Design Tools
4. Study Reports and Guidelines/Criteria
5. Flood Preparedness

An outline of FAP Components, agencies involved and future activities is given on the following page.

FAP Components, Generated Activities and Involved Agencies

FAP Components	Involved Agencies	Generated Activities		Future Activities
FAP 1 Brahmaputra Right Embankment	BWDB/FPCO	Regional Plans Master Plans Area Plans		National Water Plan
FAP 2 North West Regional Study	FPCO			
FAP 3 North Central Regional Study	FPCO			
FAP 4 South West Area Management Study	FPCO			
FAP 5 South East Regional Study	FPCO			
FAP 6 North East Regional Study	BWDB/FPCO			
FAP 7 Cyclone Protection Project	BWDP/FPCO		Potential Projects	Implementation of FAP generated projects
FAP 8A Greater Dhaka Protection	BWDB/FPCO & Others			
FAP 8B Dhaka Integrated Protection	BWDB/FPCO/DCC/DWASA			
FAP 9A Secondary Towns Protection	FPCO		Feasibility Studies	
FAP 9B Meghna Left Bank Protection	BWDB/FPCO & Others			
FAP 18 Topographic Mapping	FPCO/SOB/BITWA	Models Data Maps		Upkeep and further development
FAP 19 Geographical Information System	FPCO			
FAP 21 Bank Protection, River Training /22 & AFPM Pilot Project	FPCO/BWDB & Others			
FAP 23 Flood Protection Pilot Project	FPCO			
FAP 24 River Survey Programme	FPCO/BWDB/BITWA			
FAP 25 Flood Modelling/Management	FPCO/WARPO			
FAP 12 FDC/I Agricultural Review	FPCO	Studies Guidelines Criteria		Updating distribution incorporation in TOR for all projects
FAP 13 O&M Study	FPCO			
FAP 14 Flood Response Study	FPCO			
FAP 15 Land Acquisition and Resettlement Project	FPCO			
FAP 16 Environmental Study	FPCO			
FAP 17 Fisheries Study/Pilot Project	Dep. Fisheries/FPCO			
FAP 20 Compartmentalization Pilot Project	FPCO/BWDB/LGEB & Others			
FAP 10 Flood Forecasting and Early Warning	BWDB/FPCO	Forecasting Warning Preparedness		Establishing systems and processes
FAP 11 Disaster Preparedness Program	Min.of Relief/FPCO			
(FAP 14 Flood Response Study)	(FPCO)			
(FAP 23 Flood Protection Pilot Project)	(FPCO)			

The implementing agencies of the following Ministries are involved and/or influenced by the implementation of FAP and FAP generated activities:

Ministry of Irrigation, Water Development and Flood Control:
The main actors of FAP are located under this Ministry: FPCO - responsible for coordinating FAP activities; BWDB - responsible for implementation of FAP generated investment projects; WARPO - a newly created water resources planning organisation; SWMC an institution under WARPO developing mathematical models and databases for planning and design for FAP Components; RRI is a semi-autonomous body under MIWDFC developing physical models to improve technical designs related to most FAP Components, RRI functions are important for medium and long term river studies which are essential to future FAP activities.

Ministry of Local Government, Rural Development and Cooperatives:
LGEB involved in planning, implementation and O&M of small scale water resource projects. LGEB is involved in FAP 9A and may have a major role in the implementation of minor works associated with compartmentalisation (FAP 20).

Ministry of Relief:
FAP 11 - Disaster Preparedness Program which will establish an office of emergency preparedness in the Department of Relief. This component is institutional support to the Ministry.

Ministry of Defence:
FAP 10 - Flood Forecasting which is located at BWDB but involves BMD. This is a long-term project financed by UNDP; FAP 18 - Topographic Mapping with SOB and BWDB; FAP 19 - Geographical Information System with SPARRSO and BBS.

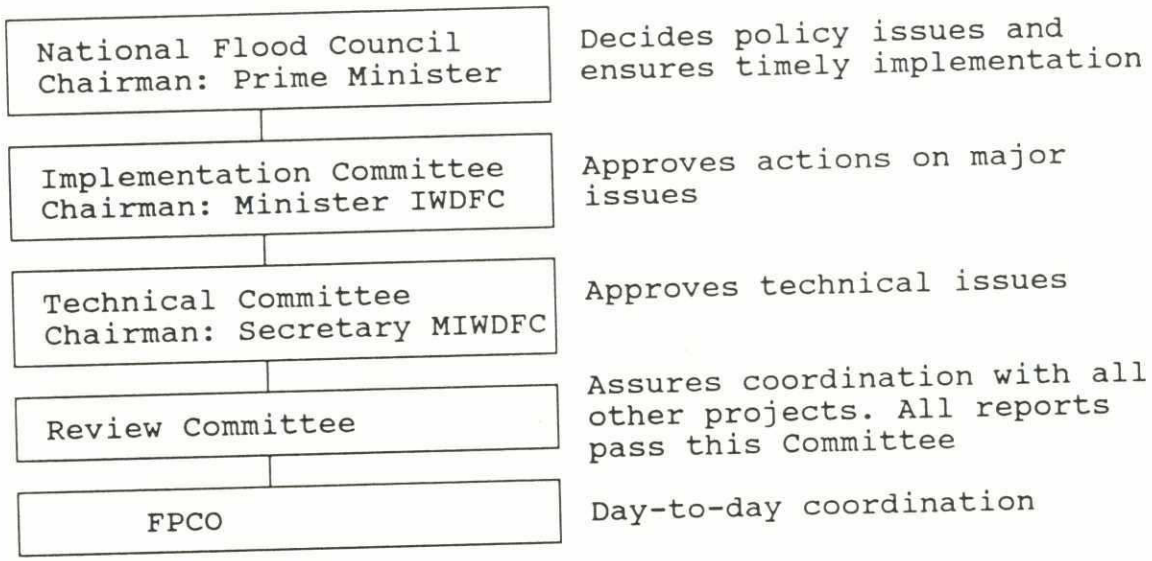
Ministry of Environment and Forest:
Department of Environment is related to FAP 16 - Environmental Guidelines, and Department of Forest to FAP 7 - Cyclone Project with tree planting on the embankments.

Ministry of Fisheries and Livestock:
FAP 17 - Fisheries Study is being carried out in cooperation with the department of Fisheries.

Ministry of Shipping and **Ministry of Communication** are also affected by the implementation of FAP especially Inland Water Transport/BITWA and Roads and Highways/R&H.

3.1.2 Procedures for Implementation of FAP Components

The coordination and approval setup established for the implementation of the Flood Action Plan is:



During the preparatory phase of FAP, the Flood Planning Coordination Organisation (FPCO) was established under the Ministry of Irrigation Water Development and Flood Control as the coordinating body.

FPCO has been responsible for the preparation of the Technical Assistance Project Proforma (TAPP) based on draft TOR, prepared by experts fielded by the donors. The Technical Committee reviewed and approved the TOR and TAPPs. The main coordination facilitated by FPCO has been between the various consulting teams.

FPCO has been responsible for ensuring written comments to the consultants reports from relevant staff of FPCO, BWDB, other government agencies, including WARPO, donor representatives as well as from the members of the Panel of Experts. The reports are reviewed by the Review Committee and together with the Review Paper submitted to the Technical Committee and formally approved.

3.1.3 Current Status on FAP Implementation (March 1992)

Implementation of FAP started in 1990 with the first phase of FAP coinciding with the Government's fourth Five Year Plan (1990-1995). Phase I - Plan Preparation (1990-1991) has been completed, and most of the FAP components have entered Phase II - the planning phase, where detailed feasibility studies are being carried out. A few projects have been identified by the studies and are ready for implementation. Extensive information has started to come in from the special FAP studies.

3.1.4 Issues Arising from Meetings

A major issue arising from discussions with FAP teams and the FPCO is related to the handling of the considerable information and planning derived from the FAP studies.

It was found that there is no established responsibility within a permanent institution for coordinated follow-up actions on the outcome of special FAP activities such as the upkeep and further development of data bases, models and other planning and design tools. These are national planning tools, and linkages need to be established to a national water planning body and further on to the Planning Commission.

The institutional responsibility for follow-up activities in relation to FAP studies, pilot projects and subsequent project implementation should be vested in the appropriate line ministries. Moreover, guidelines and findings from FAP studies and pilot projects should be considered as a very important source of information and data of high relevance to the planning and preparation of water related projects.

It was found that most of the FAP derived/generated projects are more holistic in nature, i.e. they include irrigation, drainage as well as flood issues. One specific initial example is the FAP 20 "Compartmentalization Pilot Project". The objective of the project is to provide a more secure environment for intensive agriculture, fisheries and rural/urban development by introducing the concept of compartmentalization. Here, the protected area behind the river embankments would be divided into compartments making use of existing road/railway embankments where possible, to facilitate the retention of drainage of water.

The compartment is basically a water management unit in which the participation of beneficiaries is considered essential for sustainability. The compartmentalisation concept is widely promoted in relation to FAP embankment projects.

From the example given above, it should be evident that a multi-displinary approach is required in all phases of the project cycle and that the FAP generated projects are related to the water resources sector as a whole. To meet the need for a multi-displinary approach, an efficient coordination is required, a role which may most appropriately be fulfilled by a single institution.

3.2 Other Water Development Projects and Programmes

The list of Water Development Projects undertaken in Bangladesh is extensive. Projects have been undertaken in relation to the establishment of structures for irrigation, drainage and flood control. Other initiatives have been more integrated into rural development "packages" whilst

yet others have been associated with special areas of concern such as "Operation and Maintenance".

Finally, it should be mentioned that various land reform projects and projects aiming a local participation also have a close relation to efforts made in the water development sector.

Most donors, by assisting the GOB in achieving national development objectives, have been funding activities associated with water development(Source: UNDP: Development Co-Operation 1989 report of june 1991).

Because of the range of disciplines in which efforts have been made, the corresponding institutional rooting of projects and programmes has been spread widely. Key institutions for the rooting of projects have been: Ministry of Irrigation Water Development and Flood Control, where support has been given to e.g. Bangladesh Water Development Board, the River Research Institute, Surface Water Modelling Centre, Master Plan Organisation. The National Planning Commission, NGO's, Ministry of Agriculture etc.

Many of these development efforts have included institutional strengthening by various means such as e.g. strengthening operational and technical capacities through training and management development programmes. Since many of the efforts proposed under FAP appear to be similar in nature to those that have already been undertaken by other programmes, it is considered important from the outset to make an audit of what has been and what is currently being undertaken in terms of institutional strengthening in relation to water development projects. The lessons learned and reconciliations made from this should be incorporated in the approach to be proposed in relation to the FAP institutional strengthening programme

3.3 Need for a National Framework for Handling FAP and Other Water Development Projects

From the meetings and discussions held by the Consultant, it appears that there is a need for a national body for the coordination of development efforts in relation to FAP as well as other water development projects.

In the initial phases of the implementation of FAP, this coordinating responsibility has been undertaken by FPCO. But with the shift in emphasis to project planning, preparation and implementation there is reason to question to which extent FPCO, as a temporary organisation, should be developed to shoulder the need for permanent multi-displinary coordination.

The main roles and responsibilities to be shouldered by a national body in the context of a multi-displinary approach to flood components as a part water development projects and programmes could be abbreviated as follows:

a. Preparation of a Water Resources Master Plan. Continuous updating of the Plan (integration of regional plans and flood control projects); screening and approval of identified projects in the context of the national plan.

b. Coordination at national level with all ministries responsible for subcomponents of projects in the water sector.

c. Preparation of TOR for second generation projects, screening of consultants, selection of consultants; monitoring and appraisal of feasibility studies.

d. Implementation (construction, operation and maintenance) of FAP generated and other investment projects.

e. Maintenance and development of data bases, models and other planning and design tools; promote and make available these data and models for users; training in using data bases and models; and to secure their adequate application

f. Development of a permanent institutional set-up to coordinate and monitor flood preparedness activities.

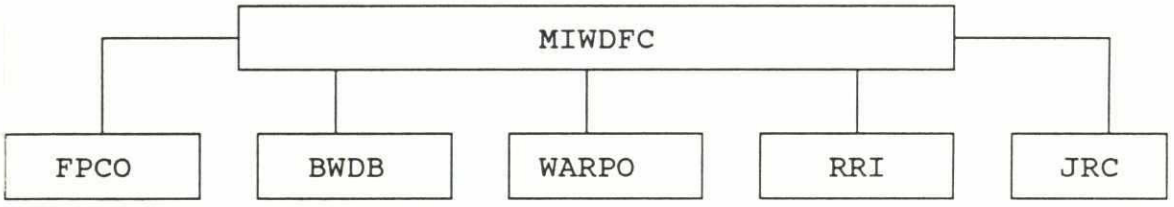
g. Coordination, revision, and distribution of guidelines and manuals in relation to different stages of the project cycle of to water development projects; ensure that findings from pilot projects and special FAP and other studies are included in project design.

h. Develop links to and coordination with field level/user groups, ensure popular participation in the project planning and design.

4.0 Current Institutional Setup

4.1 Ministry of Irrigation Water Development and Flood Control (MIWDFC)

The main actors in relation to the implementation of the FAP are located under the MIWDFC. This ministry is responsible for major water resource projects nation wide, including flood control and flood protection, drainage, irrigation, and town protection schemes. The Ministry supervises five agencies:



The Flood Plan Coordination Organisation (FPCO), which has been created as a temporary support organisation to the Ministry to deal exclusively with the implementation of FAP.

Bangladesh Water Development Board (BWDB), which is the implementing agency for the Ministry and responsible for the implementation of FAP generated investment projects. The Minister of MIWDFC appoints the Chairman of BWDB.

The **Water Resources Planning Organisation (WARPO)**, which is responsible for preparation of a Water Resources Master Plan. The Surface Water Modelling Centre (SWMC) under WARPO generates mathematical models for water resource planning, these are used in the regional studies carried out under FAP. The Minister of MIWDFC is Chairman of the Board of Directors of WARPO.

The **River Research Institute (RRI)** generates physical models to support and improve technical designs in connection with physical structures of the FAP generated investment projects. The Minister of MIWDFC is Chairman of the Board of Directors of RRI.

The **Joint Rivers Commission (JRC)** is dealing with joint water issues related to the neighbouring countries.

4.1.1 Flood Plan Coordination Organisation (FPCO) Status: A temporary institution with no established positions

FPCO was setup as an arm to the MIWDFC in 1990, as a temporary staff organisation, under the UNDP project BGD/90/004: "Flood Action Plan Coordination". The immediate objective of was: "to assist the GOB in coordination and implementation of the Five Year Action Plan for flood control through a Flood Plan Coordination Organisation".

Funding for FPCO under the UNDP project was for two years (January 1990 - December 1991). There are no established posts in FPCO.

In February 1992, a proposal was submitted by FPCO to acquire additional UNDP support up to the end of 1993. Essentially, the request covers the operational costs of FPCO and time allocated to expatriate advisors of the international and local FAP Panels of Experts (POE). Some time has also been reserved for short term international and local consultancies. It is difficult to assess to which extent the UNDP input would contribute to the institutional strengthening of FPCO in relation to the more permanent responsibilities to be shouldered during the implementation of FAP and in particular to other water development projects.

FPCO has no institutional functions and responsibilities in the water sector, other than those associated with FAP. The latter can be listed as follows (an extract from the proposal submitted to UNDP, February 1992):

- to provide technical guidance and strategic decisions to the plan's consultants, and to coordinate their activities;
- to undertake a full and comprehensive review of consultants reports, assisted by the Panel of Experts, government entities and other relevant agencies;
- to advise the government's Technical Committee on the Plan's progress, and bring to the Committee's attention any issues that are constraining execution of the Plan;
- to update the Action Plan throughout the planning and project preparation phases.
- In addition to its role in coordinating all FAP activities, FPCO will be responsible for producing and processing the overall flood plan through the individual study plans (FAP 1-11).

FPCO is headed by a Chief Engineer with the overall responsibility for output and activities of FPCO. The core of the manning of FPCO is embodied in six sections under the Chief Engineer, each headed by a Superintending Engineer, supported by a total of twelve Executing Engineers, and six Assistant Engineers. Various other support staff is also attached.

FPCO is supported by an Expatriate (5 members) and a Local (5 members) Panel of Experts (POE). The Chief Technical Officer (Chairman for the Local Panel of Experts) is working full-time with FPCO. The Resident Coordinator from the World Bank is the link between GOB and the Donors. In

addition, a number of local technical specialists have been sub-contracted to assist FPCO.

FPCO Staff Support 1990-93

	Total m/m	GOB m/m	Local POE	Inter. POE	Local UNDP Specialist
Professionals:	983	564	135	106*	178
Support staff:	1663	1392			271

* incl Resident Coordinator (36 m/m)

The staffing of FPCO is similar to that of an engineering organisation and the multi-disciplinary input is provided by the Panels of Experts and a team of local consultants (funded by UNDP). It appears that there is very little know-how transfer and/or institutional strengthening measures in this. The sustainability of the FPCO organisation is therefore questionable.

Under a French Government grant, a training programme for about 38 FPCO staff members has and will be embarked upon in 1992. Training covers subjects on project management, environmental impact assessment, mapping and remote sensing. This training programme is based upon a very rudimentary training needs analysis not specifically related to the organisational long term objectives of FPCO. In addition, since participants are mostly deputed officers from BWDB, the long term organisational benefits of the training investment may easily be lost.

The outputs of the different FAP components: regional studies, special studies and pilot projects are today compiled within FPCO. The objective of this is that the same material would be an input for FPCO to formulate a national flood plan.

However, the information and results gathered are of a much wider relevance to that of only FAP generated projects and flood planning. It can very appropriately be utilised in the preparation and implementation of many different water development projects.

In fact, the flood plan should be prepared as a part of the overall Water Resources Master Plan and eventually incorporated into the National Development Plan. In this way, the general water related and the FAP generated investment projects would be an integrated part of the overall development strategy and water project portfolio. The Consultant is of the view that the planning responsibility for water resources be assigned to only on permanent institution.

4.1.2 Bangladesh Water Development Board (BWDB) Status: A permanent institution with a full establishment.

The Bangladesh Water Development Board (BWDB) replaced the Water Development wing of the East Pakistan Water and Power Development Authority (EPWAPDA), created in 1958. BWDB became the implementing agency for MIWDFC by the Presidential Order in 1972.

According to the Ordinance (1972) the Board shall consists of a Chairman and not more than five members to be appointed by the Government. It further states that the Chairman and other members shall exercise such powers, and perform such functions as may be prescribed, or as may be assigned to them by the Board or the Government.

BWDB has the following overall functions and responsibilities related to the water sector:

- Planning, design, implementation and O & M of flood control , drainage and major irrigation (surface water and deep tubewell) structures, devices and projects.

In relation to FAP, the BWDB would be expected to fulfil the following roles and responsibilities:

- main executing agency for implementation of projects;
- executing agency for operation and maintenance of projects.

It is in the context of this, that the institutional capacity analysis of BWDB has been made.

4.1.2.1 Organisational Setup

Today, BWDB is involved in the implementation of several hundreds of projects of a different size. The organisation has more than 20,000 employees. In order to handle the vested roles and responsibilities, the BWDB is divided under 5 members for : finance; administration; planning; implementation; and operation and maintenance (O&M) respectively. Please see the enclosed organisation chart. Of particular relevance to FAP, the planning, implementation and operation & maintenance "sections" should be considered.

Planning

This Member/("section") supervises, guides, and coordinates project preparation, including feasibility studies and long-term planning. It administers the overall planning of water resources and flood control projects in the country. The Member is subdivided into three groups: Water Investigation, Hydrology and Planning, each headed by a Chief Engineer.

The main functions of the **Hydrology** and **Water Investigation** are the collection of data on surface and ground water hydrology, river morphology and floods, for flood warning systems and for planning purposes.

The Chief Engineer for the **Planning** is responsible for preparation of documents in support of requests for government approval of BWDB projects. This includes Project Proposals, TAPP and TOR for consultants. He supervises eight "sub sections":

1) General planning

2) Scheme I: Feasibility studies of IDA-supported flood control and drainage projects.
3) Scheme II: Feasibility Studies, detailed design, and implementation and monitoring of ADB-supported projects.
4) Scheme III: Feasibility Studies, detailed design, and implementation and monitoring of IDA/IFAD-supported projects.
5) Scheme IV: Feasibility Studies, detailed design, and implementation and monitoring of Dutch/Swedish-supported projects.
6) Estuary Survey
7) Project Management Unit (PMU)
8) Director Economic Planning

Implementation

The Member/("section") supervises, controls, and coordinates project execution. This includes the preparation of detailed design and construction. The Member is divided into five groups: two design offices and three projects offices each headed by a Chief Engineer. The Chief Engineer for Design has seven design circles with the following functions and responsibilities:

I: Consultant review;
II: Consultant tenders, contracts, and specifications;
III: Mechanical design;
IV-VII: Responsible for specific projects.

BWDB have project implementation offices in Pabna, Barisal and Rangpur.

Operation and Maintenance (O & M)

The Member/("section") supervises the O & M of completed projects and is divided into nine "sub-sections". The O&M organisation follows geographic and hydraulic boundaries with a Chief Engineer in charge of each.

There is a Chief Engineer for each of the directorates: Food for Work; Mechanical Equipment; and for Dredger.

The Member also has the two Directorates for land: Land & Water Use and Land & Revenue.

Finally, there is a Directorate for Systems Rehabilitation, which is headed by a Chief Engineer assisted by two Directors.

BWDB have O&M offices in Dhaka; Comilla; Faridpur; and Rajshahi.

4.1.2.2 Institutional Assessment

From the discussions held at different levels, the Consultant would like bring forward some indicators of the institutional capacity of BWDB. Reservations should be made in relation to this tentative assessment which has been mostly based on secondary sources. To acquire the level of assessment, whereupon institutional development objectives could be formulated, a detailed organisational assessment survey is recommended. This survey should be carried out specifically in relation to the successful planning and implementation of water development projects, specifically those concerned with flood issues.

When the preparation and implementation of FAP generated project commences, BWDB could be expected to be caught in a capacity bottleneck. It has already been observed that the BWDB is generally lacking behind schedule in project preparation as well as implementation. This has been particularly so in relation to the hiring of consultants and the awarding of contracts. This would be an indicator that BWDB is in many ways running at maximum capacity. A full appraisal of this situation needs to be done.

Another issue, which should be given the highest attention, relates to the scale of FAP generated projects. Many of the FAP projects identified so far are large and complex, and they may easily be beyond the capacity of BWDB to handle. The present capacity and/or capability of BWDB is not sufficient to handle the workload in the Design Circles. This appears mainly to be because of lack of qualified engineers with the necessary experience. The workload on design is expected to increase as a result of FAP, and this would probably cause considerable delays.

The FAP studies (12 and 13) have identified problems in relation to implementation, such as: inferior designed structures; low quality of structures; time and cost overrun; inadequate water management capability; lack of maintenance capability; and lack of maintenance funds. Most of these problems have their origin in the engineering design and/or supervision, and in the selection of unqualified consultants and contractors by BWDB.

At present about 20% of the design work is subcontracted to consultants. It should be looked into, how much work the implementation of FAP generated projects would impose and

to which extent more of this work could be subcontracted to local consultants. Alternatively, an assessment should be made on how much it would require to upgrade the design capacity and/or capability of BWDB to meet the future workload.

It appears that one strategy adopted in relation to donor funded projects to avoid delays, has been to involve the planning "section" in the detailed design works of structures and subsequent the monitoring of their implementation. Such an approach makes it difficult to assess the actual design capacity and/or capability of BWDB and furthermore has the risk of inferior design works.

The Planning Directorate has been assigned the responsibility of detailed project preparation in relation to some foreign-aided projects. This has resulted in significant shortcomings in relation to the application of a multi-displinary approach since this capacity is very low within BWDB. The future planning functions of BWDB need a thorough review taking into consideration the multi-disciplinary approach which has been launched as the policy of the GOB in connection with the implementation of FAP.

The Government of Bangladesh has taken a general decision that contractors, and especially local, should be increasingly involved in the provision of turnkey projects in the field of water development projects. This would significantly lower the work load on BWDB, but at the same time induce new organisational requirements in terms of the capacity to prepare TOR and the supervision of consultants and contractors. The institutional requirements in relation to this should be assessed and catered for.

The capacity of local consultants and contractors to handle this business opportunity needs detailed assessment and measures embarked upon to cater for possible shortcomings. There is otherwise a risk that the quality of services would be lowered.

From the point of view of BWDB, the whole process of screening consultants and contractors needs to be looked into and pre-qualification standards must be established to avoid less qualified bidders. Secondly, the increased involvement of consultants and contractors will require a more thorough material tests and quality control. The capacity of the River Research Institute to undertake this work should be assessed and measures taken to meet any shortcomings.

A general assessment of the roles and responsibilities, existing and required future capacity and capability of the decentralised level of the BWDB should be carried out. It is particularly relevant to the allocation of responsibilities in relation to O & M.

A general element which applies to the whole BWDB organisation is related to employees incentives and general motivation to perform. In an organisation such as BWDB, where promotion, salary as well as other perks are not related to individual performance, only little expectation should be made in relation to the optimal taxing of the human resource base. This should be taken into account when the assessment of the capacity and capability of BWDB is made. Raising the capacity of an organisation may not necessarily need comprehensive training and institution building efforts so long other factors are holding back the performance. The institutional development programme proposed under FAP should take up the discussion with the BWDB and other government institutions involved and work out remedial actions.

.1.2.3 Institutional Support to BWDB of Specific Relevance

Institutional strengthening is being provided to BWDB/Hydrology, under the UNDP project BGD/88/054. The programme covers support to the Surface Water Directorates, the Groundwater Circles and the Directorate of River Morphology and Research. The objective of this support is to strengthen the capacity of BWBD in relation to collection, compilation and collation of hydrology data. At the end of support BWDB/Hydrology shall be transferred from the development to the revenue budget. No further strengthening to BWDB/Hydrology has been identified at this stage.

The O & M "section" of BWDB is receiving assistance through the Systems Rehabilitation Project. This project has three major objectives: (a) increased financing and more efficient use of funds for O & M through improved planning and reduction of costs; (b) improved skills and better motivation of BWDB staff for O & M tasks; and (c) increased involvement of farmers in planning, construction and O & M, particularly for on-farm development works.
The experience acquired from the implementation of this project would be very relevant for the FAP generated projects. Further support in the field of strengthening O & M should be based on this experience.

.1.3 Water Resources Planning Organisation (WARPO) Status: A Permanent Institution with established posts

In March 1992, the Water Resources Planning Organisation (WARPO) was established as an autonomous body under MIWDFC. Essentially, WARPO has derived and developed from the former Master Plan Organisation (MPO), established in 1983 under Phase I of the Water Sector Master Plan Project (WSMPP) - funded by the UNDP. From April 1987, the activities of this project were merged with those the Surface Water Simulation Modelling Programme (SWSMP) also funded by UNDP. This effort, which continued up to November 1987, were the initial steps taken to formally set up two

institutions of MPO (subsequently WARPO) and the Surface Water Modelling Centre (SWMC).

Phase II of the National Water Planning Project (NWPP) started in December 1988 and was terminated in June 1991. MPO was set up as a multi-disciplinary national planning agency to identify policy issues associated with the development of water resources. MPO was mainly engaged in drafting investment proposals; institutional aspects of water resource development and development of a national water plan. Since 1991 there has been a large degree of uncertainty about the future existence and role of MPO, but this has now been formally cleared by the establishment of WARPO.

WARPO does not have a well defined role in FAP, the reason apparently being the uncertain status of the organisation up to march 1992. However, the SWMC is responsible for the models used in planning and design of water development projects in the regional studies carried out under FAP.

The GOB has (1992) endorsed the statutory functions and responsi-bilities of WARPO in relation to the water sector as follows:

- to prepare and update a Master Plan for water resources development;
- to organize, upgrade and manage a national water resources planning database;
- to advise other water sector agencies on the development, utilization and conservation of water resources;
- to provide technical assistance to the water sector and water user agencies;
- to organize and conduct national and international seminars, meetings and workshops in the field of water resources.

4 1.3.1 Organisational Setup

WARPO is headed by a Director General, supported by a Chief Planning Unit, and a Chief Technical Support Unit, both headed by a Chief Scientific Officer. The Planning Unit comprises 5 sections covering the following disciplines: engineering, water resources, economy, agronomy and environment, fisheries and forestry. The organisation is fairly multi-displinary in its composition. The Technical Support Unit comprises 3 sections: computer and information centre, monitoring and evaluation and a section for special studies. The approved staff is 87, of which 43 are professional staff, and the remaining 44 support staff.

The Surface Water Modelling Centre is today a part of the WARPO organisation. Current staffing of the SWMC is: 23 GOB-engineers (22 posts are filled) and a further provision for 27 local consultants has been made. About 70% of the local consultancy posts have been filled.

WARPO is clearly in the process of finding its feet at the initial stages of its operation. Today, WARPO is mainly involved in ground water and surface water data collection in cooperation with the Surface Water Modelling Centre (SWMC).

4.1.3.2 Institutional Assessment

Being at the embryo state, WARPO cannot really be assessed in terms of its current organisational capacity and capability. However, it appears that WARPO would be expected to provide the necessary multi-displinary resources in relation to national as well as to some extent to individual water project planning. In this way the institution will be of significant importance to the implementation of FAP.

Moreover, the joint UNDP/IBRD/GOB Evaluation Mission (february 1992) found that at the time of the completion of the Fourth Five Year Plan (FFYP) project portfolio, MPO was the government agency with the most complete data set on water sector programmes and projects, including technical and economic criteria for evaluation and prioritization. MPO fulfilled a need for technical assistance and advice to the water sector agencies; and MPO was recognized for its data base, its ability to analyze, and for its evaluation skills and capacity. WARPO today still possess some of this know-how.

It should be clear that there is a need for an institution like WARPO. However, if WARPO is to fulfil its functions and responsibilities and continue the successful efforts of MPO, then support is required immediately. This would prevent further deterioration of the set-up and the loss of valuable data, models, and reports. The immediate support should be considered on an "emergency" basis, while the need for long-term support should be defined and approved.

It should be clear that the approved GOB setup of WARPO, as a permanent national body for the water sector, calls for a review of the responsibilities of the organisation in relation to FAP.

4.1.3.3 Institutional Support to WARPO of Specific Relevance

The objectives Surface Water Modelling Centre, under the donor funded SWSMP-II programme, are to consolidate and develop a local capacity and capability in one-dimensional surface water modelling; to maintain and continuously update the previously developed South-East Regional Model and General Model; to develop new Regional Models, for

GD

South-West, North-East, North-West, and South-Central Regions; to demonstrate the potential for practical use of the models in connection with planning and design of water development projects and flood forecasting; and to ensure long-term sustainability of the established modelling technology in the country. SWMC has provided models for FAP 2 to FAP 6 (regional studies). A total of 208 expatriate staff months is anticipated to be provided during the 4 year project period.

With the exception of what is being provided to SWMC, WARPO is not receiving any donor support at present. However, the Consultant would recommend a review and continuation of the support previously given to the Master Plan Organisation.

4.1.4 River Research Institute (RRI)
Status: A permanent institution with established posts

The RRI was established in 1958 as the Hydraulic Research Laboratory (HRL) to handle mainly engineering problems pertaining to hydraulics and soil mechanics. Through different packages of external support, the RRI today plays a major role as a specialised unit for applied research in the fields of river, irrigation, estuary and coastal hydraulics, soil mechanics, concrete and building materials and water quality. In July 1990, RRI became the national River Research Institute, a semi-autonomous organization reporting directly to MIWDFC.

RRI is assigned an significant role in relation to FAP. The institute has already provided assistance to several FAP Components. FAP 1 and FAP 9B have received assistance in hydraulic (physical) modelling; soil analyses have been carried out for FAP 1, 2, 3, 9A, 9B, and 21/22; sediment analyses for FAP 1, 9B and 21/22; and soil and concrete analyses for FAP 8A and 20; and water analyses for FAP 17.

The gazetted functions and responsibilities of RRI are:

a. Preparation of designs by physical model of river training, river erosion control, flood control, irrigation, drainage and research works of river engineering sediment control, estuary and tidal and undertake studies of them.

b. To investigate river flow, flow distribution water security, surface and ground water use and environmental aspects mainly saline water intrusion and water quality to develop water resource by physical model.

c. To investigate the quality of elements to be used for river training, control of river erosion, flood control and irrigation and drainage of water and to justify and evaluate the quality of construction works.

d. To carry out training programmes on the aforesaid areas and to publish periodicals and articles on these activities.

e. To advise the Government Local administration or any other organizations on the above-mentioned activities.

f. To communicate and help local and foreign organizations which are engaged in the relevant types of activities to carry out joint activities.

g. To take up any step necessary to implement the above activities.

4.1.4.1 Organisational Setup

RRI is headed by a Director General and comprises three directorates each managed by a Director: Geotechnical Research; Hydraulic Research; and Technology Services. The additional setup comprises: 7 Chief Scientific Officers (CSO); 11 Principal Scientific Officers (PSO); 20 Senior Scientific Officers (SSO); and 58 Scientific Officers (SO). In total 100 professional staff and 321 support staff.

4.1.4.2 Institutional Assessment

One of the most significant problems of RRI appears to be the ability to attract and retain qualified staff. As of April 1992, only 43% of the established professional posts are filled. The main reason for this seems to be the physical location of RRI. The location at Faridpur appears to less attractive for qualified professional staff. In addition, the organisation has experience a very high staff turnover. This situation apparently is complex in nature, but would have to be looked into with the objective to minimize if not eliminate the problem.

RRI will continue to play a significant role in the implementation of FAP and FAP generated projects. Physical modelling in connection with design of structures; quality control such as inspecting cement and other construction materials; testing quality and salinity of water; investigating sub-soil, and preparation of engineering analyses of soil. The materials testing capacity of RRI should be reviewed since the role of RRI in this capacity would increase with the increased direct supply of materials by local contractors.

4.1.4.3 Institutional Support to RRI of Specific Relevance

Since 1977, RRI has received considerable external as well as national support. RRI received assistance through the UNDP project "Preparatory Assistance Project" from 1977 to 1982. The UNDP project "River Research Institute" was a follow-up project implemented during the period 1983 - 1990.

The joint UNDP/UNDTCD/GOB Evaluation Mission in 1990 called for additional external support to enable the increased potential of RRI in hydraulic and geotechnical engineering to be applied to FAP and other projects in the water-resources sector. The programme would also increase the range, quality and quantity of RRI's work. The programme is still to be embarked upon pending the availability of donor funds.

4.2 Other Organisations

A number of institutions have different roles and responsibilities in relation to the implementation of FAP and FAP generated activities. The Consultant has identified the following:

Ministry of Local Government, Rural Development and Cooperatives:

The Ministry of Local Government, Rural Development and Cooperatives will have a role in relation to the to the planning, implementation and O & M of small scale water resource projects. In this context the Local Government Engineering Bureau will be a key organisation. LGEB is currently involved in FAP 9A and may have a major role in the implementation of minor works associated with compartmentalisation (FAP 20). Moreover, the Ministry would also have a significant role at decentralised levels to secure the necessary local participation in the different stages of the project cycle.

Ministry of Relief:
FAP 11 - Disaster Preparedness Program which will establish an office of emergency preparedness in the Department of Relief. This component is in itself an institutional support activity to the Ministry.

Ministry of Defence (MOD):
FAP 10 - Flood Forecasting which is located at BWDB but involves BMD/MOD. This is a long-term project financed by UNDP; FAP 18 - Topographic Mapping with SOB/MOD and BWDB; FAP 19 - Geographical Information System with SPARRSO/MOD and BBS.

Ministry of Environment and Forest:
Department of Environment is related to FAP 16 - Environmental Guidelines, and Department of Forest to FAP 7 - Cyclone Project with tree planting on the embankments.

Ministry of Fisheries and Livestock:
FAP 17 - Fisheries Study is being carried out in cooperation with the department of Fisheries.

Ministry of Shipping and **Ministry of Communication** are also affected by the implementation of FAP especially Inland Water Transport/BIWTA and Roads and Highways/R&H.

Identification of institutional shortcomings and the objectives of potential institutional strengthening activities to be embarked upon, should be looked into, in relation to the quantity of work the implementation of FAP generated projects would impose.

4.3 Local Consultants and Contractors

The two main issues should be considered in relation to the increased involvement of local contractors and consultants for the planning and implementation of different stages of flood and other water related projects. The first relates to the volume of work involved and the second to the quality of works required.

Let alone other water development projects and all other projects for that sake, the implementation of FAP generated projects alone would require an immense input of consultancy and contractor services over a 15-20 year period.

An assessment of the workload and to which extent local contractors and consultants would be able to respond to this demand would have to be made.

The other aspect relates to the quality of services to be provided. Past experience by the BWDB has shown some technical deficiencies on the part of local consultants and contractors in the field of design, choice of materials, project management and general workmanship. The quality audit and level of competence possessed needs a detailed assessment before development efforts are embarked upon.

Since the GOB has decided to privatise a lot of work in relation to water development project, the assignments mentioned above is of utmost importance. Thus, it should be determined to which extent local consultants and contractors would be expected to participate in the different stages of the project cycle and the level of competence required to undertake the relevant range of assignments.

The necessary capacity building activities to be embarked upon in relation to this would be quite different in nature - ranging from potential attachments to foreign consultants in the field of short term consultancies to actual technical training aiming at skills development. The assignment is even more complex since we are dealing with a competitive private sector. Neither local Consultants' nor Contractors' organisation appear to exists in Bangladesh today, whereupon the management of this capacity building initiative could vested.

5.0 Proposed National Framework for an Institutional Development Programme

5.1 Important Issues when Assigning Institutional Roles and Responsibilities

It is the view of the Consultant, that the present organisational setup related to FAP and general water development is not fully appropriate compared to the considerable tasks lying ahead. In particular, one would question the capacity to ensure continuity of the FAP generated activities.

It appears that there is an urgent need for an established institution, within the water resource sector, to take up the responsibilities of revising and improving the National Water Resources Master Plan; to evaluate water projects in a national context; to provide linkages between the national and field level; and to ensure a multi-disciplinary approach in planning, monitoring and evaluation of water projects.

The present set-up, therefore, needs re-allocation of functions to be able to meet this demand in general and specifically in relation to the continuation of FAP generated activities: regional studies, feasibility studies, water planning models and databases, and studies and guidelines.

Since the implementation of the Flood Action Plan has now reached a stage where the activities are related to the water resources sector in general, the corresponding allocation of roles and responsibilities of individual organisations should be reconciled in order to meet the associated requirements.

To ensure the continuity of the activities related to the improvement of models and data, the responsibility for the same should be assigned to a permanent institution.

The present planning methodology is predominantly done top-down although experience shows that the main problems encountered in project implementation can be directly related to lack of consultation at field level. Future planning activities and systems should follow the bottom-up approach. This aspect has to be reflected in the assignment of roles and responsibilities to different institutions at different levels.

WARPO has been assigned the task of preparing a Water Master Plan, but the organisation has no formal links to FAP. FPCO, which is a temporary organisation, has been assigned the responsibility of preparing an overall flood plan, based on the regional studies. One may question the appropriateness of this situation.

5.2 Proposed Organisational Re-location of Roles and Responsibilities

It is proposed that the **Water Resources Planning Organisation (WARPO)** be re-organized in the capacity of a national water resources planning organisation. The investment projects generated by FAP should be integrated in the present Water Resources Master Plan.

The functions of the **Flood Plan Coordination Organization (FPCO)** shall be transferred to WARPO to support capacity building in non-structural components. FPCO will cease to exist since it has achieved its objectives of initiating FAP.

Bangladesh Water Development Board (BWDB) should be re-organized to function as a supervising engineering organisation for physical construction and operation and maintenance of physical structures.

The institution building programme proposed in relation to FAP should be more widely focused within the framework of national water resource development. It is recommended that institution building activities at national level be based upon the organisational setup proposed above.

5.3 Water Resources Planning Organisation (WARPO)

WARPO should be assigned the responsibility for the integration of regional plans (FAP) into an overall Water Resources Master Plan. WARPO would be responsible for updating this Plan in accordance with national development objectives. WARPO would be responsible for the maintenance and development of data and models, and ensure its availability. Continuous collection of good river data is essential for all future planning. WARPO would supervise preparation of studies, assist in development of guidelines and criteria, hold workshops and meetings to discuss changes in guidelines and criteria, and to test new models. All roles and responsibilities currently assigned to or proposed for FPCO in relation to FAP would be shouldered by WARPO.

It is proposed that WARPO be reorganised to comprise three sections: a planning section, a technical section, and a training section. The major roles and responsibilities assigned to each of them are listed below:

5.3.1. Planning Section

The Planning Section would comprise three units and a library:

- Water Resources Development Unit,
- Special Studies Unit,
- Project Monitoring and Evaluation Unit, and
- Project Report Library.

The **Water Resources Development Unit (WRDU)** would be responsible for:

The main responsibilities of the Water Resources Development Unit would be to revise and to integrate FAP investment projects in the Water Resources Master Plan. Most of the FAP regional studies have not included a list of other or complementary projects and activities currently under implementation in the respective regions, so this needs further elaboration.

The Unit would also be responsible for preparing TOR for feasibility studies, and for evaluation of completed feasibility studies in the overall plan context.

To summarise the responsibilities of the unit:

1. Preparation of a national Water Resources Master Plan and continuous updating of the Plan;

2. Coordination at national level comprising all ministries concerned with activities in the water sector such as fisheries, water supply, navigation, transport, industry, forestry, environment etc.;

3. Screening, prioritizing, and approving identified projects in national plan context;

4. Preparation of TOR for feasibility studies; screening and selection of consultants; monitoring and evaluation of the feasibility studies.

The **Project Monitoring and Evaluation Unit (PMEU)** would be responsible for:

1. Establish/monitor Project Implementation Units (PIU);

2. Provide support to the PIUs; and

3. Evaluate completed projects.

The **Special Studies Unit (SSU)** would be a flexible set-up to deal with and carry out/supervise special studies when required. In general, this unit would look after the various guidelines: keeping, updating (according to new findings in the various line ministries), and ensure availability of the same to relevant ministries, agencies and consultants.

The unit would be responsible for:

1. Support and coordinate studies (environmental, fisheries etc.);

2. Carry out studies and special assignments as delegated by the WRDU;

The SSU would be manned by a small core staff and the activities would be carried out by private consultants supervised by SSU.

The Project Report Library would ensure availability of all reports, studies, and guidelines completed under FAP. The library facilities should be of very high standard, bearing in mind, the time and money spent on the reports, guidelines etc. It is important that the library be established from inception to ensure continuity and proper storage of all the data and materials from the implementation of the FAP Components.

5.3.2 Technical Section

The Technical Section would comprise two centres and a library:

- Water Resource Modelling Centre,
- Planning Data Centre, and
- Water Resources Reference Library.

The **Water Resource Modelling Centre (WRMC)** would be responsible for:

1. Mathematical modelling work including the present SWMC models, models developed under NWP and others as required.

2. Continued development, updating and modification of national and regional planning models;

3. Support to other users in planning and design of infrastructure development projects as well as to university and research institutions;

4. Establish a direct link to:
   - the Flood Forecasting and Early Warning Centre (FAP 10);
   - the National Flood Management and Disaster Preparedness Centre (FAP 11); and
   - the Flood Management Model (FAP 25).

5. Develop and improve the hydrology data base in close cooperation with BWDB/Hydrology Directorate, which is the primary source of data.

6. WARPO/SWMC should establish a field office at RRI, to ensure technology transfer in connection with development of models.

The possibility of having the BWDB/Hydrology Directorate under the umbrella of WRMC should be considered.

The **Planning Data Centre (PDC)** would collect all data from relevant GOB agencies:

1. Develop national data bases, with appropriate maps for planning purposes;

2. A geo-referenced data base and thematic maps are being developed by the Geographical Information System (FAP 19) in cooperation with SPARRSO.

3. Photo maps with contours are being developed by Topographic Mapping (FAP 18) in cooperation with SOB.

4. A mapping cell would be established in BWDB (FAP 18).

A list of water resources and related data collection and user agencies is given in Annex 2.

5.3.3 Training Section

The flood problems in Bangladesh are extremely complex and challenging because of the country's unique geography and location. Given this unique position of WARPO should be used to develop specialists within all aspects of the river systems.

Training of specialists has started in SWMC and GIS (FAP 19). Training should be offered to various line agency staff in use of the data base and models. The training section would organize and conduct seminars, meetings and workshops related to water resources development.

Technology transfer is a key issue and it is recommended that WARPO establishes a field office at RRI to ensure technical cooperation between the two institutions.

The Training Section would comprise two units:
- Manpower Development Unit
- Workshops/Seminars Unit

The summarized proposed functions of the Training Section are:

1. Prepare a programme of training for the WARPO staff;

2. Advise and assist other agencies on training possibilities in WARPO training section and develop training programmes in the utilization of the hardware and software available at the centres; and

3. Host workshops for technical presentations;

4. Develop and promote in-country training.

5.4 Bangladesh Water Development Board (BWDB)

It is recommended, BWDB be streamlined to function as a supervisory engineering organisation with outstanding design facilities and highly qualified staff. BWDB would be responsible for the physical construction of the FAP generated investment projects, and for operation and maintenance of the completed structures.

FAP generated projects will constitute the major project portfolio for the coming 15-20 years, at present some 40 locations for investment projects have been identified in the regional studies. It is necessary to streamline BWDB and to develop the necessary capacity to ensure efficient implementation of the generated projects.

BWDB would be the responsible agency for design, construction, operation and maintenance of physical structures.

BWDB shall participate at the local level in the Project Implementation Units, as the supervising and monitoring agency for physical construction. BWDB would be responsible for project management in relation to time schedule, that proper quality control and material tests are carried out; training in operation of structures (water management); and training of maintenance teams.

5.5 Flood Plan Coordination Organization (FPCO)

The temporary functions of FPCO should be phased out and the responsibilities for subsequent recurrent activities handed over to WARPO. An appropriate phased time schedule for this should be prepared to secure the continued operation and relevant systems designed and applied by FPCO.

5.6 Participation of Institutions at Local Level

The studies carried out under FAP, have identified lack of consultation at local level during the planning and project preparation stage as the main reason to problems encountered in the implementation and subsequent operation and maintenance of water projects. Some measures have been embarked upon during the implementation of FAP to meet this requirement. "Guidelines for Project Assessment" have been prepared to ensure a multi-criteria analysis is used in project planning. A "People's Participation Act" is currently being drafted, which will include guidelines for consultation at field level.

5.6.1 Project Implementation Units (PIU)

To achieve a multi-disciplinary approach during individual project implementation, Project Implementation Units (PIU)

are proposed to be established in connection with the implementation of the FAP generated projects. The objective of such units would be to act as a link between involved national level institutions, particularly the BWDB, the project, and Local level organisations.

The actual local institutions or bodies to be involved would depend on the specific project, but it is envisaged that different levels of Local Authorities, Water User groups should have a say and a role.

The feasibility studies should explicitly describe: identified local institutions to be involved in implementation as well as their defined, agreed and accepted roles and responsibilities. A proposal for the composition of a Project Implementation Unit (PIU) should also be included in the feasibility study.

It would be the responsibility of WARPO to secure that TOR given for the feasibility studies, in an adequate way, cover the participation element and that the final feasibility study report has taken the same into account in an adequate way.

The subsequent Project Document should contain a project implementation strategy and plan. It should also include identified local institutions involved in implementation and their defined roles and responsibilities as well as inputs to be provided. The responsibility and authority of the PIU should be clearly defined in the project document, which will be approved by the local institutions to be involved.

The PIU would comprise all major parties involved in implementation of, or affected by, the project i.e. the executing agency (in most cases the BWDB and WARPO), the implementing agency (contractor and/ or consultant) and the Local organisation (e.g. one or more Local Authorities, Water User group(s)).

The PIU would coordinate and monitor project implementation and report to the involved Local Authority(ies) and WARPO/BWDB. A format for this monitoring should be worked out.

WARPO/BWDB would take the initiative to establish the PIU. The PIU would submit monthly progress reports to WARPO/BWDB and the involved local authority(ies).

The PIU would deal with the necessary aspects of local participation during implementation, local conflict issues, responsibilities in relation to operation and maintenance of completed works.

The PIU would actively take part in the identification of training needs for the appropriate operation and maintenance of structures. This should cover possible

strategies to be embarked upon in relation to raising funds for local maintenance work.

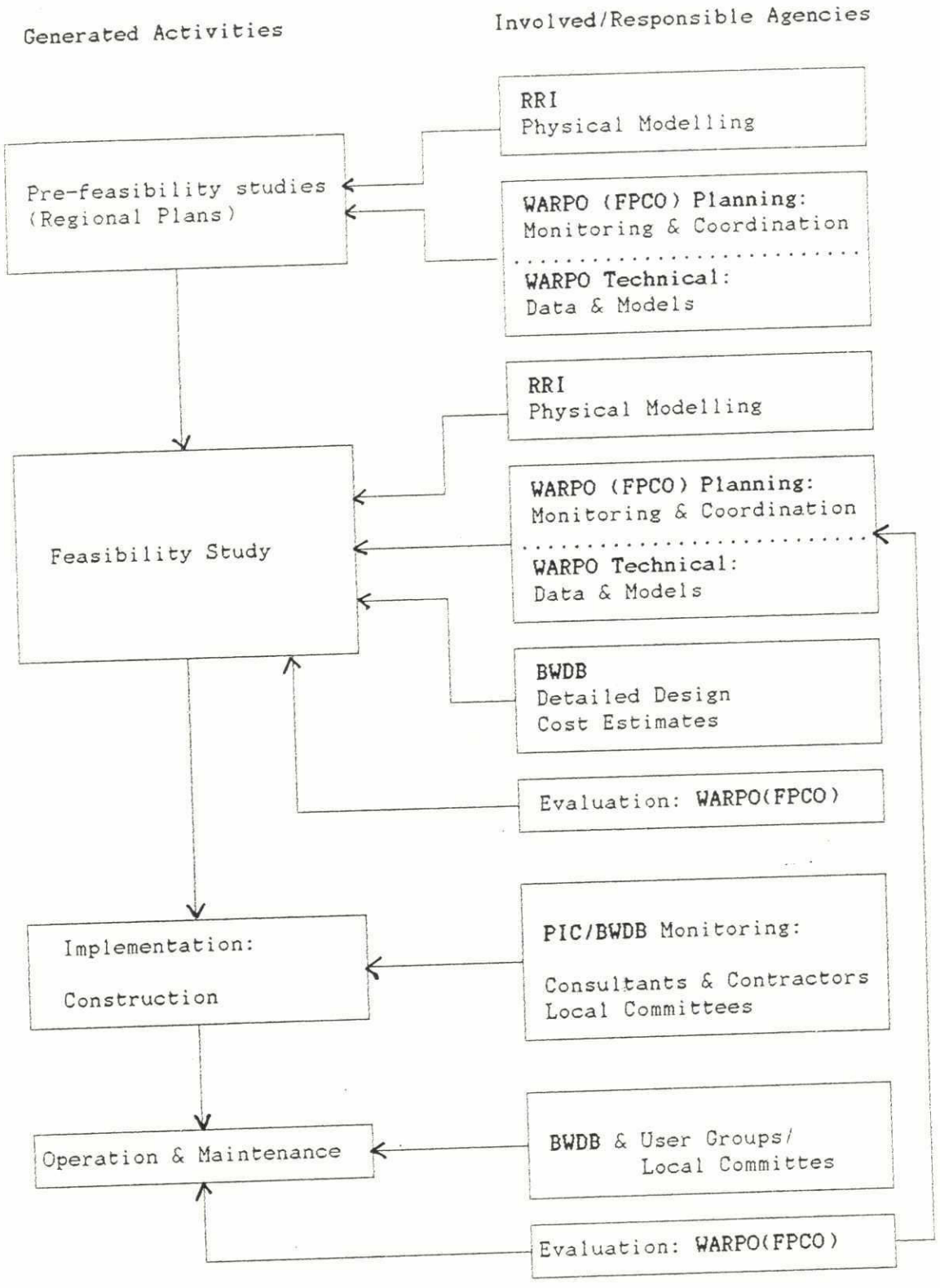
The PIU would oversee the implementation of training for local staff, and issue a certificate of completion when this has been successfully completed.

For the detailed design and implementation of the PIU concept, WARPO should take the necessary contact to the Systems Rehabilitation Project currently being implemented with the BWDB and of cause make use of the recommendations provided by the "People's Participation Act".

5.6.2 Local Government

It would be natural to some extent to root a project in the appropriate local authority. This could be done with the establishment of Upazila level planning offices, alternatively that WARPO be decentralised to this level. This would, at the same time, be a step forward in building up local level capacity in relation to the planning and implementation of water development projects. It is proposed that an element of an institution building programme be reserved for exploring the appropriateness of this.

In most cases water projects would involve more than one Upazila and therefore more than one Local Authority. Small water projects located within the same Upazila are in most cases being implemented by Local Government Engineering Bureau.


Generated Activities
Involved/Responsible Agencies
RRI
Physical Modelling
Pre-feasibility studies
(Regional Plans)
WARPO (FPCO) Planning:
Monitoring & Coordination
WARPO Technical:
Data & Models
RRI
Physical Modelling
Feasibility Study
WARPO (FPCO) Planning:
Monitoring & Coordination
WARPO Technical:
Data & Models
BWDB
Detailed Design
Cost Estimates
Evaluation: WARPO(FPCO)
Implementation:
Construction
PIC/BWDB Monitoring:
Consultants & Contractors
Local Committees
Operation & Maintenance
BWDB & User Groups/
Local Committes
Evaluation: WARPO(FPCO)

6.0 Principles of Institutional Support

The main principle behind an institutional support programme would be that any required external assistance should be of an advisory nature. The whole idea of institution building requires external support to be kept out of line positions thus not having executive functions and responsibilities.

Today, a battery of different institutional development activities are being undertaken for different local organisations and Ministries involved in water development activities at national and lower levels. This whole support needs a full appraisal before a new institutional development programme be designed and embarked upon. Overlap should be avoided and previous experience build upon.

The GOB should be prepared to enter into a dialogue regarding the conditions of service of local staff employed in the organisations to be supported. The current promotion, rotation and transfer system of staff seems counter productive to the building up of an institutional capacity. Sorting out this aspect should be given a high priority.

It should be clear, that much of the institutional support earlier anticipated to be provided to FPCO would now be a requirement of WARPO. Some of these needs have already been identified in the Concept Note prepared for the Institutional Development Programme (FAP 26).

The Joint Evaluation Mission Report, National Water Plan Project, IBRD/GOB/UNDP, 1992 also states "The need for dynamic leadership and managerial capacity is greater in an organisation dealing with important data, objective analysis and planning." Clearly, there would be a need for a managerial development activity, specifically designed to cater for the needs of a multi-disciplinary organisation.

In terms of the physical location of the entities to be incorporated in the WARPO organisation, there would be a good case for considering some relocation of activities. This in itself would contribute to the concept of WARPO as a national body and the feeling among the staff to belong to such. In this context the possibility of using the previous RRI area on Green Road should be investigated. A physical transfer of WARPO and SWMC to the area, where BWDB/Design, BWDB/Hydrology and FPCO already are placed, could present an excellent opportunity for a fast and smooth creation of an efficient national water resources planning organisation. It would also facilitate the development of BWDB/Design.

In the context of this, the institutional support package could include funds for the establishment of appropriate office facilities, computer equipment and for some time

transport. However, since this kind of investments are of a recurrent nature, the institution building programme should also encompass activities on how to raise revenue to cover the depreciation cost of such.

To build up a national capacity in planning and implementation of water development projects, the organisations involved must be able to attract and retain highly qualified staff. An institution building programme should cover activities related to this. It should be made clear that institution building would not necessarily be achieved from the provision of equipment and technical training.

So far little has been said about building up the required technical capacity of the involved institutions. However, this would be subject to a detailed training needs analysis. The analysis would include an assessment of the proposed organisational setup and establishment with the subsequent development of the required job descriptions. These would stipulate the qualifications and experience required to hold a particular position against which individual training activities can be embarked upon. It is proposed that a project related training approach be adopted to undertake this.

Moreover, the organisational capacity would also relate to more "soft" issues related to management procedures, delegation of responsibility etc.. This may more appropriately be covered through an on-the-job coaching approach where bottlenecks are simultaneously being identified and action plans developed and implemented to remedy shortcomings.

ANNEX 1

Detailed Output from FAP Componenets
(subject to review)

FAP 1 - FAP 6: REALIZED AND EXPECTED OUTPUT

OUTPUT	Regional Plan Master Plan Area Plan	Identified Projects	Database Models	Feasibility Reports	Detailed Design Tender Doc
FAP 1	**Area Plan** Brahmaputra Right Embankment Strengthening Completion: February 1993	Fulchari Sariakandi/ Mathurapara Kazipur Sirajganj Betil	1.Mathematical Model 2.Physical Model 3.Morphological Study 4.Geotechnical Study 5.Engineering Design 6.BRE Inventory Survey 7.Survey Database 8.1-D and 2-D Numerical Models	Sirajganj Sariakandi/ Mathurapara	Tender Doc completed Appraisal July 1992
FAP 2	**Regional Plan** North West Regional Plan Completion: **December 1992**	1.Lower Atrai Left Bank 2.Chalan Beel Polders 3.Lower Karatoya 4.Mohananda 5.Kurigram South 6.Teesta RB 7.Gaibandha	1.Topographical Survey 2.Engineering Survey 3.Sectoral Surveys 4.Environmental Survey 5.Social Impact Survey 6.NW Hydrological Database 7.NW Region Model	Gaibandha Improvement Project	
FAP 3	**Regional Plan** North Central Regional Plan Completion: **July 1992**	1.Jamalpur 2.Bhuapur/Kauljani 3.Bhuapur/Aricha 4.Jamalpur/Bhuapur 5.Pungli/Buriganga	1.Char Land Study 2.Public Participation/ Regional Office 3.Jamuna Bridge & Dhaleswari Mitigation Study 4.Environ. Information Collection 5.Hydraulic Model Requirements	Jamalpur Priority Project	
FAP 4	**Regional Plan** South West Regional Plan Completion:	Initial Studies end April 1992 Selection of Priority Projects May/June 1992	1.Hydraulic/River Morph. Study 2.Hydraulic Models		
FAP 5	**Regional Plan** South East Regional Plan Completion:	1.Noakhali North 2.Dakatia 3.Dhonagoda		Noakhali North	
FAP 6	**Regional Plan** North East Regional Plan Completion: **August 1993**		1.Agricultural Study 2.Fisheries (database) 3.Environmental Study 4.Water Resource Development 5.Hydrogeology 6.River Morphology and Sediment 7.Hydrology 8.Gender and Sociology 9.Mathematical Modelling 10.Mapping 11.Institution Building*		

* Training Needs Analysis
GOB Training
Support to GOB Institutions
NGO Development (North East Region)

FAP 7 - FAP 10: REALIZED AND EXPECTED OUTPUT

OUTPUT	Regional Plan Master Plan Area Plan	Identified Projects/Towns/ Activities	Database Models Studies	Feasibility Reports	Detailed Design Tender Doc
FAP 7	**Master Plan** Cyclone Protection Project II Completion: **May 1992**	1. First Year Priority Programme Embankments 2. Feeder Roads 3. 5 Year Mid-Term Programme/Phase 2	1.Design Studies 2.Hydraulic Studies 3.Afforestation Studies 4.Agricultural Studies 5.Socio-econ. Studies 6.Environmental Studies 7.Fisheries Studies 8.Warning Systems Studies 9.Studies of O&M 10.Embankment Surveys 11.Condition Surveys 12.Soil Investigations 13.Mathematical Models Simulation of Cyclonic Storm Surge	Embankments Feeder Roads Feasibility Studies for 5 Year Mid-Term Programme Completed	Detailed Design & Tender Doc Completed Detailed Design & Tender Doc Completed
FAP 8A*	**Master Plan** Greater Dhaka East Completed: **March 1992**	1.Greater Dhaka East 2.Narayangnj DND 3.Narayanganj West		Feasibility Study for the three identified areas Completed	
FAP 8B**	Greater Dhaka West Completed: **August 1991**	Integrated flood protection works for Dhaka metropolitan area, 260 sq.km, with infra-structure and environment		Feasibility Study Completed -	
FAP 9A**	**Master Plan** Secondary Towns Protection Project Completion: **April 1992**	1.Khulna 2.Dinajpur 3.Kurigram 4.Panchagarth 5.Habiganj 6.Moulvi Bazar	1.Topographical Surveys 2.Houshold Surveys 3.Public Health Situation for Khulna 4.Resettlement Survey for Khulna 5.Study of Drainage - polders west of Khulna 6.Environmental Impact Assessment 7.Hydrological Data Collection 8.Khulna Drainage Design Model	The study for all 6 towns completed to feasibility level	
FAP 9B	**Area Plan** Meghna Left Bank Protection Project Completion: February 1992	1.Bhaira Bazar & Railway Bridge 2.Munshigang 3.Chandpur Town 4.Eklashpur 5.Haimchar 6.Meghna R&H Bridge 7.Maniknagar 8.Meghna Lower long-term Strategy Plan	1.Geotechnical Investigations 2.Scale Model Studies 3.Mathematical Model Studies 4.Environment Impact Assessment	Bhairab Munshiganj Chandpur Chandpur Eklashpur Haimchar Meghna R&H Maniknagar Long-term Strategy Plan	Design and Tender Doc prepared -do-for emergency work pre-F/S Design and Tender Doc prepared
FAP 10	Flood Forecasting and Early Warning Completion: **December 1993**	1.Improve Lead Time Forecasts 2.Improve Awareness of Flood Forecasts	1.System Design 2.Training Programme in-house and overseas 3.Study on flood behavior of Eastern flooding Rivers	Report completed	Draft Tender Doc

* No Institutional Support is included. Recomended an optimum O&M program be prepared by BWDB/DWASA
** The project includes Implementation support to involved GOB institutions (DWASA and DCC not included)

FAP 11 - FAP 17: REALIZED AND EXPECTED OUTPUT

OUTPUT	Study	Identified Projects/Towns/ Activities	Criteria/ Guidelines	Pilot Schemes/ Area	Comments
FAP 11*	Disaster Preparedness Programme Completion: **March 1995**	1.Establish an Office of Emergency Preparedness 2.Produce Flood Preparedness Manuals - National Level - District Level - Local Level 3.Train officials and community leaders			
FAP 12	FCD/I Agricultural Review Completion: **February 1992**	Constraints in Project Management	Guidelines and Criteria for removing constraints	PIE: Chalan Beel, Kurigram South, Meghna Dhongoda IP, Zilkar Haor, Kolabashukhali. RRA: ProtappurIP, Nagor River Project, Sonamukhi Bonmander Beel DP, Sukunia Beel, Silimpur-Karatia Bridge, Khatakhali Khal, Halir Haor, Kahua Muhuri, Konapara, Polder 17/2, BRE Kamarajani and Kazipur Reach Comments:	
FAP 13	O & M Study Completion: **February 1992**	1.Constraints of O&M in FCD/I Projects 2.Beneficiary Participation	Guidelines for removing constraints		
FAP 14	Flood Response Study Completion:		Guidelines for enhancing effective flood response Criteria for use in planning, design and operation		
FAP 15	Land Acquisition and Resettlement Project Completion: **January 1992**		Criteria and approaches for minimizing land acquired and to facilitate rehabilitation of displaced families Criteria and guidelines and procedures for land acquisition and resettlement	Upazila ** KIP Rjarhat BRE Shahzadpur KAP Shalika DCFPP Mirpur Thana MDIP Matlab MRP Moulvibazar	
FAP 16	Environmental Study Completion:	Identify Environmental Issues Assess need for Training GOB personnel in EIA methodology	Guidelines for EE and EIA TOR for annual review of the study and for monitoring the environmental trend		
FAP 17	Fisheries Study and Pilot Project Completion:	Impact on flood plain fisheries and fishing communities	Guidelines for planning Action Plan Project with minimised negative impact on fisheries and with improved fisheries resources		

* An Institutional Development Programme to strengthen the Ministry of Relief

** KIP Kurigram Irrigation Project
BRE Brahmaputra Right Flood Embankment Project
KAP Kalidaskhali Arpara Project
DCFPP Dhaka City Flood Protection Project
MDIP
MRP Monu River Project

FAP 18 - FAP 26: REALIZED AND EXPECTED OUTPUT

OUTPUT	Study	Identified Projects/ Locations/Activities	Criteria/Guidelines Database and Models	Institutional Support	Comments:
FAP 18	Topographic Mapping Completion:		Topographic Maps Thematic Maps Aerial Photography Satellite Imagery	Mapping Cell in BWDB	
FAP 19	Geographical Information System (GIS) Completion:	9 prospective applications and pilot studies	Standardized Data Protocols and Data Base Formats	Training in GIS	
FAP 20	Compartmentalization Pilot Project Completion:	Tangail Serajganj Full Scale Trials	Criteria and Guidelines for Planning, Implementation and Management		
FAP 21/22	Bank Protection and APPM Pilot Project Completion:	Practical Design and Implementation of Test Work Full Scale Trials Work	New standards for design Construction and Maintenance of cost-effective structures		
FAP 23	Flood Proofing Pilot Project Completion:	Identify and test effective measures to mitigate adverse effects			
FAP 24	River Survey Programme Completion:	Collect reliable data Undertake special studies Strengthen BWDB Upgrade institutional capability		1.On-the-job training to BWDB, BITWA 2.Upgrade the institutional capability for river hydrological and morphological data collection 3.study programme	
FAP 25	Flood Modelling/ Management Project Completion: **June 1994**	Coordination (CAT) Flood Hydrology Study (FHS) Flood Management Model (FMM)	FHS: 1.Hydrology Design Criteria 2.Methodology for establish hydrology design Criteria 3.Assessment of inter-regional effects FMM: 1.FMM software 2.Three Pilot FMM 3.Recommendation on continued development, institutional responsibility and necessary training programme	Recommendation on continued development, institutional responsibility and necessary training programme	
FAP 26	Institutional Development Programme Completion: FPCO Support **December 1993**	Assess existing concerned institutions and recommend appropriate arrangements for planning, implementation and managing the AP projects		Training programme for BWDB/FPCO	

ANNEX 2

Water Resources Data Collection Agencies and Users

ce: MPO/MIWDFC: Inter-agency Committee Report on
Data Improvement - January 1991, Dhaka

LIST OF DATA USERS

1. Bangladesh Water Development Board (BWDB)
2. Bangladesh Agriculture Development Corporation (BADC)
3. Master Plan Organization (MPO).
4. Flood Programme Co-ordination Organization (FPCO).
5. Joint River Commission (JRC).
6. River Research Institute (RRI).
7. Department of Agriculture Extension (DAE).
8. Bangladesh Agriculture Research Council (BARC).
9. Bangladesh Rice Research Institute (BRRI).
10. Bangladesh Agriculture Research Institute (BARI).
11. Soil Resources Development Institute (SRDI).
12. Directorate of Agriculture Marketing (DAM).
13. Bangladesh Inland Water Transport Authority (BIWTA).
14. Bangladesh Inland Water Transport Corporation (BIWTC).
15. Bangladesh Shipping Corporation (BSC).
16. Chittagong Port Authority (CPA).
17. Khulna (Mongla) Port Authority (KPA).
18. Planning Commission (PC).
19. Bangladesh Bureau of Statistics (BBS).
20. Department of Forests (DOF).
21. Department of Environment (DOE).
22. Public Works Department (PWD).

23. Survey of Bangladesh (SOB).
24. Bangladesh Meteorological Department (BMD).
25. Space Research and Remote Sensing Organization (SPARRSO).
26. Bangladesh Power Development Board (BPDB)
27. Rural Electrification Board (REB).
28. Geological Survey of Bangladesh (GSB).
29. Bangladesh Parjatan Corporation (BPC).
30. Civil Aviation Authority (CAA).
31. Directorate of Fisheries (DOF).
32. Bangladesh Fisheries Development Corporation (BFDC).
33. Bangladesh University of Engineering and Technology (BUET).
34. Bangladesh Agriculture University (BAU).
35. Dhaka University (DU).
36. Jahangir Nagar University (JNU).
37. Rajshahi University (RU).
38. Chittagong University (CU).
39. Bangladesh Institute of Development Studies (BIDS).
40. Roads & Highways Department (RHD).
41. Jamuna Multipurpose Bridge Authority (JMBA).
42. Railway Board (RB).
43. Bangladesh Chemical Industries Corporation (BCIC).
44. Chittagong Dry Dock.
45. Khulna Shipyard.

46. Local Govt. Engineering Bureau LGEB)

47. Department of Public Health Engineering (DPHE).

48. Dhaka WASA (DWASA)

49. Chittagong WASA (CWASA)

50. Dhaka Municipal Corporation (DMC).

51. Chittagong Municipal Corporation (CMC).

52. Khulna Municipal Corporation (KMC).

53. Rajshahi Municipal Corporation (RMC).

54. World Bank Resident Mission.

55. United Nations Development Programme (UNDP).

56. UNICEF.

57. Food & Agricultural Organization (FAO).

58. Asian Development Bank (ADB).

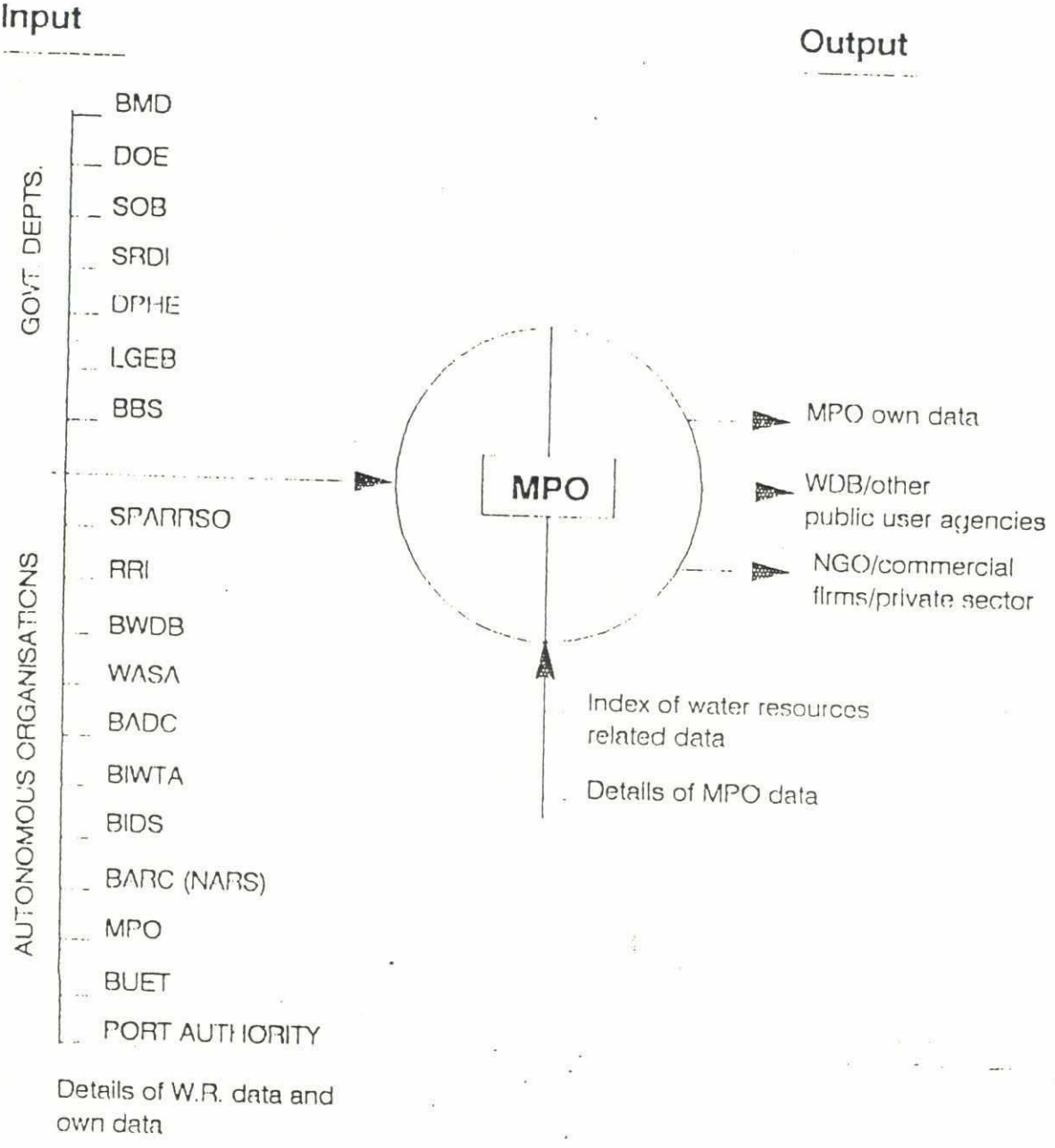
59. Institute of Engineers Bangladesh (IEB).

60. Krishibid Institution.

61. Bangladesh Association for the Advancement of Science (BAAS)

62. Centre on Integrated Rural Development for Asia and the Pacific (CIRDAP).

Water Resources Related Data



Input-Output Interactions

TYPE AND SOURCE OF WATER RESOURCE AND RELATED DATA & COLLECTING AGENCIES

Type of Data	Name of Organization										
	BWDB	BADC	BIWTA	BMD	DPHE	WASA	SOB	SPARRSO	DOE	SRDI	Port Auth.
1.Precipitation	X	–	–	X	–	–	–	–	–	–	–
2.Streamflow	X	–	–	–	–	–	–	–	–	–	–
3.River WL	X	–	X	–	–	–	–	–	–	–	–
4.GW Table	X	X	–	–	X	X	–	–	–	–	–
5.Aquifer Test	X	–	–	–	X	–	–	–	–	–	–
6.Drilling Test	X	X	–	–	X	X	–	–	–	–	–
7.Sediment Load	X	–	–	–	–	–	–	–	–	–	–
8.Salinity level	X	–	–	–	–	–	–	–	–	–	X
9.River X section	X	–	X	–	–	–	–	–	X	X	–
10.Water use	X	X	–	–	X	X	–	X	–	–	X
11.Land elevation	–	–	–	–	–	–	X	–	–	–	–
12.SW quality	–	–	–	–	X	X	–	–	X	–	–
13.GW quality	X	X	–	–	X	X	–	–	X	–	–
14.Evaporation	X	–	–	X	–	–	–	–	–	–	–
15.Climatic data	X	–	–	X	–	–	–	–	–	–	–
16.Satellite photo & water related	–	–	–	–	–	–	–	X	–	–	–
17.Maps(Cont./topo)	–	–	–	–	–	–	X	–	–	–	–
18.Soil data	–	–	–	–	–	–	–	–	–	X	–
19.Cloud picture	–	–	–	–	–	–	–	X	–	–	–
20.Morph. change	X	–	X	–	–	–	–	–	–	–	–
21.Flooded area	X	–	–	–	–	–	–	X	–	–	–
Total	15	4	3	3	6	5	2	4	3	2	2

TYPE AND SOURCE OF WATER RESOURCE AND RELATED DATA & COLLECTING AGENCIES (Rev)

Type of Hydrologic Data	Name of Organization												
	BWDB	BADC	BIWTA	BMD	DPHE	SOB	SPARRSO	DOE	SRDI	BARC	RRI	MPO	WASA
1.Precipitation	X	–	–	X	–	–	–	–	–	X	–	X	–
2.Streamflow	X	–	–	–	–	–	–	–	–	–	–	X	–
3.River WL	X	–	X	–	–	–	–	–	–	–	–	X	–
4.GW Table	X	–	–	–	X	–	–	–	–	–	–	X	X
5.Aquifer Test	X	X	–	–	X	–	–	–	–	–	–	–	–
6.Drilling Test	X	–	–	–	–	–	–	–	–	–	–	–	X
7.Sediment Load	X	–	–	–	–	–	–	–	–	–	X	X	–
8.Salinity level	X	–	–	–	–	–	–	X	–	–	–	–	–
9.River X section	X	–	X	–	–	–	–	–	–	–	–	–	–
10.Water use	X	–	–	–	–	–	–	–	–	–	–	X	–
11.Land elevation	X	–	–	–	–	X	–	–	–	–	–	–	–
12.SW quality	X	X	–	–	–	–	–	X	–	–	–	–	X
13.GW quality	X	X	–	–	X	–	–	X	–	–	–	–	X
14.Evaporation	X	–	–	X	–	–	–	–	–	X	–	–	–
15.Climatic data	X	–	–	X	–	–	–	–	–	X	–	–	–
16.Satellite photo & water related data	–	–	–	–	–	–	X	–	–	–	–	–	–
17.Maps(Cont./topo)	–	–	–	–	–	X	–	–	X	–	–	–	–
18.Soil data	X	X	–	–	–	–	–	–	X	X	–	–	–
Total	16	4	2	3	3	2	1	3	2	4	1	6	4

ANNEX 3

Organisations Visited and People Met

Organisations Visited and People Met

United Nations Development Programme

Mr. Charles H. Larsimont, Resident Representative
Mr. Khondker A. Hafiz, Assistant Resident Representative

World Bank

Mr. Ross Wallace, Resident Flood Plan Coordinator
Mr. Saeed A. Rana, Deputy Director

Ministry of Irrigation, Water Development and Flood Control

Mr. M. Asafuddowlah, Secretary
Mr. Rezaul Hayat, Additional Secretary
Mr. Abul K. Azard, Deputy Secretary (Dev-1)
Mr. H. Khalid, Sr. Assistant Secretary
Dr. A.T.M. Shamsul Huda, Additional Secretary, MIWDFC

Planning Commission

Mr. M. A. Khaleque, Joint Chief, Irrigation wing

Flood Plan Coordination Organization (FPCO)

Mr. M.H. Siddiqui, Chief Engineer, FPCO
Mr. Afzalur Rahman, Superintending Engineer, FPCO
Mr. Gulzer Hossain, Executive Engineer, FPCO
Dr. M.S. Zaman, Inst. Spec., FPCO

FPCO Panel of Experts

Mr. Nurul Huda, Chairman,
Dr. Ainun Nishat
Mr. Steven Jones
Mr. W. van Ellen

UNDP Specialists

Mr. Shaheedal Islam, Team Leader
Mr. Masud Ahmed, Institutional Specialist

Bangladesh Water Development Board (BWDB)

Mr. A. Razzak, Member of Planning, BWDB
Mr. Liaquat Hossain, Chief Engineer, Planning
Mr. Md. Afazuddin, Chief Engineer, Design

BWDB Hydrology

Mr. Karoly Futaki, CTA, BGD/88/054

BWDB System Rehabilitation Project (Staff Training):

Mr. Geoffrey G. Pope, Personnel Management/Training Specialist
Mr. L. Prins, Personnel Specialist

BWDB System Rehabilitation Project (O&M Improvement):
Mr. Leen van 't Leven, Team leader
Ms. J.W.M. Spreeuwenberg, Socio-Economist

Water Resources Planning Organization (WARPO)

Mr. Taslimuddin, Director General
Mr. A.M.M. Nurul Huq, Chief Scientific Officer, Planning
Mr. Azizul Haque, PSO/Chief Agronomist
Mr. Khorshed Alam, PSO/Engineer
Mr. Tuliar Rahman, Chief Scientific Officer, Technical

Surface Water Modelling Centre (SWMC)

Mr. Alasdair Macdonald, Team Leader
Mr. Ranjit Galappatti, Computational Hydraulics Eng.

River Research Institute (RRI), Faridpur

Mr. Syed Anwar Yusuf, Director General, RRI
Mr. P.N. Bhakat, Chief Sientific Officer, RRI
Mr. Nazrul Islam, Chief Sientific Officer, RRI
Mr. Zahirul Islam, Principal Scientific Officer, RRI
Mr. Sheikh Amir Ali, Chief Engineer, BWDB
Mr. Serajul Hoque Talukdar, Superintending Engineer, BWDB
Mr. Md. Amir Khasru, Executive Engineer, BWDB

Local Government Engineering Bureau (LGEB)
Mr. Q.I. Siddique, Engineering Adviser, LGEB

Department of Fisheries
Mr. Ataur Rahman, Director

Department of Environment
Mr. M. Kamal Farooque, Joint Director
Mr. MD. Reaz Uddin, Deputy Director (Research)

Royal Netherlands Embassy
Mr. J. van der laan, First Secretary, Netherlands Embassy

Embassy of the Republic of France
Mr. Alain Van den Abeele, Delegate, C.C.C.E

Royal Danish Embassy, DANIDA
Mr. K. Kjær Nielsen,
Mr. Poul E. Christensen, Counsellor, DANIDA

British High Commission, ODA
Mr. E. Taylor, First Secretary (Aid)
Mr. N.J. MacPherson, First Secretary (Fisheries)

Embassy of Sweden, SIDA
Dr. Jan Clewestam, First Secretary

Delegation of the Commission of the European Communities
Mr. W. Tuck, First Secretary

Canadian High Commission
Mr. Steve Rayfield, First Secretary

USAID
Ms. Helen K. Gunther, Deputy Director, Office of F&A

ISPAN
Mr. R.E. Aten, P.E., Chief of Party, Irr.Sup. Project
Dr. G.T. Keith Pitman, Chief of Party, (FAP 14,16,19,23)
Mr. Kazi F. Rahman, Principal Advisor, Irr.Sup. Project
Mr. David Bogan - Technical Support Center, ISPAN
Mr. Mujibul Huq, Co-Team Leader, Environmental Studies (FAP 16)

FAP-Teams:
Mr. A.P.G. Russell, Team Leader, (FAP 1)
Mr. T.R. Franks, Team Leader, (FAP 2)
Mr. Donald A. Brown, Team Leader, (FAP 3)
Mr. C.G.Swayne, Team Leader, (FAP 3.1)
Mr. Nik Ille, Hydraulic Engineer, (FAP 3.1)
MR. R.I. Thiagarajah, Team Leader,(FAP 4)
Mr. John W. Dunn, Team Leader, (FAP 5)
Mr. Michael J. Politzer, Team Leader, (FAP 5)
Mr. Donald N. Moore, Divisional Director (MMD)
Mr. Herb D. Wiebe, Team Leader, (FAP 6)
Mr. Michael E. Ibbitt, Eng. Hydrologist, (FAP 6)
Mr. Bjarne Mathiesen, Team Leader, (FAP 7)
Mr. Hajime Tanaka, Team Leader, (FAP 8A)
Mr. E. G. Thomas, Team Leader, (FAP 9A)
Mr. James E. Dent, CTA, (FAP 10)
Dr. M.A.K. Smith, Team Leader, (FAP 17)
Dr. B. McCarton, Fisheries Scientist, (FAP 17)
Mr. Veikko Jatunen, Mapping Consultant, (FAP 18)
Mr. Dirk R. Frans, Sociologist, (FAP 20)
Mr. Martin de Graaf, Institutional Development Section
Mr. Hartmut Brühl, Project Director, (FAP 21/22)
Mr. Frans C.M. van der Knaap, Team Leader,FAP 22
Mr. Jorgn Rasmussen, Team Leader, (FAP 25)
Mr. Emaduddin, Team Leader (FAP 25)

Danish Hydraulic Institute (DHI)
Mr. Ole Juul Jensen, Resident Manager, DHI

LCG Sub-group Water Meeting
FPCO - Team Leader Meetings

ANNEX 4

References and Selected Readings

References and Selected Readings

1. Evaluation Draft Report - UNDP BGD/81/046 Technical Assistance to **River Research Institute**, October 1990

2. Evaluation Draft Report - UNDP BGD/85/076 **National Water Plan Project** - Phase II, February 1992

3. Office Memorandum, MIWDFC - Status and role of the Flood Plan Coordination Organisation, May 1991

4. Final Report: Institutionalization of Beneficiary Participation for Project success, Dd. M.S. Zaman, March 1992

5. Action for Flood Control, Achievements and Outlook, March 1992

6. Bangladesh Gazette, President's Order No. 59 of 1972 - The Bangladesh Water and Power Development Boards

7. Report on Institutional Shortcomings in Flood Related Activities in Bangladesh, Dr. M.S. Zaman, May 1991

8. Bangladesh Action Plan for Flood Control, World Bank, December 1989

9. A Flood Policy for Bangladesh, Government of Bangladesh/UNDP, May 1989

10. Bangladesh Flood Policy Study, Final Report, UNDP, May 1989

11. **Bangladesh Water Development Board**, Study of Institutional Capability - Final Report, The SGV Group, February 1988

12. FPCO Progress Reports: June 1991, December 1991

13. **Local Government Engineering Bureau**, Information Brochure, 1992

14. Notification for Set up of Local Government Engineering Bureau, Bangladesh Gazette, October 27, 1984

15. LGEB Newsletter, December 1991

16. River Training Studies of The Brahmaputra River, **FAP 1**, Second Interim Report, Main Report, SWHP in association with DHI, EPC, DIG, **December 1991**

17. Supplementary Feasibility Study, For the Provision of Irrigation Supplies to the Gumti Phase I Sub-Project, **FAP 2**, Final Report, BCE in association with SWHP, **August 1990**

18. North West Regional Study, **FAP 2**, Interim Report, ODA and JICA, **October 1991**

19. North Central Regional Study, **FAP 3**, Interim Report, BCEOM, Compagnie Nationale du Rhône, Euroconsult, Mott MacDonald International, Satec Development, in association with Desh Upodesh and BETS, **November 1991**

20. Jamalpur Priority Project Study, **FAP 3.1**, Interim Planning Report, SOGREAH, HALCROW, LAHMAEYER in association with EPC, and AQUA Consultants and Associates Ltd, **March 1992**

21. Southwest Area Water Resources Management Project, **FAP 4**, Inception Report, SWHP in association with DHI, EPC and SSL, **January 1992**

22. South East Region Water Development Programme, **FAP 5**, Interim Report, Main Report (Draft), SMMPL in association with NKCL, RDCL, HCL, Desh Upodesh Ltd., **September 1991**

23. Northeast Regional Water Management Project, **FAP 6**, Work Plan, October 1991, and Progress Report, Shawinigan Lavalin (1991) INC, Northwest Hydraulic Consultants in association with Engineering and Planning Consultants Ltd and Bangladesh Engineering and Technological Services, **December 1991**

24. Cyclone Protection Project II, **FAP 7**, Feasibility and Design Studies, Draft Project Preparation Report, Vol. I - Main Report and Appendix I - Feasibility Study on Patenga Project, Kampsax International A/S, BCEOM, DHI in association with DDC, **February 1992**

25. Data Book II 1) Land Use and Urban Planning 2) Flood and Flood Damage 3) Living Environment, **FAP 8A**, Draft Final Report, JICA, **July 1991**

26. Feasibility Study on Greater Dhaka Protection Project, **FAP 8A**, Main Report, Draft Final Report, JICA, **March 1992**

27. Dhaka Integrated Flood Protection, **FAP 8B**, Combined Interim report no. 2 and Draft Final Report, Louis Berger International, INC in association with ACS, Desh Upodesh Ltd., Technoconsult International Ltd., **August 1991**

28. Secondary Towns Integrated Flood Protection, **FAP 9A**, Final Draft Report, SWHP in association with HFA and EPC, **February 1992**

29. Meghna River Bank Protection Short Term Study, **FAP 9B**, Interim Report, Main Report, Haskoning, Royal Dutch Consulting Engineers and Architects, Delf Hydraulics, BETS, Bangladesh Engineering & Technological Services, **October 1991**

30. Improvement of Flood Forecasting and Warning System, **FAP 10**, Progress Review, J.E. Dent, CTA/FAP 10, **October 1991**

31. FCD/I Agricultural Study, **FAP 12**, Draft Final Report Vol. 1 - Main Report, Vol 2 - RRA and PIE Results, Vol 3 - Appendices E-J, Vol 4 - Appendices K-P, Hunting Technical Services Limited in association with BIDS, FHRC, Hunting-Fishtech, Techno-consult International Limited, ODA and Sanyu Consultants INC., JICA, **December 1991**

32. Operation and Maintenance Study, **FAP 13**, Appraisal of Operation and Maintenance in FCD/I Projects, Vol. I - Main Report, Vol. II - Case Studies, Hunting Technical Services Limited in association with Flood Hazard Research Centre, Technoconsult International Limited, ODA and Sanyu Consultants INC., JICA, **August 1991**

33. A Study on Land Acquisition and Resettlements, **FAP 15**, Inception Report, MARC in collaboration with HIFAB International, **February 1991**

34. Guidelines for Environmental Impact Assessment, **FAP 16**, ISPAN, **June 1991**

35. Action Plan for Flood Control - Fisheries Study and Pilot Project, **FAP 17**, ODA Project Identification - Mission's TAPP's, **April 1990**

36. Surface Water Simulation Modelling Programme Phase II, **FAP 25**, Incep-tion Report, DHI in association with BUET, March 1990 and Phase II -Interim Report I, DHI in association with BUET, **June 1991**

37. Flood Modelling and Management, **FAP 25**, Draft, CAT, 3rd mission, December 1991

38. Flood Modelling and Management, **FAP 25**, Flood Hydrology Study, Draft Main Report, Kruger Consult in association with BECOM, **February 1992**

39. Institutional Strengthening of the Department of Fisheries, First Draft, Vol I - Main Report, Vol II - Annex to Main Report, Uniconsult Int'l Limited, January 1992

40. The Environment Pollution Control Ordinance, 1977, Bangladesh Gazette

41. BWDB System Rehabilitation Project, SRP, Inception Report, July 1991 and Workshop: The Objectives of SRP, September 1991.

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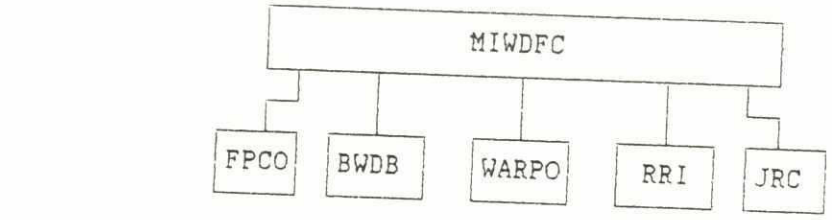
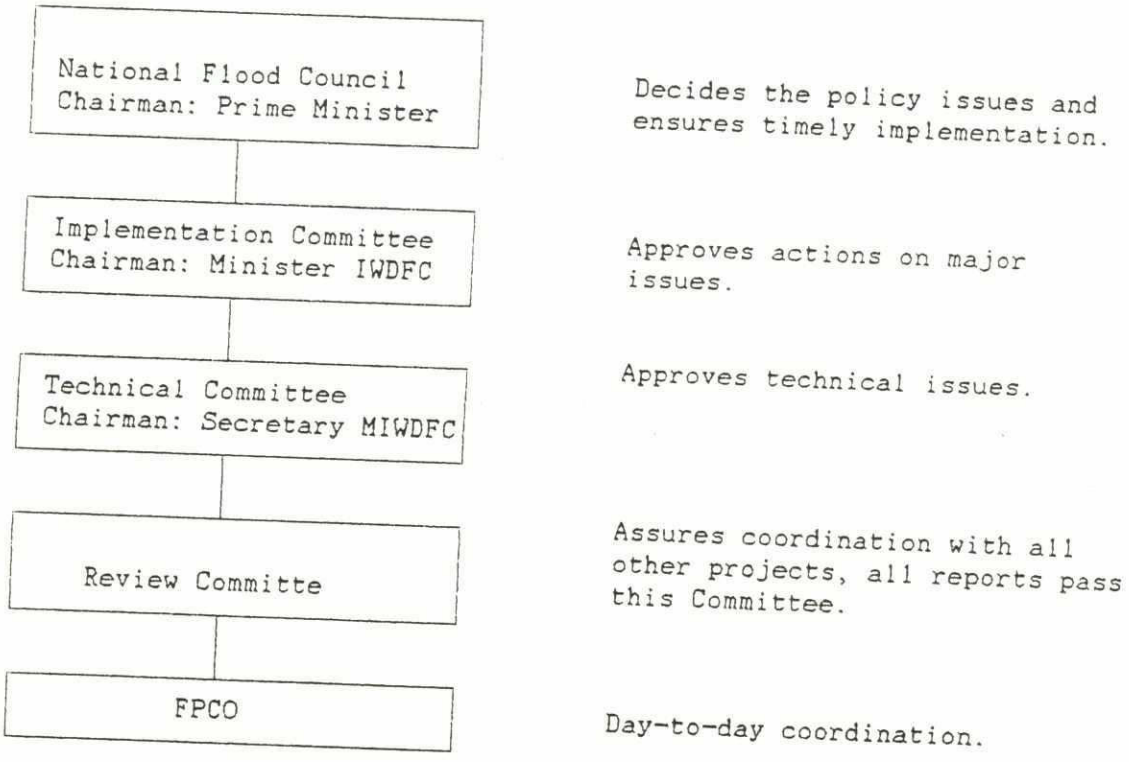
ANNEX 5

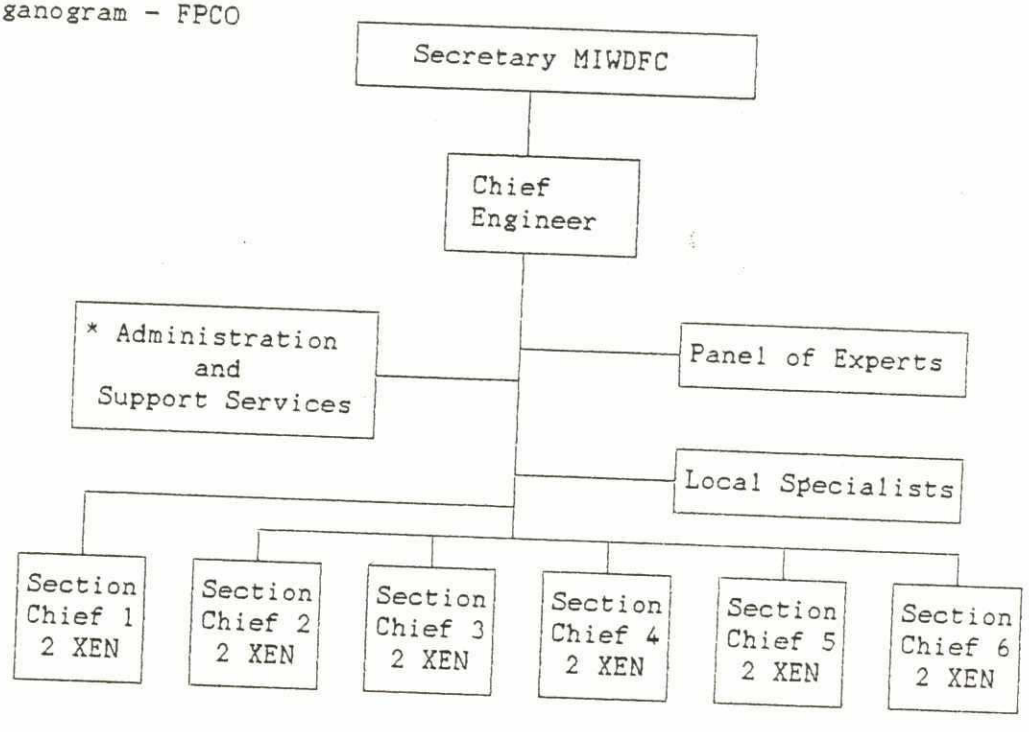
Organisational Setup

- FPCO
- BWDB
- WARPO (present)
- WARPO (proposed)
- RRI
- MLGED&C/LGEB

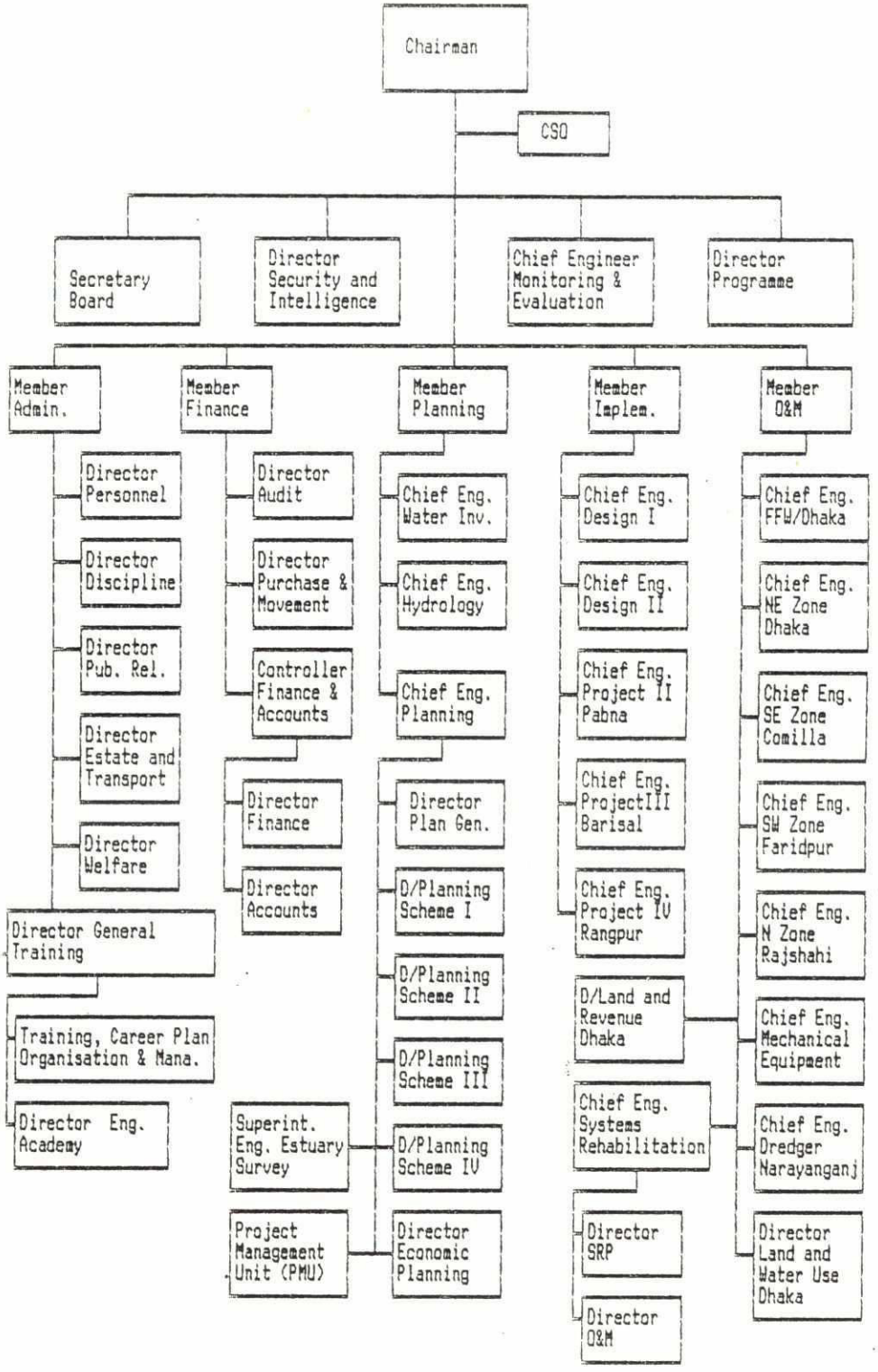




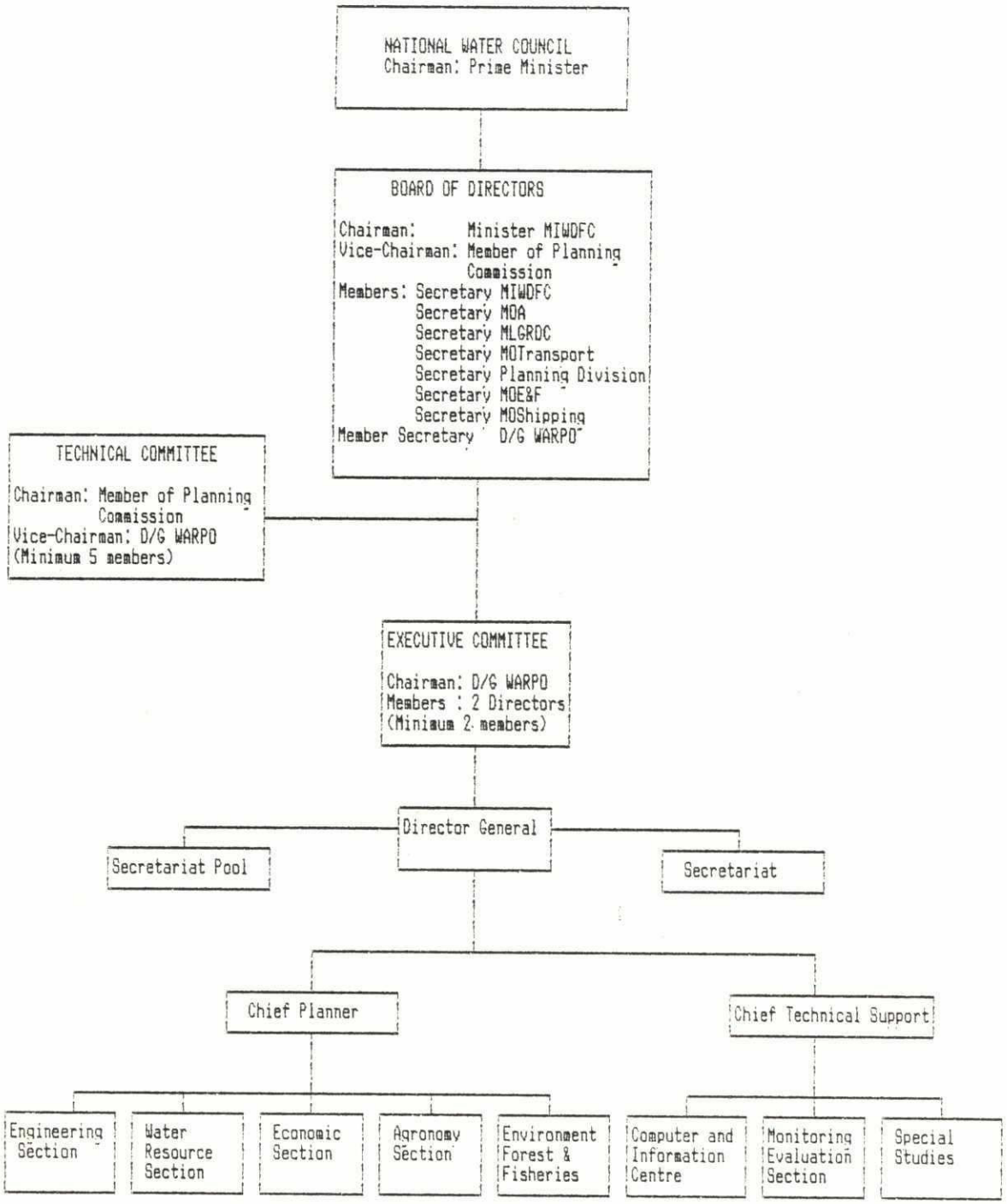
Organogram - FPCO



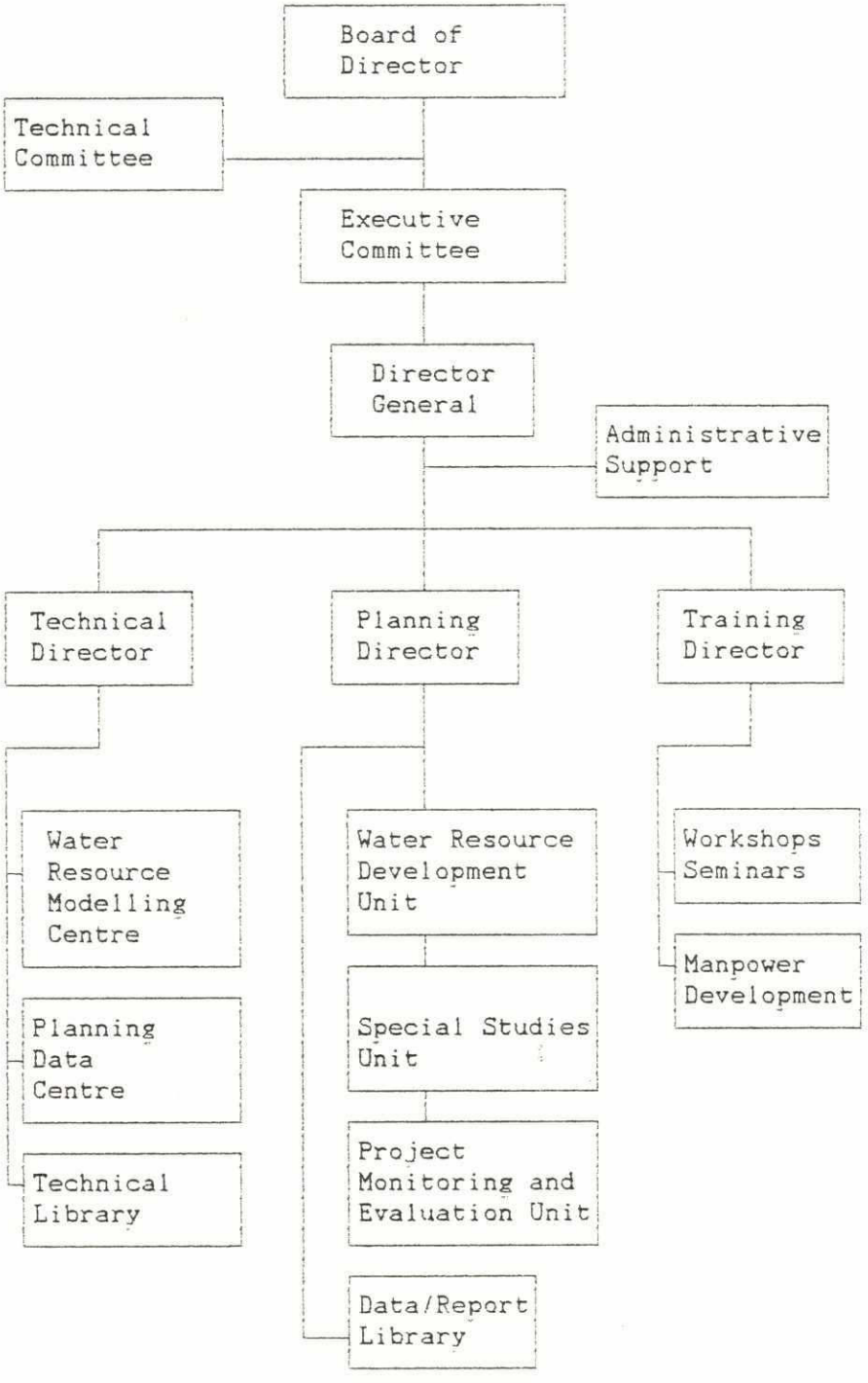
Bangladesh Water Development Board



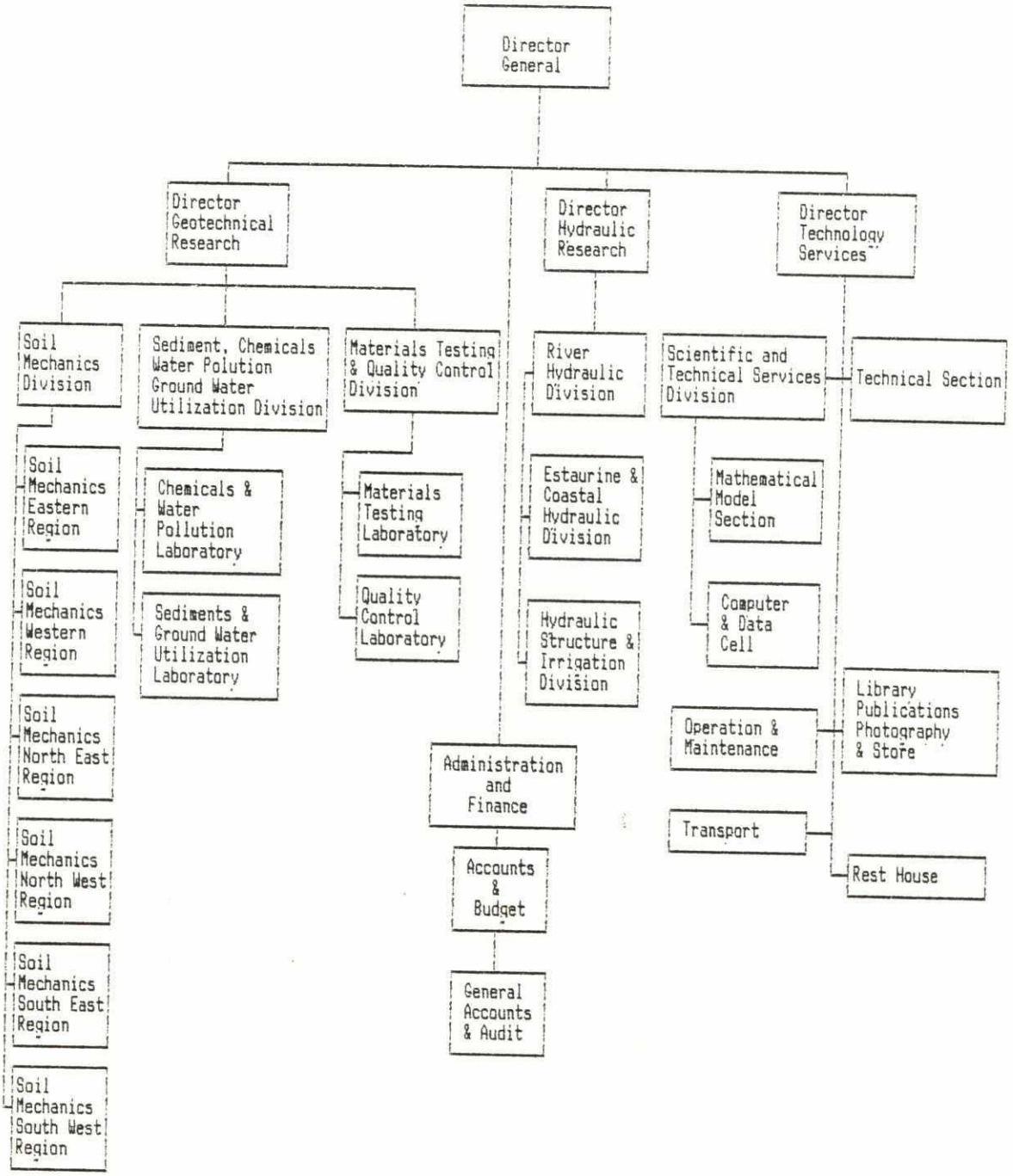
WATER RESOURCES PLANNING ORGANISATION (WARPO)
Organogram



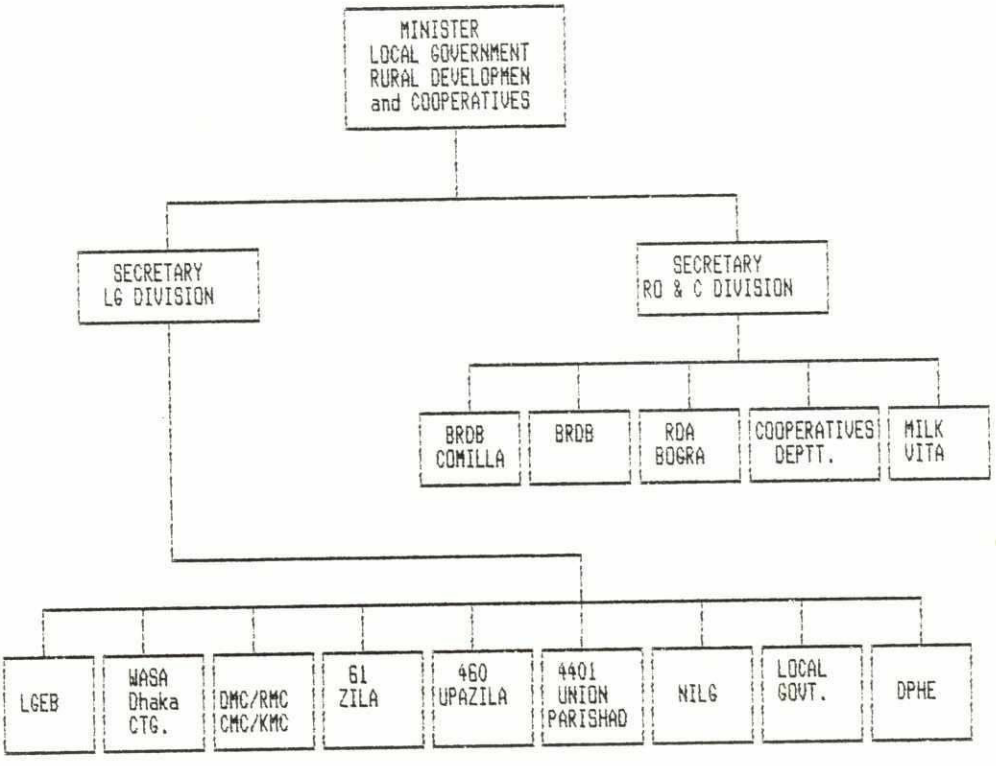
Proposed Organisation of WARPO



River Research Institute



Organisation of Ministry of Local Government, Rural Development and Cooperatives (MLGRDC)



Local Government Engineering Bureau (LGEB)