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Government of the People's Republic of Bangladesh
Ministry of Water Resources
Bangladesh Water Development Board
Water Resources Planning Organization

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COMPARTMENTALIZATION PILOT PROJECT, TANGAIL

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Final Phase



INCEPTION REPORT VOL 1: MAIN REPORT

April 1997

LAHMEYER INTERNATIONAL GMBH, Germany

in Association with

HASKONING - Consulting Engineers & Architects, The Netherlands
Consultants for Development Programmes (CDP), The Netherlands
Development Design Consultants Ltd. (DDC), People's Republic of Bangladesh

Donors:

Directoraat Generaal Internationale Samenwerking, Government of the Netherlands

and

Kreditanstalt für Wiederaufbau, Federal Republic of Germany

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LIST OF ABBREVIATIONS

ADAB	=	Association of Development Agencies in Bangladesh
ADP	=	Annual Development Plan
AEP	=	Aquaculture Extension Programme
AIT	=	Asian Institute of Technology
ASSP	=	Agricultural Support Services Project
ATAP	=	Annual Technical Assistance Programme
BADC	=	Bangladesh Agricultural Development Corporation
BARD	=	Bangladesh Academy for Rural Development
BARI	=	Bangladesh Agricultural Research Institute
BAFRU	=	
BBS	=	Bangladesh Bureau of Statistics
BCAS	=	Bangladesh Centre for Advanced Studies
BELA	=	Bangladesh Environmental Lawyers Association
BLE	=	Brahmaputra Left Embankment
BSS	=	Bittahin Samabay Samity (Landless Cooperative Society)
BMDC	=	Bangladesh Management Development Centre
BRAC	=	Bangladesh Rural Advancement Committee
BRDB	=	Bangladesh Rural Development Board
BRE	=	Brahmaputra Right Embankment
BRAC	=	Bangladesh Rural Advancement Committee
BURO	=	Bangladesh Unemployment Rehabilitation Organization
BUET	=	Bangladesh University of Engineering & Technology
BWDB	=	Bangladesh Water Development Board
CARE	=	Co-operative for American Relief Everywhere
CC	=	Chawk Committee
CE	=	Chief Engineer
ChWMC	=	Chawk Water Management Committee
CPP	=	Compartmentalization Pilot Project
CT	=	Consultants Team
CWMC	=	Compartmental Water Management Committee
DAE	=	Department of Agricultural Extension
DC	=	Deputy Commissioner
DEM	=	Digital Elevation Model
DGIS	=	Directoraat Generaal Internationale Samenwerking
DLAC	=	District Land Acquisition Committee
DOF	=	Department of Fisheries
DPHE	=	Department of Public Health Engineering
DTC	=	District Technical Committee (Agriculture)
DTW	=	Deep Tube Well
DWA	=	Deep Water Aman
EIA	=	Environmental Impact Assessment
EIRR	=	Economic Internal Rate of Return
EMG	=	Embankment Maintenance Group
EMP	=	Environmental Management Planning
FA	=	Financial Assistance
FAP	=	Flood Action Plan
FAO	=	Food and Agricultural Organization
FCD/I	=	Flood Control, Drainage and Irrigation
FDAM	=	Flood Damage Assessment Modelling
FFW	=	Food For Work
FMM	=	Flood Management Model
FRI	=	Fisheries Research Institute
FPCO	=	Flood Plan Co-ordination Organization (merged with WARPO)
FRG	=	Federal Republic of Germany
GB	=	Grameen Bank
GIS	=	Geographical Information System
GoB	=	Government of Bangladesh
GoN	=	Government of Netherlands
GPS	=	Global Positioning System
GPV	=	Gross Product Value
ha	=	Hectare
HYV	=	High Yielding Variety
IDC (Tangail)	=	Information Dissemination Center
ICDDR,B	=	International Centre for Diarrhoeal Disease Research, Bangladesh
IOV	=	Inspectie Onderzoek Ter Velde (DGIS-M&E unit)
IPM	=	Integrated Pest Management
ISPAN	=	Irrigation Support Project for Asia and the Near East
KfW	=	Kreditanstalt für Wiederaufbau
LCS	=	Landless Contracting Society

LGED	-	Local Government Engineering Department
LLP	-	Low Lift Pump
ME	-	Mechanical Engineering Department, BWDB
M&E	-	Monitoring and Evaluation
MDF	-	Management Development Foundation, Netherlands
MoU	-	Memorandum of Understanding
MOT	-	Manually Operated Tubewell
MP	-	Muriate of Potash
MPO	-	Master Plan Organization (now WARPO)
MWR	-	Ministry of Water Resources (formerly MIWDF-C)
MT	-	Metric Tons
NAS	-	Needs Assessment Survey
NAI	-	Needs Assessment Intervention
NCA	-	Net Cultivable Area
NGO	-	Non-Governmental Organization
ODA	-	Overseas Development Agency
O&M	-	Operation and Maintenance
OFTD	-	On-Farm Testing and Demonstration
OFTR	-	On-Farm Testing and Research
OFR	-	On-Farm Research
PAP	-	Project Affected Person
PC	-	Project Council
PD	-	Project Director
PRA	-	Participatory Rural Appraisal
PT	-	Project Team
PWD	-	Public Works Department
R&H	-	Roads and Highways
RNE	-	Royal Netherlands Embassy
RRR	-	Rapid Rural Appraisal
SC	-	Sub-Compartment
SCWMC	-	Sub-Compartment Water Management Committee
SFS	-	Social Forestry System
SRDI	-	Soil Resources Development Institute
SSS	-	Senior Scientific Officer
SSS	-	Society for Social Services
SRP	-	Systems Rehabilitation Project
SWMC	-	Surface Water Modelling Centre
STW	-	Shallow Tube Well
TAPP	-	Technical Assistance Project Proforma
TA	-	Technical Assistance
TA	-	Transplanted Aman
TIR	-	Tangail Interim Report
TN	-	Technical Note
TNO	-	Thana Nirbahi Officer
TL	-	Team Leader
ToR	-	Terms of Reference
UNDP	-	United Nations Development Programme
UP	-	Union Parishad
UST	-	Ummayy Shahajogi Team
WARPO	-	Water Resources Planning Organization
WFP	-	World Food Program
WP	-	Working Paper
WMC	-	Water Management Committee

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FOREWORD

In order to enhance the readability of the report, this inception report (First draft, Final Phase CPP) has been divided into two volumes

Volume 1: Main Report

Volume 2: Annex 1: Sectoral Analysis

Annex 2: Executive Summary Reformulation Mission Report(October 1995)

Annex 3: ToR CPP-Final Phase (June 1996-June 2000)

Annex 4: MoU Donor Review Mission (February-March 1997)

Although all main issues are being dealt with Volume 1: Main Report, some have only been discussed briefly while the dominant ones have been allocated more space.

A sectoral analysis on all relevant issues has been elaborated upon, sector wise in Volume 2, Annex1, while also the most recent strategic documents are included for easy reference (Vol 2, Annex 2-4).

The chapter on institutions is not included as an annex; due to the importance in the overall framework, this information has been integrally taken up in the text of the Volume 1: Main Report.

This Inception Report is clearly a product of the CPP-Team (Project Team and Consultants Team) and should therefore be considered as a joint effort for CPP-Final Phase until June 2000.

EXECUTIVE SUMMARY

Experiences gained, its values and new perceptions

The first phase was based upon a ToR (First Phase), issued in June 1990. The ToR at that time was valid for an envisaged time frame up to and including 1994. However, as the project progressed, it became apparent that it did not reflect the circumstances and settings properly and on various occasions discussions were initiated in order to discuss possibilities for adjustment of the original ToR.

One of those occasions was the IOV-mission which took place during January-February 1993. It was not until May 1995 when an evaluation mission was fielded, followed by a reformulation mission in October/November 1995 that the opportunity was created to discuss the originally defined ToR.

The following were the main strategic points which were formulated by the mission for redirection

- to broaden the scope of the project's objectives and activities towards an integrated water resources management approach;
- to ensure a more effective approach to people's participation;
- to create an institutional development process which is viable, sustainable and replicable and which is capable of conflict resolution;
- to move from a project approach to a process approach which is integrated into the national institutional framework;
- to ensure that the project addresses any negative impacts through mitigation measures during the project and a provision for the mitigation of failure after the project finishes; and
- to improve the monitoring and evaluation of the project, both technically and with the integration of a broad range of concerned parties; including the establishment of an M&E capacity beyond the project period

The ToR (Final Phase) formulated the overall project objective using these points as follows:

"To determine whether the concept of compartmentalization is a good investment in contemporary Bangladesh, i.e. whether it will provide a more secure environment for intensive agriculture, fisheries, and integrated rural/urban development and thereby improve the economic security and quality of life."

An Open Book with a dynamic "environment"

The inception report for the Final Phase of CPP is definitely NOT a closed book, but it is rather *an open book*, in which many ideas are incorporated which are being brought forward by various parties since the first inception report. Conceptually, many issues have been analysed, some are still pending, many have to be proved to be worthwhile and have to emerge into a viable setting. CPP is being looked upon in various ways; one point of view is and will be the role of this exercise in the national context of water resources planning in Bangladesh.

The entire environment in which CPP is embedded, has also gradually changed over time, in the same way as the project itself has changed and is still changing. Concepts and perceptions are changing over time in the way this type of project is being monitored and evaluated. In other words, a dynamic environment has been created which has even adapted concepts to the physical reality of Bangladesh.

Key points in the inception report (Final Phase)

The following are the key points of the inception report (Final Phase):

- 1. The concept of compartmentalization**
- 2. The institutional aspects of water management**
- 3. The legal status of the proposed committees**
- 4. The concentration of project's efforts into OFTD**
- 5. Monitoring and Evaluation**
- 6. Mitigation measures**
- 7. The institutional embedding of CPP at national level**
- 8. The Information Dissemination Mechanism**
- 9. Workplan, personnel planning and budgets**

1. The concept of compartmentalization

The concept itself is certainly not an invention conceived by CPP. It is rather a concept which was described in documents, but never really applied in the Bangladesh context.

The technical and institutional issues of the compartment, its relation to other areas and/or compartments in the floodplain, are all issues which can only be partly addressed by CPP. The CPP area in Tangail was selected because of the presence of an already existing peripheral embankment built in the early nineteen sixties, and the proximity of the compartment to the Brahmaputra river, such that the hydrological linkage between the main river and the compartment can be expected to remain in the long term.

The perceived functions of compartmentalization are

- 1) protection against harmful flooding,
- 2) flood storage,
- 3) beneficial flooding,
- 4) protection against moderate floods; and
- 5) improved drainage.

Firstly, the theoretical concept itself has elements which are not well-defined.

The presence of primary embankments along the main rivers, behind which these compartments would be built, was originally perceived to form an integral part of the concept. The first ToR mentioned this unequivocally. However, this idea has been dropped, at least for the Brahmaputra Left Bank area. The degree of protection against harmful flooding is therefore significantly reduced, as the primary embankments are not built and most probably will not be built in the near future.

Secondly, the flood storage function is probably difficult to assess. In reality, this flood storage cannot be tried out in the field as it is not possible to acquire this experience by trial-and-error on farmers' fields. Furthermore, the impact of flood storage will probably be limited as the level of the compartmental and internal embankments are too low.

Thirdly, beneficial flooding is a typical component which indeed can be tested. The project can assess the effects on various issues (agriculture, fisheries, environment etc.) by observing monitoring and evaluation

Fourthly, the protection against moderate floods can be assessed. This is a scaled-down version of the firstly mentioned function of compartmentalization.

Fifthly, the effect on improved drainage can also be assessed.

2. The institutional aspects of water management

There is an intricate relationship between institutions and watermanagement and it is difficult to distinguish between them because functionality of the first depends on the second one and vice versa. A very intensive field study performed by an independent organization concluded that the functionality and effectiveness of the water management committees at various levels does suffer, due to a less-than-adequate representation or selection of committee members, a lack of clear mandates for each type of committee and in some cases

confusion due to high intra- or inter-subcompartment dependency upon water regulation. It is proposed in this report that both physical and institutional adjustments will therefore be made to the original concepts.

Water Management

Adjustments will be made, if necessary on the establishment of sub compartment boundaries such that it reflects better the changed emphasis from controlled flooding from rivers only, to controlled flooding combined with control of rainwater drainage.

Institutions

More relevant interest groups should be represented in the water management committees, starting from the hawk level with elected representation to the higher, subcompartmental level. Also the fair representation of women (not as a separate interest group as their requirement is very broad) is foreseen in these committees. The future SCWMC's will predominantly represent the interests and views of the ultimate direct stakeholders in water management. Stakeholders who have not this direct linkage, will only bias the institutional setting, make it unworkable and unsustainable. Furthermore, a fair and reasonable election mechanism should be established to ensure this representation. An Executive Committee should be formed for the SCWMC to run the day-to-day running of the SCWMC business. Also adjustments are required at Project Council/ Compartmental Water Management Committee level in order to make them more effective and capable of conflict-resolution.

The renewed emphasis on reformulating these two main issues should help toward convergence of the sustainability, viability and replicability of the compartmentalization concept. Two main points of caution should be mentioned here:

1. this emphasis on adjustment for these two main (institutions, watermanagement) issues can not and certainly should not be done overnight. A gradual change will take place, taking into account the actual situation and the envisaged future institutional and physical setting. A planning schedule has been developed for a one year period to cover this transition phase starting from restructuring Hawk Water Management Committees, to Subcompartmental Committees and the Project Council/Compartmental Water Management Committee; and
2. the proposed election procedure of the watermanagement committee members. Careful balance should be considered between fair and free election and keeping the process manageable and practicable.

There is a clear trend towards handing over responsibilities regarding O&M from the implementing agency to beneficiaries. However, in a project like CPP where a combination of water management techniques are applied, those beneficiaries cannot always be identified uniquely. It is a challenge for CPP Final Phase to realize and strengthen that relationship between project's activities and beneficiaries such that responsibilities for future O&M are more eagerly accepted and realized.

3. The legal status of the proposed committees

Although the emphasis on institutional and physical adjustments seems to be justified (based on experience, studies and analysis), there is one fundamental issue which makes this new setup vulnerable: "legal status". Unfortunately, an intense debate is still ongoing on the legal status of water management committees in Bangladesh and a clearcut strategy from a national point of view has not yet been formulated. The limited role which CPP can have in this national debate is to only contribute and make experiences and information as transparent as possible to other interested parties. Related to the legal status of the water management committees, is the aspect of Operation and Maintenance during and after the project finishes. The current institutional setting does give insufficient incentive for trying to solve this issue, as too many outsiders (non legitimate stakeholders) and outsiders' views bias the real picture. In one selected part of the project area, a first attempt will be made in "rationalizing" the aspects surrounding O&M on a trial basis, whereby the more direct involvement, representation and responsibility of legitimate stakeholders in the water management committees may create conditions for better response to making O&M more sustainable in the long term.

4. Concentration of project's efforts into OFTD

Although the project area comprises only approx. 13000 ha, the quantity of plots is very large and monitoring of project impacts on these plots is a complicated logistical problem. In order to streamline project efforts in collaboration with GOB-departments, institutions and organizations it is proposed in this report that three (or four) pilot chawks be selected, which are representative for the various physical settings within the CPP project boundary. These chawks are part of the On-Farm Testing and Demonstration (OFTD) program.

As the chawk is the basic water management unit, it is logical to monitor main ongoing activities regarding agriculture, fisheries, environment and initiate the restructuring the institutional framework at this level, to be followed up at other chawks and at (sub)compartmental level.

5. Monitoring and Evaluation

The viability, sustainability and replicability of the project are to be assessed through Monitoring & Evaluation. Through a careful selection of indicators this process can be quantified. However, some of the M&E indicators are difficult to quantify.

The establishment of a base-year is a crucial decision in order to establish a basis for comparison. After analysis of available data, the year 1992 has been selected as a base year as at that time CPP had not started physical implementation activities in the field.

Effective intra and inter-departmental cooperation are pre-conditions for viability, sustainability and replicability. Capable and managerially-oriented institutions dealing with a dynamic medium will not emerge overnight and a process of incremental adjustments will be necessary to ensure that sustainability.

Project impacts and influences cannot or are difficult to distinguish from non--project related influences. In CPP, the peripheral embankment was already constructed long before the CPP started its activities. In other words, the pre-project situation was not a floodplain without embankments. A first set of indicators have been developed which are customized especially for the CPP-setting. The M&E activities can be partially performed by independent parties, while the more continuous data sets should preferably be under CPP's guidance.

6. Mitigation measures

The term mitigation measures has focussed upon the issue of compensating those who are in some way or another, affected in a negative way from an economical point of view. This term may imply many different points of view, which are difficult to quantify. The issue of compensation is also clearly delicate, and must aim for equitable treatment and avoidance of deliberate manipulation by potential beneficiaries.

Funds under budget line item "Mitigation Measures" "Unforeseen" and "Miscellaneous" can be allocated in this context. Special emphasis should be placed on the mitigation plan for fisheries and on the implementation of the environmental management plan.

A special set of mitigation measures may be necessary in connection with the Jamuna bridge railway and Tangail bypass road. These aspects of works are implemented under the Jamuna Multipurpose Bridge Authority (JMBA). Both works cut across the eastern half of the compartment and will certainly interfere with the detailed watermanagement activities from the concerned institutions at various levels.

Detailed investigation of the impact areas is currently being performed in order to mitigate the impacts of these works on the watermanagement plan. Furthermore close collaboration has been established with the responsible coordinating organization (JMBA) and their most directly involved donors (World Bank, Asian Development Bank).

7. The institutional embedding of CPP at national level

The physical dimensions of CPP-Tangail are only confirmed to a very limited area of a few thousand ha. The application of various new approaches with regard to integrated water resources management in the CPP-area may serve as an example for similar settings in Bangladesh.

Although the new tasks assigned are of crucial importance for the viability of CPP itself, it should also be acknowledged that this task should be shared as much as possible within the proposed institutional framework, including the new national institutional setting in which the National Water Master Plan will be developed. As that framework is not developed yet, it is at this stage not possible to elaborate on the linkage between CPP and that framework.

However, the implementing and coordinating organization (BWDB and WARPO respectively) should ensure that the experiences obtained in CPP, should be properly fed into a national framework to make optimal use of this information.

8. Information Dissemination Mechanism

The opening of an information dissemination center and the availability of a mobile information unit have both greatly enhanced the availability of information on the project.

Many interested parties have consulted these sources and there appears to be a growing demand. As the Information Dissemination Center, based in the heart of Tangail town, has reached its potential in the current set-up, new ways will be explored to keep information up-to-date, both at local level (Tangail), at national level (Dhaka) and even international level. This should naturally being performed within the tight budget available. New possibilities should also be explored in the context of the National Water Master Plan.

A proposal for further enhancement of project information and availability should be made in the wake of the formulation of the National Water Master Plan, expected to start shortly.

9. Work plan, personnel planning and budgets

The entire financial setting is based upon an agreement, described in the Technical Assistance, Project Proforma (TAPP), which was released at the end of 1995.

The Financial Assistance (FA) component encompasses a wide array of activities, varying from construction to mitigation measures, augmentation of the project team, operation and maintenance etc.

The Technical Assistance (TA) component includes contract staff costs, programmes, investments, and contingencies.

The GoB contribution covers personnel costs and also the land acquisition. A new study on the application of GOB rules in land acquisition, has led to a decision the Government to issue an order that no implementation of interventions can take place until and unless the land has been possessed by the requesting agency. Furthermore the donors have asked the project to enhance the processing of pending cases, whereby an independent organization or institute could facilitate and intermediate to solve pending land acquisition cases.

No substantial delay is expected from the government order regarding the land acquisition, as the major works have already been implemented, and a further check on the functionality of already implemented interventions may have some effect on the planning of remaining infrastructure.

A new initiative developed by the project which will enhance the feeling of responsibility by the water management committees is that they can now directly propose minor works to the project authorities, and a special budget line is made available until June 2000 in the TAPP. These minor works can now be implemented under the responsibility of the water management committees themselves.

The (financial) future of the project(-area) after June 2000 is clearly a matter of concern. First of all, it is doubtful if definite conclusions can be drawn up by the end of the project period. The testing of the entire compartment can only be started from June 1998, provided that proper physical AND institutional provisions are present and working.

Even if all necessary requirements are present, one main issue beyond the influence of the project is the occurrence of hydrological years with various return periods. If, for some reason, the hydrological behaviour is such (either due to nature and/or man-made reasons) that no serious testing can be done on the entire compartment, then it becomes questionable how to approach the decision making procedure on the question of viability, replicability and sustainability of the Tangail compartment.

In view of the limited testing time available before the expiring date of the current phase, it is intended that recommendations will be formulated for continuation of the M&E components beyond June 2000. Conclusions will be drawn at this time on the basis of information collected to date, but it may not be realistic to expect these interim results to be valid as a final judgement on the viability, sustainability and replicability of the compartmentalization concept in Bangladesh.

O&M budgeting

O&M budgeting, from a project approach towards a process approach, in other words, the transfer from project-bound activities to institutionally embedded. A clearcut O&M procedure depends largely on a clearcut institutional and physical framework, where there is a direct and visible relationship between the project's impacts and the beneficiaries.

One clear instrument which makes these changes "transparent" and understandable, is the Monitoring and Evaluation unit. However, as long as the beneficiaries do not see any direct linkage between impact and their personal benefit, their contribution towards O&M cannot be addressed; moreover, the legal status of the committees need to be finalized in first instance. A trial situation will be created in one of the areas within the project boundaries, in which partial responsibility will be given to the water management committees for O&M as a prelude to further extension of the concept to other areas within the project area.

CHAPTER 1: AIM OF CURRENT PHASE

1.1 Introduction

This report is structured into two volumes. The first, the Main Report, presents the approach being adopted to achieve the aims of the final phase of the Compartmentalization Pilot Project, and sets out the methods proposed for evaluation of the concept of compartmentalization.

The current chapter (Chapter 1) summarises and comments on the Terms of Reference (Final Phase), while Chapter 2 expands upon key terminology, of which a clear understanding is a pre-condition for achievement of the objectives of the phase. In Chapter 3, description is given of the compartmentalization concept, its application to the Tangail area, and proposed physical and institutional adjustments based on experience gained to date. Especially the institutional part dominates this Chapter, but proper justification can be drawn from the overall importance of the institutional setup in CPP.

Chapter 4 explains the approach being adopted to Monitoring and Evaluation, the key tool for assessing the compartmentalization concept, and sets out the preliminarily proposed performance indicators for measuring the impacts of the project activities. In Chapter 5, the workplan for the remaining period is set out, together with the re-estimated budgets, and some proposals for modifications to the planned staffing.

Chapter 6 offers proposals on the future of the Project after the end of the final phase of the project.

In Volume 2, the various sectors are analysed individually in more detail and linked to the aims.

Readers wishing to obtain information upon proposed methodology and overview of the various sectors impacted by the project may therefore want to concentrate on Volume 1 only, while those seeking more sector-specific details will also want to refer to Volume 2.

1.2 Terms of Reference for Final Phase

The Terms of Reference (ToR) for the Final Phase of the Compartmentalization Pilot Project are based on the Reformulation Mission Report, but modified to change the emphasis of that report, so that the focus during the final phase remains upon evaluating the compartmentalization concept.

The key elements of the ToR are reflected in the Overall Development Objective and the Overall Project Objective:

Overall Development Objective

To enhance economic production, reduce poverty and achieve sustainable development for the population living in protected areas in Bangladesh.

Overall Project Objective

To determine whether the concept of compartmentalization is a good investment in contemporary Bangladesh, i.e. whether it will provide a more secure environment for intensive agriculture, fisheries and integrated rural/urban development and thereby improve the economic security and quality of life.

Within this context, the Final Phase includes the following tasks (according to ToR-CPP, Final Phase)

- I To complete the physical infrastructure of the compartment in close consultation with the concerned population and relevant (local) organisations
- II To test the viability and replicability of compartmentalization. This will include
 - * Introduction and testing of all management aspects of controlled flooding on compartment, sub-compartment and field level
 - * Testing of the agricultural production potential with controlled flooding
 - * The provision of extensive agricultural advisory services
 - * The establishment of a replicable and sustainable institutional base for the operation and maintenance of the compartment
 - * The assessment of the economic viability and social and environmental impacts of compartmentalization
 - * The implementation of adequate mitigation measures
- III To develop integrated water resource management options for different sections of the rural population based on the total hydrological system, while remaining focused on the determination of whether compartmentalization is a valid and attainable concept for socially, economically and financially sound development in Bangladesh.
- IV To develop policies and guidelines for the development of integrated water resource management in protected areas.
- V The development of improved drainage for Tangail urban area.

Comments on Approach to Fulfilling the Terms of Reference

Our interpretation of the Terms of Reference is that the focus in the final phase is no longer upon design and implementation, but upon realising the aim of a pilot project: testing and evaluation.

Completion of Infrastructure

With regard to completion of the physical infrastructure, most of the major physical works will be finished in the FY 97-98, and detailed attention will be paid to the necessity of completing all of the previously planned minor infrastructure. Close participation with the population of the area will be maintained. The recent agreement with the GOB to ensure that land acquisition procedures are 100% finalized before construction at a particular site commences could be expected to lengthen somewhat the time frame as envisaged until recently.

The infrastructure as planned and partially implemented under CPP, is a direct result of a long process of various phases of "People's participation" as defined by CPP in various documents and also stipulated in the Guidelines for People's Participation. Through a detailed, field-oriented approach to needs assessment and after consultation meetings with various interest groups and in combined sessions, plans were discussed and ultimately endorsed by the subcompartmental water management committees. In these committees, representatives of interest groups and other interested parties took part in these discussions and plans.

1.3 Testing Viability and Replicability of Compartmentalization

There has been a great deal of discussion about the meaning and aims of compartmentalization, much of which refers to "controlled flooding". We now interpret "controlled flooding" to mean two things: first, the allowing of water in a controlled way from rivers outside the compartment to flow into and through the compartment, and secondly, the control of flooding arising from rain falling within the area, by managing the rate at which it moves from higher to lower ground and (where applicable) out of the compartment. Where rainfall and high river levels occur simultaneously, surface water management will be a mixture of these two and will also have mixed aims: damage limitation and beneficial water application.

Chapter 3 (Approaches to Achievement of Aims) argues for the emphasis in terms of water management to be placed upon the control of drainage of rainwater within and from the compartment, and suggests that the water management committees be constituted accordingly, i.e. in conformance with "natural" drainage

patterns within the compartment. This has the objective of maximising subsidiarity, making management units as autonomous as is practicable, by setting unit boundaries in a way which minimises the amount of water crossing these boundaries, and thereby also minimising the requirement for joint decision-making and conflict-resolution by unit committees.

Proposals are included for improved measurement of agricultural impact through a modification of the controlled test plots, and recommendations are presented for the improved provision of extension services.

In the establishment of a replicable and sustainable institutional base for O&M and intra- and inter-compartment co-ordination and co-operation, it is argued that the representation of interest groups in water management committees established during the first phase be modified to include representation of groups of farmers with varying interests as well as representatives of the fishing community. Women are members of these groupings and cannot be considered as a separate homogenous interest group. As such their various interests are better protected and promoted through a fair representation within the sectoral representation in the water management committees.

Procedures are suggested for forming and running management committees with a view to ensuring the replicability of the institutional base. Its sustainability will eventually include the establishment of O&M responsibilities devolved downwards as far as possible, but it is argued that the aim of beneficiaries taking responsibility for maintenance at higher levels of system infrastructure involves a long process, and should be approached with sensitivity.

The detailed, field-oriented approach adopted for infrastructure planning also made clear that water management is a very detailed and dynamic exercise. It is always changing, and in fact analysis of the use of the implemented water management infrastructure reveals that detailed planning at chawk or multiple-chawk level may have to be adapted frequently over time as land use is also changing over time, especially in view of the intensified landuse. This dynamic behaviour may point to a required change in management with regard to field level (or chawk-level) water level control (see Chapter 3). Furthermore, it converges with the adjusted approach towards more emphasis on drainage and water level control. Taking this one step further into the near future is the consideration that the Operation and Maintenance of the main system should be continued under GOB control, while both planning and O&M of minor water control structures should come partially under local water management institutions. This renewed emphasis on sustainability of the entire organizational setup is the only way to have this worthwhile experience embedded into future frameworks.

Not all impacts of compartmentalization are beneficial to all sections of the community, and the design and implementation of mitigation measures comprises an important part of the concept. Furthermore their cost has to be considered in the viability testing. Design refinement, costing of mitigation measures and assessment of their effect upon viability will comprise an important part of this phase of the work.

Monitoring and Evaluation (M & E) will play a key role in the assessment of whether or not compartmentalization is a good investment for Bangladesh. The M & E component aims to identify some key performance indicators and measure them during the final phase, with the objective of determining the true impacts that compartmentalization has had. Here, one major difficulty will be the separation of the effects of compartmentalization itself from the effects arising from other factors.

Furthermore, measurement of impacts implies comparison with a base situation or "pre-project" conditions. Here it must be pointed out that the pre-project situation in the Tangail area was one where a protective embankment already existed. The "pre-project" situation is therefore definitely not to be confused with the "without peripheral embankment" situation. To the extent possible, data from outside the compartment will be utilised, where available, in an attempt to establish what are the "without peripheral embankment" conditions. However, it should be clearly understood that most data will refer to "pre-project" i.e. with embankment but prior to construction of water management structures.

1.4 Development of integrated water resource management options

The aim of basing water management on the total hydrological system is a desirable one, and the needs of the landless, marginal farmers, and fishing and boating households are being carefully considered. The impact of the management of surface water flooding upon the recharge of groundwater will be assessed on the basis of groundwater level (and quality) monitoring. However, we consider it inappropriate and impracticable to attempt to mix the management of surface water through committees at various levels with the management of groundwater usage, which is largely in the hands of private individuals operating tubewells. Should it become possible to show that the water management strategies adopted by management committees impacts in some way upon the (annually recharged) groundwater aquifer, it may become necessary to consider flooding operations with the aim of aquifer recharge for the benefit of dry season operations.

The isolated nature of the compartment could well mean that aquifer recharge is different from that in a multiple compartment environment. The point we wish to make is that we consider it would be confusing and premature at this stage to try to mix surface water management by sub-compartment committees with the private sector management of tubewells. Nevertheless, it may be the case that farmers on higher ground, who are negatively impacted by limiting depths of flooding, could for example be given a higher priority in achieving access to limited credit resources for investing in tubewells.

Development of Policies and Guidelines for Integrated Water Resource Management in Protected Areas

In view of the isolated nature of the compartment in the floodplain, it must be realised that there will be no opportunities for learning, and limited opportunities for suggesting how inter-compartment co-operation should function. If the concept of compartmentalization were found to be a good investment, then the eventual establishment of adjacent compartments would certainly bring new institutional aspects to the fore in comparison with those of primary significance in the context of the Tangail compartment, and the present phase can at best only hope to provide some pointers to the future of co-ordination and co-operation among multiple compartments.

The currently unique nature of the Tangail compartment has other, more physical, implications: the early signs of improved water management in the form of improved cropping intensities and greater diversification arise largely from an increase in the proportion of lands with a lower depth of flooding (i.e. the proportion of land with a low "F" number has increased and that of land with greater flooding depths has decreased). This is partly because of operating the main intake and peripheral structures in a way such that not only is the timing of flooding amended, but also the total volume of river flood water entering the compartment is reduced. As long as the compartment is isolated, the effects of these management policies on areas outside the compartment will be limited, and can be addressed with appropriate local mitigation measures (e.g. the excavation of Gala Khal to relieve flooding upstream of the main intake through drainage to the Pungli River).

In a situation where there are multiple adjacent compartments in the flood plain, water management strategies which reduce the volume of water entering the compartment or the entry discharge at peak river levels can be expected to impact negatively on adjacent compartments, since such strategies have the effect of reducing flood peak attenuation, and will tend to be additive.

Thus the benefits experienced to date within the compartment could be said to be due in part to the fact that it is a single compartment, and it is possible that these benefits could not be fully realised in a multiple compartment environment. It will be difficult for the current phase to identify such effects and formulate appropriate responses other than in a very general way. One proposal made in the current report is that further hydraulic modelling is required in order to try to separate the effects of operation of the peripheral structures from internal operations for the Tangail compartment, so as to understand better their individual impacts: it is thought likely that operation of the peripheral structures may have a greater impact than that of the internal structures. However, modelling of the impact of compartment operations on areas outside the compartment is beyond the scope of the current phase and we wish to discourage expectations that the

project will formulate comprehensive water management procedures applicable at a regional or national level.

1.5 Information Dissemination

Information dissemination will play an important role in gaining acceptance of the concepts and managing the practicalities of compartmentalization. Significant achievements have been made through the Tangail Information Dissemination Centre, and arguments are presented in this report for extending the process to a national level through a Centre established in Dhaka, dealing with national perspectives, and possibly linked to the forthcoming National Water Master Plan. This should aid the feeding of lessons learned into policy formulation and national level planning.

1.6 Development of Improved Drainage for Tangail Urban Area

This work is ongoing and is expected to be completed in 1998 with the construction of the Tangail town drain which should substantially alleviate the drainage congestion. The operation of this flushing drain link closely with the operation of the main regulator.

CHAPTER 2: INTERPRETATION OF CPP'S AIM

The focus

CPP is to focus on three issues, notably viability, sustainability and replicability of the compartmentalization concept. In the next sections it will be explained how these three conditions define in broad terms the indicators for M&E.

Viable compartmentalization approaches

In the first place, CPP has to make clear whether the compartmentalization approach, as it has been implemented in Tangail, is technically, economically, socially and environmentally acceptable. This means an answer to the question whether technical components of the project perform properly. It also implies the achievement of a number of economic and financial target values, this is that as result of the project the population as a whole is better off. Moreover, CPP's activities should not lead to a degradation of social structures, they should instead lead to a more even distribution of power and wealth, if the concept is really socially justifiable. Finally, the project should not impact negatively on the environment, unless measures are taken to mitigate against negative environmental effects.

Viability indicators

Based on this analysis, the viability of the approach is reflected by:

- Data on flood damage reduction as compared with the non-intervention situation which prove that the concept is attractive from the economic point of view;
- Economic indicators such as IRR, NPV and B/C ratio, which equal or exceed commonly accepted viability levels;
- Understanding of the perception of the population of their social position; and
- Data on positive environmental impacts and possible degradation, and on mitigation measures that clearly indicate a bettering of environmental conditions.

Sustainability of the approach

Sustainability comprises the ability of the compartmentalization concept to work and continue without outside help. This means that once CPP's activities terminate, the compartment should be able to stand on its own feet with the constructed hydraulic infrastructure, created institutions for water management, and achieved improvements in its social-economy. Sustainability, not only implies that the compartment is able to continue after the project terminates, it means equally that it can handle emergency situations, do the necessary repairs, etc.

Sustainability indicators

- Stability of the institutional base for the O&M of water management infrastructure;
- Effectiveness of guidelines and rules for water management;
- Cooperation between water users and water management implementors, which is reflected in part by the number of complaints water users lodge about water management; and
- Effective arrangements for O&M of hydraulic infrastructures, including adequate financial provisions

Replication of the compartmentalization approach

Replicability reflects the way in which the specific CPP situation, once it proves viable and sustainable, could be replicated elsewhere in Bangladesh. The important question is whether Tangail's boundary conditions (those elements which cannot be changed by man), notably topography, climate, soils, and the specific flood regime of the Jamuna, influenced the choice of solutions for the CPP's compartmentalization in such a manner that the project is in fact unique and not replicable. This would mean that the specific combination of topography, climate, soils, flood regime, and remoteness (distance to the metropolis of e.g. Dhaka) is hardly found elsewhere in Bangladesh. Or could it be that the boundary conditions in fact only served as parameters for design and implementation, while the principles used and advantages gained are reproducible elsewhere? Then it would mean that replication is possible.

Replicability indicators

When trying to evaluate the replicability of compartmentalization approaches, the likely indicators are

- A compartmentalization approach which is first and foremost effective in the particular context of Tangail, but whose:
- Boundary conditions are not unique in the Bangladeshi context;
- National policies and guidelines that promote compartmentalisation;
- Acceptance of the approach by government organisations active in water resource development and management; and
- A judicial and administrative structure to legalise the institutional set-up and collection of water charges.

Assumptions, risks and conditions

A basic condition is the continuation of adequate finances to operate and maintain structures, coming from either paid-up water charges, or government subsidies. The risks include non-achievement of the expected results. The umbrella condition for the achievement of the results is that there is some degree of people's participation and that marginal groups benefit. M&E should also try to evaluate the fulfillment of these assumptions, risk and conditions.

The implementation of mitigation measures comprises an extensive and wide range of activities in a project such as CPP. As the range of activities is many fold, the exact interaction and final impacts are difficult to assess. It is therefore felt that the scope of mitigation measures should not be "confined" but should instead remain open-ended until impacts are properly assessed and enough time has passed for the impacts of interventions to become clear.

The identified mitigation measures focus, either within the project area or in the adjacent areas, in particular on:

- water management;
- agriculture;
- fisheries;
- environment;
- institutions; and
- gender issues

According to the reformulation mission (pg 53 etc):

"One aspect of the mitigation measures which needs to be carefully taken account of is the assessment of the full cost. This will not be the same as the direct implementation cost to the project of the individual mitigation measures, as not all will have total coverage and the implementation modalities, through the project, are very different to those which would be found in a non-project area. The assessment of costs must include personnel, evaluation and planning costs, the costs of monitoring the impacts, the environmental impact assessment and all associated assessment and administrative costs. It is expected that a separate evaluation of the full economic cost of impact mitigation will be made"

The ToR (Final Phase) explicitly adds one extra dimension to this.

"The need to ensure that the project specifically addresses any negative impact through mitigation measures during the project and a provision for the mitigation of failure after the project finishes. These mitigation measures include structural investments inside and outside the compartment, environmental interventions, planning and consultation procedures and the internalization of externalities"

Viability, sustainability and replicability

A water management system which is viable, sustainable and replicable should meet in our opinion the following conditions

- 1 Attractive in financial and economic terms
- The results of the economic analysis will be a determining factor for GoB to invest in compartmentalization. The main benefits to be expected from increased agricultural and fisheries production and reduced damages through improved flood control.

- improved water management has to bring a tangible increase of income for the beneficiaries
- for the water users assuming full responsibility for O&M at chawk level, the accrued financial benefits as a result of increased production have to outweigh the O&M costs

2. *Social acceptability*

- the accrued benefits have to be adequately evenly distributed among the different interest groups.
- substantial decrease in flood damage in terms of loss of human lives, housing and private properties
- adequate representation of legitimate interest groups on WMCs (to prevent blockage by disaffected interest groups)
- adequate provision of mitigation measures for PAPs

3. *Institutionally acceptable*

- achievement of a legal status for the WMO, upon well defined agreements and contracts with supporting and co-operating institutions and upon clear definitions and agreements concerning allocation of responsibilities for operation, particularly in respect of water users' contribution to maintenance, eventually resulting in a Water Management Act.
- an adequate institutional capacity and capability (GO and NGO) at national, district and field level to plan and implement the compartmentalization process according to the procedures as developed under CPP.

4. *Politically conform with national developments*

- Political commitment from the government needs to be guaranteed especially with respect to the implementation of the (to be developed) legislation related water management particularly referring to:
 - legislation/agreements with regard to conflict resolution
 - agreements made on roles and responsibilities of BWDB and water management committees.
 - full incorporation of the (agreed) maintenance costs in the ADPs.

For replicability reasons, the developed concept for compartmentalization should also satisfy the following conditions:

- the project area should be representative for a larger area of the flood plains of the main country's river plains.
- the institutional capacity and capability should be adequate to plan and implement compartmentalization without (or with strongly reduced) technical assistance.

CHAPTER 3: APPROACHES TO ACHIEVEMENT OF AIM

3.1 General Introduction

The background against which the Compartmentalization Pilot Project has been projected, is of essential importance to understand the originally perceived context and set-up (Chapter 3.2). The "historical" description of the perceived context is set against the experiences acquired to date. As the reality of the settings of the project, and its practical results so far, are a mixture of physical, institutional, social and organizational issues and constraints, it is necessary, to try to explain the experiences in a similar fashion (Chapter 3.3).

Further, elaborating on those experiences, and formulating new activities accordingly, a re-orientation took place regarding these activities (Chapter 3.4 - 3.9).

3.2 Brief description history of Compartmentalization

Compartmentalization is an established technique in watershed management. The technique is applied when it is necessary to slow down the runoff of river systems or watersheds or to create independent systems to which different drainage criteria can be applied. By applying the technique, the risks of flooding and/or the size and cost of interventions can be reduced.

Compartments may store excess water temporarily and can do so in two ways:

- Excess rainfall is temporarily stored in the compartment and is released after high water levels outside have receded. The runoff process is slowed down.
- Excess water from upstream parts of the watershed is taken in by more downstream compartments in order to "shave" or alternate peaks further downstream.

Under the first approach, the runoff water from sub-systems is temporarily prevented from entering the main system. Under the second one, the water which is already in the main system is stored in a compartment. Later it is released again, when the high peaks have passed.

Compartmentalization at national level in Bangladesh

From a historical point of view, floods have devastated large parts of Bangladesh; after the 1987 and 1988 floods, various studies have been done on the assessment of confining these floods or, at the other extreme, apply a strategy of "living with the floods", which is the more traditional way of coping with these floods in these circumstances. A compromise was made out of these two extreme points of view. Hence, the concept of compartmentalization was developed.

To prevent the almost yearly flooding along the great river systems of Bangladesh, it was visualised that compartments could be created over extensive areas within respective their flood plains. They would "shave" the peaks by the two mechanisms described: slowing down the runoff, and, taking in water when the approaching peaks are feared to exceed certain maximum levels.

How many of those compartments would be needed in order to have an appreciable impact on the peaks of the major rivers, is not yet known and can not be answered by CPP. Even if the Tangail Compartment were flooded to great depth, the effects on water levels in the surrounding river systems would not be noticeable due to the ratio of storage inside the compartment to the storage in the entire floodplain. In addition, flooding the Tangail Compartment for no immediate benefit, would not be acceptable to the land users inside the compartment.

Nevertheless, CPP can contribute basic information to compartmentalization at national level. From its databases on land use systems, topography, soils and flooding, the Project is able to establish practical relationships between imperfect drainage conditions, flooding and damages.

Compartmentalization of the Brahmaputra floodplain would serve three purposes.

- a. **Flood control** in order to reduce flood damages to human lives, economic assets and agricultural production (a degree of flood protection);
- b. **Controlled Flooding** to capture the benefits of flooding for agriculture, fisheries and navigation purposes (Beneficial Flooding); and
- c. **Flood storage** to store floodwater and/or rainwater in predefined (sub) compartments to reduce floodpeaks in order to reduce flood damages elsewhere in the floodplain.

In the compartmentalization approach it is foreseen that floodwater would be regulated in such a way that it gives maximum protection, minimum flood damages and maximum benefits to agriculture, fisheries, and navigation. When the system is in full operation, (entire floodplain covered with multiple compartments), decisions need to be made on how the flood (and rain) water is to be distributed among the compartments, given the hydrological conditions (flood levels, flood duration, flood predictions and actual rainfall) and given the degree of liberty as determined by the technical features of the system.

The entire scenario of possible choices regarding the management of these compartments is heavily determined by the prevailing hydrological conditions of a particular year. In hydrologically "wet" years, flood protection and minimizing flood damages will prevail, while in dry years the beneficial effect of controlled flooding will dominate. Risk management is an essential part of the concept and therefore an analysis of possible scenarios need to be worked out which would provide guidelines for management at (floodplain) regional scale.

The perceived physical system in the floodplain area to satisfy the compartmentalization approach assumes

- 1: The presence of primary embankments:

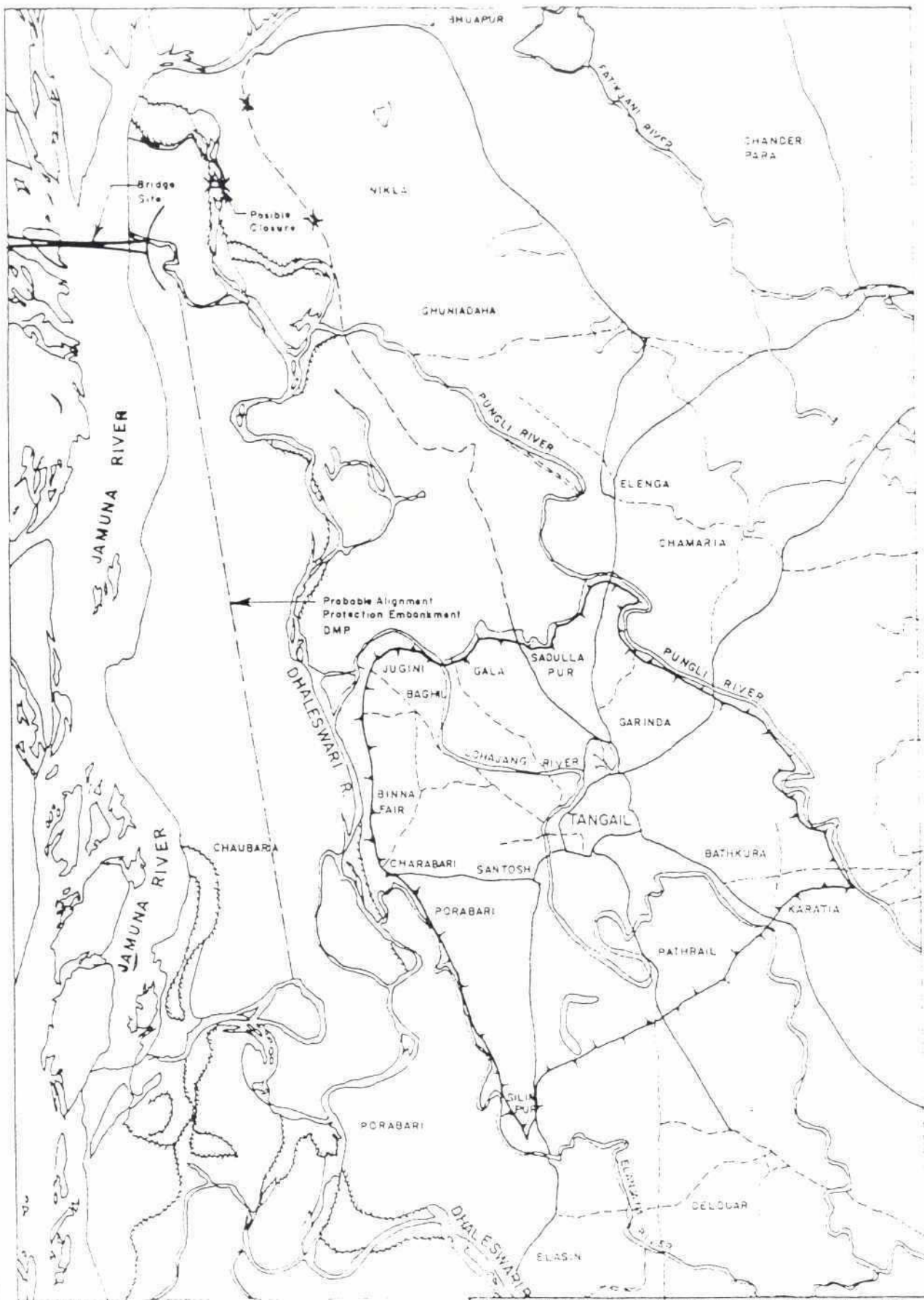
It was assumed originally that a primary embankment would have been constructed on the left bank of the Jamuna river (Brahmaputra Left Embankment or BLE), in the same way as the construction (as completed) of the Brahmaputra Right Embankment (BRE), built during the nineteen sixties. The main objective of the BLE would be to provide flood control to the entire Brahmaputra Left Bank. Later this idea was dropped due to the severe maintenance problems which occurred with the BRE.

There is an urgent need to describe the concept of the compartmentalization in order to agree on the principles and the objectives etc. In various documents, the degree of details regarding the description of the concept, makes comparison rather tedious and difficult. The original Term of References (January 1990), states clearly that this primary embankment is supposed to be present.

The Original ToR of the Compartmentalization Pilot Project (issued in 1991) state

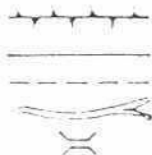
"The flood protection policy adopted in the Flood Action Plan is that of controlled flooding and controlled drainage. This involves the building of embankments along the main rivers to prevent unusually early, rapidly rising, high or late river floods from damaging crops and property on adjoining floodplains, and providing regulators/slucies in the embankments to allow 'normal' flooding of land to occur to depths with which farmers are familiar for HYV and LHV (local improved varieties), to allow fish to move between the rivers and their floodplain feeding and spawning areas, and to evacuate excess rainwater flooding when external river levels are low enough. The protected area behind the river embankments would be divided into compartments, making use of existing road/railway embankments where possible, so as to facilitate the retention or drainage of water, as required. The compartment is basically a management unit in which the involvement of beneficiaries is considered essential for its success. The overall objective is to provide, through water management, a more secure environment for intensive agriculture, fisheries and integrated rural/urban development, and thereby improve the economic security and quality of life of the floodplain population."

Figure 3.2.1: Map CPP within regional setting, as perceived by ToR (First Phase)



LEGEND

Existing Embankment/Raised Road
(Project Boundary)
Highway
Local Road
River & Khal
Bridge



MINISTRY OF IRRIGATION, WATER DEVELOPMENT AND FLOOD CONTROL
BANGLADESH WATER DEVELOPMENT BOARD/FLOOD PLAN COORDINATION ORGANIZATION
COMPARTMENTALIZATION PILOT PROJECT
FAP-20

Fig 3.41: CPP TANGAIL LOCATION MAP

CONSULTANTS Euroconsult, Lohmeyer Int. Bets Ltd., HCL

Drawn by: G.K. Rahman Checked by: G.K. Kibria Fig. no.

Annually the Jamuna river stores vast amounts of water on the Brahmaputra flood plain, whereby actual flood depths may reach several meters at particular locations. Variation of water levels in the floodplain areas in Bangladesh is a combination of river flows conveyed by the Brahmaputra river (originating in India Nepal and responsible for more than 90% of the total discharge) and local regional rainfall. Under these unpredictable floods depths only low value crops can be grown, while higher yielding crops can only be cultivated with high risk.

In order to smooth these floodpeaks and consequently reduce damage risk, the variation in flooding risk has to be brought down and be made more stable to allow higher value crops to be grown and to reduce damage to other economic activities. A solution would be to embank the entire area prone to floods, and consequently have waterlevel control to a certain extent.

Embanking vast areas of the floodplain would also result in a substantial reduction of fish fry and reduced silt deposition which would result in reduced fish and crop productions.

The height of the embankment is limited and would therefore be only partially effective. Furthermore, a long duration flood which would "invade" the entire floodplain area would not spare the embanked area from flooding as the inside water level cannot be drained out unless artificial means (e.g. pumps) are used.

If these fully-fledged embanked areas would be implemented at large scale in the floodplain area, the discharge capacity of the floodplain area itself would most probably be strongly influenced as the net conveyance area would be strongly reduced. This in turn would eventually influence the height of any embankment in the floodplain area. It is possible that extra scouring and substantial bed level changes would take place whereby the same conveyance capacity for the entire floodplain area could be maintained. This last statement is not verified by hydrological modeling.

2: The presence of secondary embankments

These embankments would have limited flood control functions as the primary embankment would satisfy on the flood control function. The main objective would be to allow controlled (beneficial) flooding to take place.

Two possible options would be available at the time of deciding on the initiation of the compartmentalization project: either to start at a location where there would be no existing embankment or select one with an existing (or partially existing) embankment.

If an area would be chosen without some evidence of initiative for flood protection, then one reason could be that there would be no need for any (limited) flood protection measures, unless these had already been implemented and in a later stage abandoned it due to certain reasons. Thus, justification might have been absent in these cases.

The Tangail district was deliberately chosen because recurrent flooding problems took place in this area and a substantial embankment with some regulators had already developed as a consequence of these frequently occurring flooding problems. In other words, local initiatives were developed in order to protect the area as much as possible.

The Bangladesh Water and Flood Management Strategy Paper (September 1995) states that flood control was the dominating theme in the "Eleven Guiding Principles" as formulated by the World Bank. This has changed over the years as awareness about environmental issues became more pronounced through studies under FAP and NEMAP (pg. 5, BWFMS, 1995).

Furthermore, subdivision of the area into smaller-sized, watermanagement units would facilitate water level control at field and (multiple) chawk level.

3.3 CPP as a Pilot Compartment and its current Institutions

3.3.1 Introduction

CPP is a pilot project to test the compartmentalization concept as a mechanism for flood regulation in Bangladesh.

The overall aim of compartmentalization was to

establish a series of compartments in the flood plains of major rivers protected by major river embankments, to regulate floods through selective protection and inundation of individual compartments

The core question the project needs to answer is:

'Whether compartmentalization is a good investment in contemporary Bangladesh'

A similar process as described in Chapter 3.2 in relation to the whole floodplain, can be applied at compartment level. The compartment is divided into sub-compartments. Ideally, sub-compartments are hydrological units where it would be possible within the hydrological boundaries conditions to manage water levels independently from the other sub-compartments. Or in other words within sub-compartments water levels could be manipulated for:

- agricultural and fisheries purposes and
- storage purposes.

So, within a compartment, given the hydrological boundary conditions and in so far as independent operation is practicable, choices need to be made on:

- which sub-compartments need to be saved from inundation (protection),
- in which sub-compartments water needs to be stored (storage) and
- how the water is to be distributed among the sub-compartments for beneficial flooding.

Criteria and scenarios need to be developed to make those choices within the hydrological boundary conditions, as well as an institutional framework for decision-making and implementation.

Compartments consist of land enclosed by peripheral embankments for flood protection with gated inlets to allow controlled flooding or inundation when necessary, and outlets for drainage. In the full implementation, a series of compartments would be established, protected by major embankments along the major rivers. It remains to be assessed if indeed these major embankments along the major rivers are indispensable for testing the concept. For CPP, it is assumed that these major river embankments are not indispensable.

3.3.2 Relevance of CPP for testing the compartmentalization concept

In CPP the compartmentalization concept is being tested in an isolated compartment which is not protected by major river embankments, which in essence means that the return period for flooding is 7 instead of 20-100 years (see also ToR June 1990, Chapter 3.2). Furthermore it is evident that flood storage cannot be tested, it is not acceptable to inundate the compartment for experimental reasons. The implications of full implementation can therefore only be simulated by extrapolating the results of the pilot compartment to an entire flood plain.

The question is then what can be tested in a single isolated compartment and whether that is sufficient for extrapolation and generalisation. In order to answer these questions various situations can be examined

which may arise in any given year within a given compartment which forms part of a series of compartments in a flood plain. They are

- a the compartment is *protected and drained* throughout the monsoon.
- b the compartment is protected against external flooding but excess rainwater cannot be drained off and is *stored* temporarily in some or all of the compartments.
- c part or all of the compartment is *intentionally inundated* to harmful water levels in order to control water levels outside the compartment; and
- d the compartment is subjected to *forced inundation* to harmful water levels because flood levels in the flood plain are too high to be kept out.

Testing the compartmentalization concept therefore implies finding answers to the following questions

1. what is the expected frequency of occurrence of the four situations?
2. what is the damage resulting from intentional and enforced inundation?
3. what is the impact of protection, controlled flooding and improved drainage with moderate flood conditions?

Questions 1. and 2. have not been addressed by CPP but they must be answered in order to extrapolate the findings.

Answering question 1 requires an overall model for flood levels in the Jamuna river as well as for the situation that would exist in the flood plain with a series of compartments established. It is beyond CPP's mandate and capability to answer this question but it is very important that it be addressed for eventual extrapolation of the CPP case. The Flood Management Model (FMM), developed under FAP-25/SWMC has partially addressed this. In the near future, this can be taken up again to assess this potential situation.

Damage by harmful flooding (question 2.) across the compartment may be assessed if forced flooding or breaches occur in the future, but it would be advisable to also address this question in a theoretical manner. This requires information on landuse and expected damage to crops and livestock from prolonged flooding. It is largely a monitoring rather than an implementation issue but CPP's assignment does imply finding an answer to this question. The Flood Damage Assessment Model, which is developed as an extension or FMM, has attempted this, but a weak model precision limits FDAM's usefulness at this moment.

Harmful flooding in individual sub-compartments for local storage purposes could be tested in case of high rainfall (including high outside water levels impeding drainage) and in case of local breaches of embankments. In principle it would be possible to manipulate the system in such a way that the flood damages are minimised by temporarily storing (part of the) flood/rain water in selected sub-compartments. Apart from the question whether the current water control level between sub-compartment allows this, selective flooding would be a highly sensitive issue which has so far not been thought through by the project.

CPP has in practice only been concerned with the third of the above questions, viz.

'what is the impact of protection, controlled flooding and drainage in years with moderate flood conditions'.

This is the only one of the 3 questions which can be addressed experimentally, the others must be addressed by other methods.

3.3.3 Outline of the CPP set-up

Minimum requirements for testing the performance of a single compartment as a model for the compartmentalization concept are:

- (i) establishment or upgrading of peripheral embankments.
- (ii) establishment of rules for the operation of peripheral gates, and

- (iii) monitoring the resulting changes in water conditions and the response of those affected in terms of landuse.

CPP has therefore established a single pilot compartment covering an area of 13,200 has. divided by a seasonal river (the Lohajang) and bordered by two other rivers, the Dhaleshwari to the West and the Pungli to the East. The project has rehabilitated and reinforced the existing horse shoe embankment, constructed a main regulator in the Lohajang river to strengthen its function as the compartment's main drainage canal and built gated inlets along the Dhaleshwari and the Pungli and gated in/outlets along the Lohajang. Furthermore, the compartment has been sub-divided into 16 sub-compartments in order to improve internal water control. The compartmentalization concept was repeated within the compartment through internal embankments, in- and outlets and flooding and drainage channels. Several larger and smaller gated and ungated water control structures have been added and several internal waterways have been excavated or re-excavated. Repeating the compartmentalization concept at the within-compartment level would imply independent water control for each sub-compartment. This, however, is not practicable. The sub-compartment boundaries are not water tight and in several cases in- and outflow of one sub-compartment passes through another.

Within a sub-compartment a number of 'chawks' have been defined as the smallest units with more or less clear physical boundaries, such as waterways, roads, settlements, etc. Generally speaking, however, the chawks do not have independent water control, although small control structures have been built at the boundaries of several chawks. Between the chawk and the sub-compartment level, 'systems' were distinguished, which consist of a series of chawks which usually have a single water inlet and a single outlet. Preliminary operating rules have been established for the main regulator, peripheral in- and outlets and major internal structures.

A three-tier institutional framework has been established for operating the compartment's infrastructure, corresponding with the compartment, sub-compartments and chawks. It consists of Water Management Committees (WMC) at all three levels. Water management decisions are to be made at each level within the degrees of liberty as determined by the limitations of infrastructure or water management decisions taken at higher levels.

The basic question which arises for Phase II of CPP is what, in fact, can be tested on the compartmentalization concept in the Tangail pilot compartment, given the fact that the existing water management system is already to a large extent determined by:

- a. the infra-structure as designed and to a large extent constructed during phase I; and
- b. the already established institutional structure of water management organisations.

3.3.4 Hydrological conditions and water management in CPP

The water management system in the Tangail compartment, as designed, constructed and partially tested during the first phase, shows that precise implementation of the compartmentalization concept is difficult. The physical reason is that the topography, characterised by a complex of ridges and beels, is not favourable for internal water control. Construction of independent hydrological units is complicated and would require a high density of costly control structures. A second reason is that this high density of structures is not favoured by the people for reasons of land acquisition and navigation. During the needs assessment and subsequent consultation meetings, people gave priority to drainage improvements and an open channel network for navigation purposes, in addition to protection through embankments.

In order to satisfy the need to test compartmentalization concept, the project added more control structures than requested and agreed upon by the population during the consultation process. Nevertheless, the concept is not and cannot be fully implemented. The result is that the actual water management system is a compromise between, on the one hand, the compartmentalization concept and on the other hand the topography and the wishes and needs of the Tangail population.

The boundaries of sub-compartments are 'porous'. Chawks are hydrological units to a limited extent only and so are sub-compartments. As a result the water management system is much more complex than in the intended compartmentalization concept. Apart from being 'porous', the sub-compartment embankments have a relatively low level, reducing the storage capacity. Even if these embankments could be fully controlled with gated structures, these would only have a limited protection function in case of breaches in the peripheral embankments.

The foregoing means that given the existing physical water management system, the compartmentalization concept at compartment level cannot be tested on its protection and storage functions. What remains is:

- beneficial flooding
- protection against moderate flood levels, and
- improved drainage

Beneficial flooding is a typical component of the compartmentalization concept which can be tested experimentally and the project has to evaluate the assumed effects of flooding on capture fisheries and on agriculture through irrigation and soil fertility. Protection against moderate floods and improved drainage are the other important components. Further testing of the compartment for beneficial flooding, protection against moderate floods and improved drainage are the mainstay of Phase II.

A first condition to effectively operate and test the compartment's control mechanisms within the above limitations is a thorough knowledge of its hydrology and the effect of the existing infrastructure. For that purpose, a modelling approach was chosen during Phase I, using an adapted version of a hydraulic model widely used in Bangladesh, "Mikel I". The project, however, has so far not itself implemented the model, nor did it have the capacity to do so. Furthermore, the reliability of the model's predictions in its present implementation are in doubt. The compartment's hydrology is therefore incompletely understood.

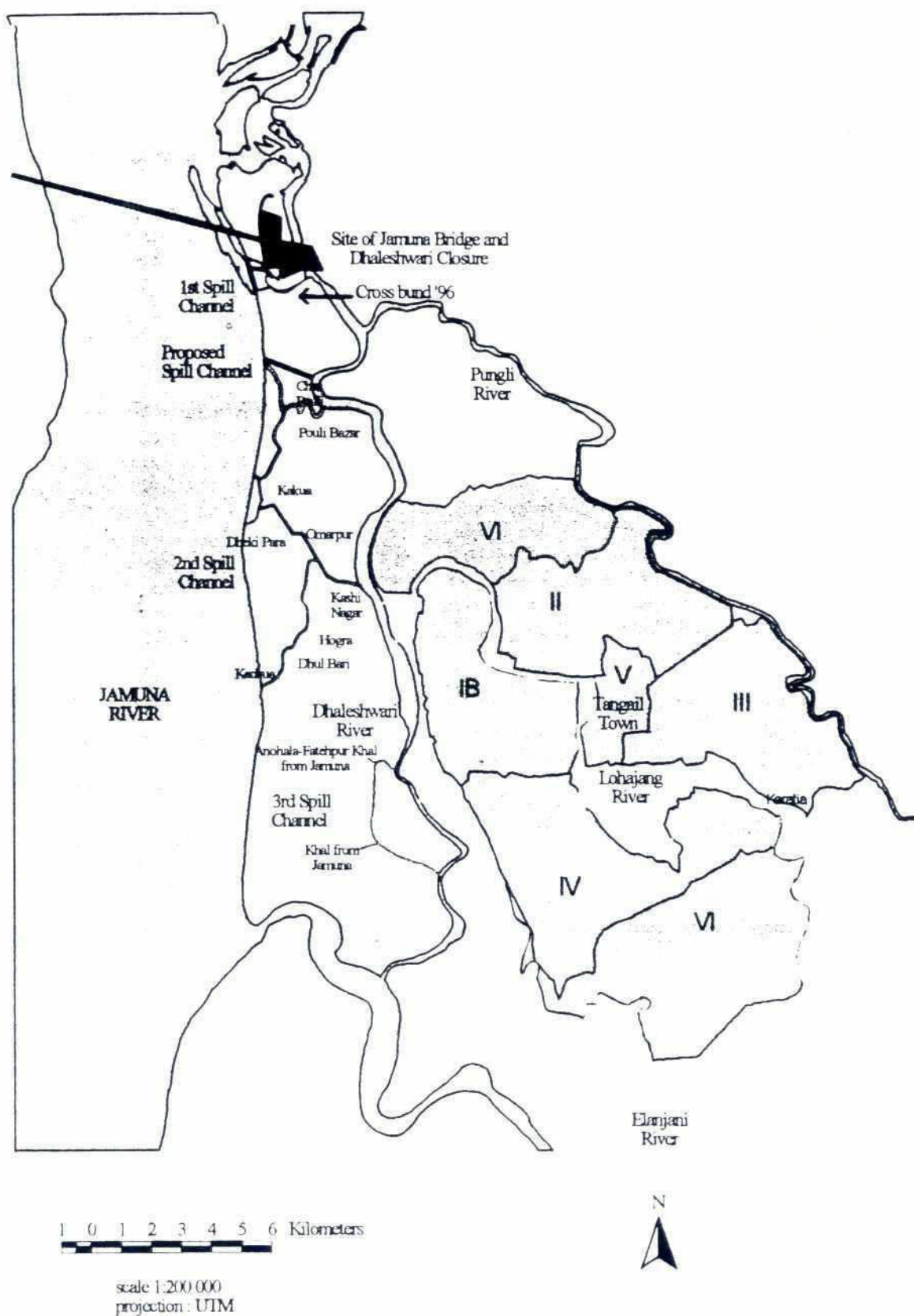
From more conventional observations it appears, however, that the internal infrastructure has only a limited effect on the water levels within the compartment. This preliminary conclusion is based on the following:

- In the report on the 1995 monsoon experience, it appears that the internal structures were only used to a very limited extent. It should, however, be noted that this was the first flooding after completion of the structures and that no institutional structures were properly in place for gate operation.
- The 'actual flooding depth maps' of the 1996 monsoon shows that there were no major differences in water level between chawks and between sub-compartments. This flood was relatively low.
- During field observations the number of structure operations appeared to be minimal and moreover water level differences up- and down-stream of the structures appeared to be small (in general not more than 10 cm., but upto 30 cm in some cases).

The main effects on water levels and flows result from regulating the flood levels by the peripheral infrastructure (embankments and regulators) and through improved drainage. The additional impact of the internal structures on the water management system and subsequent benefits for agriculture fisheries are uncertain and remain to be assessed thoroughly. Nevertheless, beneficial changes to cropping patterns and cropping intensities in the northern (earliest constructed) part of the area are attributed by the affected population to project activities.

Figure 3.3.4 Physical setting CPP-area

Figure 3.3.4 Physical setting CPP-area



3.3.5 *Implications for water management organisations*

Given the many uncertainties about the hydrological conditions in the compartment it is obviously difficult to draft meaningful guidelines for internal water management. Attempts to formulate them for the SCWMCs have resulted in complicated regulations which can certainly not be handled at the level of the SCWMC. Obviously, this has had a negative impact on the effectiveness of the WMCs at all levels, as shown by the results of the recent appraisal of the WMCs (Communica, 1997). In its current condition, the hydraulic model gives limited insight in system operation. This is obviously not adequate for a system managed by water users. Arriving at clear guidelines for water management committees is thus a pre-condition for a system managed by them. If the water management system turns out to be too complicated for drafting easy to follow guidelines, the viability of water management committees is put at stake.

This means that during phase II, priority needs to be given to a thorough characterisation of the compartment's hydrology resulting in the development of clear guidelines which can effectively be handled by water user organisations. The alternative would be a trial and error learning process.

Incomplete control of internal water flows also implies that the sub-compartments as previously defined do not sufficiently reflect hydrological conditions and inter-relationships. Drainage patterns and command areas of the various inlets in the main embankment are therefore being considered as the basis for describing and ultimately managing water conditions in the compartment. A tentative subdivision to 'Drainage Catchments', for instance, showed the degree of interdependence of several sub-compartments for drainage. At the lower level, chawks also depend on one another to varying degree from a drainage point of view. These inter-dependencies are treated in more detail in Annex-IA of this report, where a revision of the sub-compartment boundaries is proposed, based on drainage patterns. Major attention will be given in the future to better characterising the compartment's drainage patterns, which will have important implications for institutional arrangements of water management at the different levels and the roles of various committees.

Compartments in the flood plains of Bangladesh would have the function to reduce floods by temporarily storing runoff waters. In case of the Tangail Compartment the necessity of storing runoff is imposed by outside conditions: it is expected that outside water levels are so high during the monsoon that parts of the Compartment can not drain.

As far as water management is concerned, it needs to be determined what optimal land uses are, under the circumstances. A second subject of study is whether flooding risks can be reduced on the low lands by improved water measures.

During the first phase of CPP, the Compartment area was sub-divided into sub-compartments, which in turn were split up in chawks. There are 15 sub-compartments in the area and about 150 chawks. The sub-compartments and chawks both have a water management function and an institutional function. Improvements in water management will involve local committees, both at chawk and at sub-compartment level.

During the final phase, chawks and sub-compartments will be maintained, but it is proposed to adapt the boundaries of the sub-compartments in such a way that each drainage system is fully contained within one sub-compartment. In the past, one of the difficulties in water management was, that drainage systems crossed the boundaries of sub-compartments. In managing a drainage system coordination was sometimes required between two or three sub-compartment committees. The proposed change does away with that complication.

Another change proposed for the final phase is that the emphasis shifts from water level control to drainage. During the first phase much attention was given to water level control down to chawk level. That appeared rather complex and not very well manageable. By concentrating on drainage, water management will become easier.

To improve water management, CPP has to establish closer and more effective contacts with the committees. For that purpose Junior Water Management Officers are appointed, who will work under supervision of a Drainage / Water Management Engineer. Their task is to assist the committees in their tasks and on the other hand to identify important water management issues (see also Chapter 5).

There is still insufficient knowledge about the behaviour of water levels outside the Compartment during the monsoon. Likewise, the detailed behaviour of the Lohajang river is still unknown. During the first phase of CPP, model calculations were undertaken related to flooding and drainage, but the model needs to be adapted to the new requirements. In the first place, it will be simplified. Secondly, the model will be transferred to Tangail office in order to improve the communication about model outputs and the field situation. It is a matter of priority that CPP acquires good understanding of the operation of the Main Regulator under a variety of difficult boundary conditions (see also Chapter 5).

3.4 Future Institutional Development, including O&M

3.4.1 Objectives and outputs

The ToR (June 1996-June 2000) state the objective of the institutional development component as follows

The establishment of an institutional base for the operation and maintenance of the compartment, good intra-compartment coordination and the potential development of inter-compartment cooperation. This institutional base should be replicable and sustainable without project assistance, including having a sustainable financial base.

This objective should result in the following outputs:

- A. The creation of a water management organisation
 - 1. which is capable to operate the system according to a set of rules and regulations as formulated by the project and satisfying the requirements of the land users;
 - 2. in which the different stakeholders or interest groups are adequately represented;
 - 3. which is capable to solve conflicts between different interest groups and between the water management units;
 - 4. which is capable to maintain the system by adhering to the tasks and responsibilities as defined by the land users;
 - 5. which is embedded within the Bangladeshi institutional structure; and
 - 6. which has a legal status within the constitution.
- B. Based on the experiences in the compartment the project should formulate a water management policy, including guidelines describing the institutional process during the planning, implementation and O&M stages of compartmentalization

3.4.2 Basic principles

In achieving the formulated objectives and outputs, the project proposes to follow some basic principles:

- 1. The People Participation Guidelines (PPG) of the MWR will form the basis of the institutional setting and participation, but will be adapted according to the actual situation in the compartment.
- 2. There will be a clear distinction in the organisational set-up between water management organisations and the project organisation.
- 3. More emphasis will be given to the waterusers' organisation at the smallest hydrological unit, viz the chawk, through
 - stimulation and organisation of chawk level water management committees where relevant interest groups at chawk level are represented ¹⁾;
 - assisting in development of internal chawk water management infrastructure through user group support
- 4. The target group in water management comprises all people with a legitimate stake in water management in the project area. Within the total group of stakeholders distinctions can be made between different categories of land users and between interest groups (farmers at low, medium and high lands, fishermen and boatmen). Conflicting interests may exist between hydrological units between interest groups. In some instances landless families and women may be considered as

¹⁾ In CPP, Phase I, the Chawk committees were composed of farmers only

distinct interest groups but their interests do not necessarily deviate from the former mentioned groups

3.4.3 Current water management organisation

During the Inception Phase (Final Phase) of the project, the current status of the water management organisation and the different committees was examined, as a starting point for further development

Relevance of the current organisation

With the acknowledgement that the compartmental infrastructure cannot give complete internal water control, the existing management layers of chawks and sub-compartments and their roles also need to be re-examined. Under the existing system, the sub-compartments often depend on each other for flooding and drainage and the dominant influence of the peripheral structures implies that drainage catchments and inlet command areas should determine management units. Sub-compartment boundaries are therefore being re-drawn on that basis.

Appraisal of the existing organisation

In late 1996, all existing 15 SCWMC's were visited by the IDS, the sociologist, the WID and one field assistant. On the basis of this preliminary appraisal two SCWMC's were chosen for further in-depth surveys, using PRA methodology. A multi-disciplinary team was formed for that purpose consisting of representatives of line agencies, NGOs and project staff. An experienced trainer/facilitator was contracted to guide the PRA. Some of the findings from the survey in respect of the Committees were:

- the objectives of the water management system were not well known
- farmers were somewhat aware of the system but other categories of interest groups were almost ignorant
- in operating the structures, the interests of farmers in high, medium and low land were not equally looked into
- 'terrace embankments' inside beels were proposed by farmers as a way of solving conflicting interests of farmers in high and low land
- decisions on gate operation were often not taken through SCWMC meetings and sometimes decided 'from the top'
- the attitude of the majority of people towards the system was positive but the fishermen were sceptical
- beels and low-lying fishing areas are usually owned or controlled by others than the fishermen
- people were more aware of the SCWMC than of the ChWMCs.

A major conclusion drawn from the PRA was that the committees are not (yet) well developed as people's institutions. The lack of clarity about the purpose of the system and the insufficiently worked out and communication rules and regulations are probably at the heart of the problem.

Three further key issues are emphasized here, which are important for the future development of the water management organisations:

1. During CPP Phase 1, there was no clear distinction between water management organisations and project organisation. A wide range of organisations (GO and NGO) have a role to play in achieving the objectives and outputs, but the water management organisations should be basically constituted of the legitimate stakeholders, and their relationships with the various organisations should be clarified.

³ In CPP Phase 1, four interest groups were distinguished: farmers, fishermen, women and landless. It is suggested that 'watermanagement interest groups' here were confused with development target groups such as landless and women being considered as the most disadvantaged groups. The special interests of landless families will be employment in the construction and maintenance of the infrastructure, but as agricultural labourers or labourers in fisheries they will not have deviating interests from the formerly mentioned interest groups. Similarly women may have special interests in clean drinking water supply, or flood preparedness, but their interest as farmer women or fishery women will not deviate from these of the earlier mentioned interest groups.

2. The different interest groups which can be distinguished in water management activities were previously organised only at sub-compartment and compartment level, ignoring the importance of their representation at the lowest level of water management unit: the chawk.
3. There was no direct relationship between the membership of the committees at the chawk and the sub-compartment level.

The new organisational set-up is intended to correct for these deficiencies.

3.4.4 Future development of the organisation

Outline

The overall function of the different WMCs is to provide mechanisms for consultation and communication among legitimate stakeholders in water management, for operation of water management infrastructure to the benefit of the stakeholders as far as this is within their competence, for conflict resolution in case of conflicting interests, and for mediation between direct stakeholders and a range of agencies with a role in water management.

The outcome of the PRAs conducted by the project during the Inception Period, in combination with the outcome of the reviews in other sectors especially regarding the physical water management system, form the basis of future development of the project's institutional component. Key issues are:

- the relevance of the present three tier system in water management organisation of compartment, sub-compartment and chawk, in view of the physical water management system
- the roles of different stakeholders in water management (directly affected persons, line agencies, local government, NGOs and project)

Two main options are available for stratifying WMC into functional layers:

1. Maintain the present system of chawks and sub-compartments, but improve co-ordination mechanisms between them, reflecting the reality of their often high degree of inter-dependence.
2. Maintain the chawks as the basic unit with the next level being the drainage catchment area or inlet command area, or a combination of the two. The objective of this option would be reduction in the need for conflict management among strongly interdependent sub-compartments.

The choice between these options must be guided by the goal of establishing an effective and efficient water management system. The system should therefore ideally be such that it is grounded in the prevailing hydrological conditions and that management decisions which affect conditions at a given level be made as far as possible at that same level (subsidiarity principle).

Since drainage flows are the most important feature of the hydrology in the compartment, it is proposed that the organisational set-up should reflect this by making it coincide with major drainage patterns. This will largely eliminate the problem of major water flows crossing the boundaries of major management units, as occurs with the current sub-compartments. It is therefore recommended to define new sub-compartment boundaries, based on drainage patterns. The revised boundaries are described and depicted in Annex-I A.

The chawk remains the best unit for grassroots organisation under any set-up because of its manageable size and its agricultural significance. The roles of the chawk committees should, however, evolve in such a way that they reflect the hydrological conditions in the chawk and their relationship with other chawks. Different chawks may be quite different in that respect, depending on their link with major drainage routes and with adjoining chawks.

Representation of interest groups in the WMC's

The ToR stipulates that an adequate representation of all interest groups in the water management organisations is required. For this purpose, the project has two important instruments:

1. the opportunity of representation of all relevant interest groups in the water management committees
2. recruiting the support of NGOs in group formation of disadvantaged and marginal groups

During the establishment process of the WMCs the different interest groups themselves have to decide on their participation, which may lead to differences between chawks. Fishermen would not be represented in chawks where they are not present.

The limitations of CPP with regard to equal representation should also be kept in mind. CPP, being a project with a limited time horizon, will not be able to fully address the equity aspect. Empowerment of disadvantaged groups is a long time process and requires a change in the social pattern of rural Bangladesh. NGOs with long term commitments to the people and groups they are working with, may eventually be able to achieve this change.

The water management committees will be composed of elected members. As is shown elsewhere in (and outside) Bangladesh, the composition of the committees will largely reflect the existing rural power structure with limited access of the disadvantaged groups such as marginal and small farmers, tenants, women and landless. Equal representation will thus depend on the emancipation of these disadvantaged groups and is by definition a gradual and long-term process. It will be one of the tasks of CPP to assess to what extent equal representation can be reached within the given time limit and with the instruments the project has available. Eventually representation will be a key indicator in reviewing the viability of compartmentalization.

Broad roles and composition of the Water Management Committees

The tasks of the WMCs are described in Chapter 3.4.5. Their general roles and composition will be assessed. The future organisation is considered at four levels (chawk, sub-compartment, compartment, region):

A. Chawk level

The chawk is considered as the smallest project-level physical unit and remains the smallest unit for significant water management. At the chawk level decisions need to be made with regard to desired water levels and the desired in- and outflow into and from the chawk. This means that already at this level distinctions need to be made among the different stakeholders. The possibilities for water control of an individual chawk, however, are very limited and therefore the immediate role in water management of the ChWMC's is also limited.

In CPP, phase I, only farmers participated in the chawk committees. In the future all relevant interest groups within this unit will be represented in the chawk committee. Water management in the project area influences agriculture, fisheries, water transport and household activities. Agriculture is practised by landowning cultivators, homestead owners and sharecroppers while fisheries is in the hands of fishermen and women. The number of boatmen involved with water transport is so small in the Tangail compartment that it is not warranted to see them as an interest group that has to be included in the committee. Use and nuisance of water related to households affects a large part of the population in the compartment. It is however not considered necessary to see them as a separate interest group that has to be represented at primary level, because it can be expected that these interests are sufficiently being taken care of by the aforementioned groups. These groups are also users of water for household purposes and have also property that has to be protected against flooding.

All interests related to water management are shared by women. Therefore it is not necessary to treat them as a group that should be represented separately. Rather a provision should be made that at least one third of the members of the lowest level committee, representing the target group as delineated above, are women.

It is therefore proposed that the ChWMC will be composed of elected members from the following categories

- farmer households, with a maximum of two representatives each from households which farm predominantly in low, medium and high land within the chawk.
- two representatives of fishing household for those chawks where fishing families are present

It remains to be seen whether these categories ensure sufficient representation of all interest groups including landless households, which are defined as households with 0-0.3 acres of cultivated land. The representation of the different interest groups will be dealt with explicitly during the formation process of the committees as outlined in Chapter 3.4.6.

This proposal for composition of the ChWMC does not fully comply with the "Guidelines for People's Participation in Water Development Project" of the Government of Bangladesh, Ministry of Water Resources, as they stand at the moment (publication in English of August 22, 1994). In these Guidelines it is clearly stated (see page 13) that water users groups shall be formed by farmers, or at least "all people engaged in farming", either owner-operators or sharecroppers. Consequently, fishermen and home stead owners are not included. The Secretary of the Ministry of Water Resources has pointed out, however, that these guidelines will be revised in the near future.

It seems fair that not only heads of households can be elected in the committee, but in principle all adult members of the household. They are as much stakeholders, especially the women in the households, as the heads themselves. Since election from the full population would be an extensive and costly process, it is proposed that eligible candidates should comprise household heads and their spouses, and that a number of seats are reserved for women.

B. Sub-compartment level

In the CPP Phase I situation, the SCWMC was composed of representatives of the various interest groups which were not directly representing the interests of the chawk as well as a number of government officials. The committees should first and foremost be a platform that represents the interests and views of the ultimate direct stakeholders. Therefore, the future SCWMCs will consist predominantly of representatives from the ChWMC's, elected by their members. To maintain a manageable size, each of the ChWMCs should elect at most two members into the SCWMCs. An election mechanism will be developed to ensure adequate representation of the major interest groups, including women, in the sub-compartmental committee. One possible approach would be to have a two-stage election process, whereby in a first round all the female and fishermen members of the different chawk committees would vote as a group for a pre-set number of SCWMC members in their category. In a second round, each chawk would vote for members in the remaining categories, whereby those chawks which are already (partially) represented through the first stage votes for a correspondingly reduced number of members.

In order to forge a link with the elected branch of local government institutions, it is proposed that some representatives appointed by the Union Parishad should be taken up in the SCWMCs. This link increases the authority of the SCWMCs and puts the interests of water users in a broader perspective. The number of Union Parishad members could be limited to three, who should preferably be living in the sub-compartment. One of the three should be a woman. The chairman of the SCWMC does not automatically need to be the Chairman of the Union Parishad, since that might mean a conflict of interests, in case he is a resident of an area in another sub-compartment.

The government officials (at the moment usually the Inspector of BRDB, the Assistant Fishery Officer, the Block Supervisor of the Department of Agricultural Extension and the Extension Overseer of BWDB) should not be members of the SCWMC. They could however be invited to SCWMC meetings as technical resource persons.

In view of their size, the SCWMC should elect an Executive Committee from among its members with sufficient decision power for day to day running of SCWMC business.

C. Compartment level

At the compartment level, a Project Council (PC) was established in July 1996, which can currently be seen as a Compartment Water Management Committee. A potential future differentiation between PC and CWMC is further explained in Chapter 5.1. The PC is chaired by the District Commissioner and has 78 members. Of which 32 are from the SCWMCs, 9 are Union Parishad members of the SCWMCs and 37 are from the Government Departments, NGO and Local Government. So far the Council has met twice. One of the decisions taken was to create an Executive Committee from within the Council.

Presently a Thana Nirbahi Officer is vice-chairman of the PC, while the sub-divisional Engineer of CPP-BWDB is member-secretary. This has caused irritation among officers from Government Departments who are members, but higher in rank and status than the vice-chairman and secretary. It is recommended that one of the Union Parishad chairmen (and member of a SCWMC) takes over as vice-chairman and that the Executive Engineer of CPP-BWDB becomes the member-secretary.

The PC is obviously too large to be effective in preparation of policies and in operational matters. That fact has been recognised by the members, whence their decision to establish an Executive Committee from amongst them. This Committee should have operational responsibilities and should prepare policy decisions, to be made by the full Council, for instance those on the rules for operation and maintenance. Although the "Guidelines" do not mention the possibility of the creation of such an Executive Committee as a part of the Project Council, the Secretary of the Ministry of Water Resources has endorsed the idea.

It is recommended that the Executive Committee consists of:

- the Deputy Commissioner, as chairman;
- one representative of each of the 15 SCWMCs (either the chairman or the member-secretary); one SCWMC representative will be Vice-Chairman of the Executive Committee; and
- Executive Engineer CPP-BWDB, as member-secretary.

Representatives of Government Departments and -agencies, and of NGOs should be invited to attend meetings as technical resource persons.

An election mechanism will be developed to ensure adequate representation of the major interest groups, and of women, in the executive committee.

For the time being the PC should be continued in its present form. Once the new composition of the SCWMCs has been realised, however, the PC should also be reconstituted, at which time its composition should also be reconsidered with regard to the political members (Union Parishad), in case the Government of Bangladesh decides to enhance the administrative status of the Thanas and to have an elected administration at that level. Also the question will have to be addressed whether the representation of the line agencies in the new CWMC is appropriate in view of its role as a water users organisation. This issue is further discussed in Chapter 3.4.5.

The overall set-up of the three-tier water management organisation is shown in Figure 3.4.4.

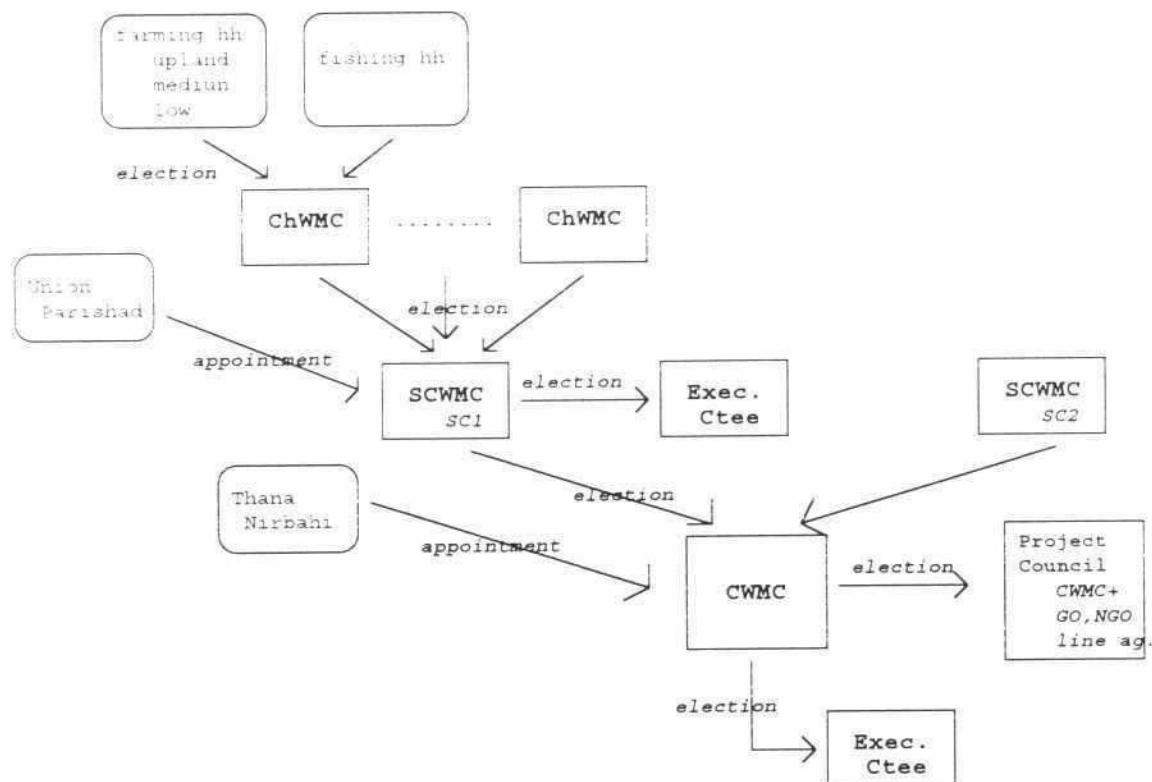


Figure 3.4.4: The three-tier set-up of the water management organisation

D. Regional level

At present a regional committee is not opportune. However, some of the decisions in respect of water management in the compartment affect the adjacent areas, in particular the operation of the main regulator. The adjacent areas are presently represented in the PC, and in the new set-up the adjacent areas should also have a say in the operation of the main regulator. In an eventual future stage of compartmentalization an authority would be responsible for the water management of the entire Brahmaputra flood plains and representatives of the compartments within the flood plains would be involved. Especially in case of the regulation of floods, choices have to be made about the relative degree of protection of individual compartments. In the development of scenarios for disaster planning, involvement of the CWMC will be a prerequisite.

The roles of the ChWMC and the SCWMC are further elaborated in Chapter 3.4.5

3.4.5 Operation and maintenance of the water management system

Principles of operation and maintenance

- 1 At each level, the relevant committee will be fully responsible for, and deal with those operational issues which relate only to water conditions within its boundaries. Issues which exceed these boundaries will be the responsibility of the committee at the next level.
- 2 The beneficiaries can probably not be made fully responsible for the maintenance of the entire within-compartment water management system. The Reformulation Report and the recently concluded Joint Donor Review Mission both recommended a cautious process to investigate the possibility of cost sharing by beneficiaries. Maintenance and operation of the chawk infrastructure should become the responsibility of the ChWMC, as the actual infrastructure is limited, whereas responsibility for maintenance of the infrastructure at sub-compartment and compartment level will, for the time being remain the responsibility of the BWDB. Experience with chawk-level maintenance by beneficiaries will guide further steps in beneficiary cost sharing at higher levels.

3. A similar situation exists regarding operation of the structures within the compartment above the chawk level. Operation will be done by operators under supervision of the relevant WMC but their salaries are presently paid by the BWDB from project funds. BWDB will continue to do so until the possibility of cost sharing or cost recovery has been further examined at the chawk level.
4. The procedures for O&M as laid down in the PPG will be the guideline for establishing the maintenance system, initially at chawk level.

Tasks of the different organisations and services

Based on the above principles the following tasks are assigned to the different groups involved in O&M.

The Chawk Water Management Committee (ChWMC)

Only a small number of chawks have any control structures at all and their effectiveness in many cases is doubtful. Furthermore, operation of a structure will usually affect several chawks which are located in the same drainage pathway. Operational rules for gated structures will therefore have to be developed and adopted at the next higher level, i.e. the redefined sub-compartment. Only minor structures, which solely affect the chawk where they are located are under full control of the ChWMC. The same reasoning applies to waterways. Only those whose function is strictly at the chawk level will be the full responsibility of the ChWMC, while the water ways which connect several chawks to a major channel are the responsibility of the SCWMC. The SCWMC may, however, assign maintenance tasks for connecting waterways to those chawks which share them.

Thus, the essential tasks and responsibilities of the ChWMCs are:

1. operation and maintenance of the internal chawk water management infrastructure,
2. contribution to the maintenance of infrastructure shared with other chawks, and
3. representation of the chawk interests in the sub-compartment committee

The Sub-Compartment Water Management Committee (SCWMC)

Sub-compartment boundaries will be redefined on the basis of drainage patterns as outlined in the Water Management (Annex-1A). The tasks and responsibilities of the SCWMC are

1. advising BWDB on the operation of the sub-compartment's main inlet(s) and outlet(s) in consultation with the Compartment Water Management Committee's Executive Committee,
2. operating the sub-compartment water management infrastructure (within-subcompartmental structures), based on agreed rules and regulations,
3. monitoring maintenance requirements of the SC infrastructure on the basis of reports from the chawk committees and soliciting maintenance services from the relevant institutions (BWDB and possibly LGED, according to their respective mandates, see below);
4. making decisions on operation of infrastructure in conflict situations, based on agreed guidelines, and
5. representation of the sub-compartment interests in the Compartment Committee.

The Compartment Water Management Committee (CWMC)

The tasks and responsibilities of the CWMC are

1. advising the BWDB on maintenance and operation of the peripheral embankments and structures, including the main regulator,
2. advising the BWDB on operation of the water management system between sub-compartments as far as relevant, and
3. representation of the compartment interests in the regional committee

Embankment Maintenance Groups (EMG)

The EMGs, consisting of groups of landless women have been constituted by the project to maintain the internal embankments with project funding. In order to be sustainable these groups have to be institutionalised in the course of the Final Phase. Organising and remunerating the EMG will in future be

the task of the organisation that takes responsibility for maintenance of intra-compartment infrastructure. Depending on the outcome of the experiment with beneficiaries' cost sharing this would be either the BWDB (or possibly LGED, see below) or the SCWMCs themselves (see above).

BWDB and LGED

The issue of responsibility for maintenance of intra-SC infrastructure has not and could not have been resolved during Phase I. The project will now experiment with giving responsibility for intra-chawk maintenance to the ChWMCs and the experiences will give guidance for further steps in cost recovery. In the event that cost recovery cannot be considered beyond the chawk level, responsibility for other infrastructure within the compartment will have to pass to GoB agencies involved in water management, viz. BWDB, LGED, etc., according to their mandates. It is therefore proposed that the project starts discussions with the LGED and other potential agencies to investigate the scope for their future involvement and explore the possibility for participation in the project in this respect.

Developing rules and regulations for operation and maintenance

To facilitate the tasks and responsibilities of the water management committees at each level, clear and detailed rules and regulations will be developed by the project in consultation with the WMCs. For the chawk level, this entails:

- if relevant, developing operational rules for the within-chawk infrastructure based on water and drainage requirements and desirable water levels, and assignment of tasks for its actual operation (gate operators, etc.);
- developing guidelines for soliciting minor works from BWDB or other agencies for the improvement of within-chawk water management; and
- developing guidelines for maintenance of infrastructure, specifying the responsibilities of the different actors.

At sub-compartment level the rules and regulations will deal with inter-chawk water distribution and drainage given the limitations of control of in- and outflow into and from the sub-compartment. Developing rules and regulations entails:

- formulation of an internal water management plan within the limitations of controlling water in- and outflow in the different agricultural seasons;
- developing detailed and clear operational rules for the sub-compartmental peripheral in- and outlets and inter-chawk infrastructure, and allocation of tasks for the actual operation of the infrastructure (gate operators, etc.); actual operation of the peripheral in- and outlets will be by the BWDB;
- developing guidelines for the management of emergency and unforeseen situations; and
- developing guidelines for maintenance of infrastructure, specifying the responsibilities of the different participants.

At the compartment level, the rules and regulations will deal with water flows into and out of the compartment within the limitations of control, as well as with water distribution between sub-compartments. Developing rules and regulations entails:

- formulation of a compartment-level water management plan within the limitations of water control in the different agricultural seasons;
- developing detailed and clear operational rules for the main regulator; actual operation will be by the BWDB;
- developing guidelines for the implementation of the rules and regulations, covering emergency and unforeseen situations; and
- developing guidelines for maintenance of peripheral infrastructure, specifying the responsibilities of the different participants.

In the process of drafting water management operation and maintenance plans, the inputs from the BWDB, LGED, DOA and DOF are crucial. The inputs of the BWDB and LGED will concern the technical feasibility of the plans given the operational possibilities and limitations of the system. The DOA and DOF

will contribute in advising on water and drainage requirements and water levels for agriculture and fisheries purposes

Responsibilities for the actual operation of the infrastructure are with

- Operators of the ChWMC for internal chawk management
- BWDB at compartment level for peripheral in-and outlets and major internal structures on the boundaries
- Operators of the SCWMC for inter-chawk water management and

The operators will implement the operational rules as formulated in collaboration with the committees at various levels. The rules should be considered as a framework for the operation of the system, which need to be regularly adjusted and adapted to the actual water conditions as they occur. This will be done in the water management committee meetings at the different levels at regular intervals, or when the situation requires; e.g. major floods and drought periods.

Procedures must be developed for timely consultation between organisational levels in case of minor or major emergencies. In view of the size of the committees at sub-compartment and compartment level, executive sub-committees will have to be formed with sufficient decision making power.

An important aspect of the operational plans is the disaster planning (see also Chapter 3.8). For floods of different occurrence and duration, scenarios need to be developed at all three levels within the compartment. For the design of scenarios criteria need to be developed for minimising the flood damages in terms of human lives, economic infrastructure and crops and livestock. The scenarios will ultimately lead to an operational disaster plan for the entire compartment defining which gates will be opened and closed for different flood levels. The BWDB will be responsible for the execution of the disaster plan at such times.

Conflict resolution

The water management committees at the three levels will be primarily responsible for solution of conflicts which arise between persons, interest groups and water management units within their area of jurisdiction. If these committees fail to reach consensus, then the conflict will be referred to the local government: the Union Chairman at the chawk and sub-compartment level or the Deputy Commissioner in case the conflict comprises the compartment.

3.4.6 Phased development of the WMCs

The institutional concepts elaborated upon in this report deviate considerably from those followed during CPP Phase I. It is realised that a clean start is not possible because of the history of the project and the ongoing activities. Implementation of the institutional development process will therefore be gradual, taking into account the present situation and ongoing developments.

Organisation of water users at the chawk level involves the following planning steps:

- 1 *Data collection*
 - assessment of hydrological features of the chawk: water use, main constraints and potentials, first identification of interest groups
- 2 *Group meetings with chawk population*
 - presentation of objectives, scope and limitations of chawk level water management,
 - identification of constraints and opportunities related to water management
 - identification of interest groups
 - formulation of possible interventions for improvement of water management system with identified interest groups
 - decision on composition of chawk committee based on identified interest
- 3 *Formation of pre-ChWMC*
 - election of committee members for the 'pre-ChWMC'
 - drafting of a constitution for the ChWMC

- start with implementation of proposed interventions
- + Planning for O&M
- approval of draft rules and regulations for chawk water management, suitably modified and planning of operations
- drafting of a chawk level maintenance plan, responsibilities, prioritisation, cost recovery
- 5. *Formation of ChWMC*
- endorsement of ChWMC constitution by members
- transformation of constitution into by-laws
- registration of ChWMC

The formation of ChWMCs (new style) will be guided by teams consisting of BRDB, NGOs, BWDB (operation and maintenance), DOA & DOF (advising) and the project. NGOs will be instrumental in stimulating special target groups in advocating their specific interests. When introducing the process of ChWMC formation, a 'fresh needs assessment', as proposed in the re-formulation report is not required. It is considered that the process of identification of interest groups (including identification of their specific interests in water management in (separate) group meetings) will have similar results as the 'fresh needs assessment'.

It is proposed to develop a planning schedule for the phased development of the ChWMC over a one year period. The first trial of the approach should take place in one of the pilot chawks which are being set up by the agricultural section (see Chapter 3.6: Agriculture). Subsequently, phasing should be by sub-compartment as newly defined. Once all ChWMCs in a sub-compartment have been formed, a similar process is initiated for the establishment of the new SCWMCs. This will allow the project to simultaneously phase out the old-style sub-compartments and their SCWMCs and phase in the new ones. Finally, the new CWMC will be established.

3.4.7 *Water management organisations within the institutional structure*

Legal status of the Water Management Committees

The water management organisations need to be developed into relatively autonomous organisations, where decisions on water management are taken by and executed by the water users, each committee within its own mandate. This implies that they need a legal status within the national institutional framework and that the committee by-laws or constitutions are recognised and incorporated in the Bangladeshi constitution.

The project is aware of the ongoing debate on the legal aspects of water management. Presently there is still no satisfactory solution for the legal status of water management organisations in Bangladesh. This means that CPP has to continue to participate in this debate.

The status of the ongoing debate is as follows. In August 1995 the CPP in a Note on Legal and Institutional Frameworks of the Beneficiaries Organisations in Water management concluded that "Both the local government organisation model and the co-operative model do not provide suitable frameworks for local water management organisations at this stage". A year later, however, the Government of Bangladesh opted for the co-operative model and decided (Ordinance of May 13, 1996) that water user groups will be registered under the Co-operative Ordinance, 1984 and the Co-operative Societies Rules, 1987. The "water management co-operative association" is defined as "a co-operative society which is formed to improve the socio-economic conditions of its members by way of providing various facilities and services and the members of which are beneficiaries of a sub-project or a scheme undertaken under a Water Resources Development Project". The Ordinance of May 1996 supersedes the earlier decision to have the water user groups registered by BWDB.

The definition of water management co-operative association seems to cover the groups in the CPP as proposed earlier. Registration under the Co-operative laws can thus take place, provided the water user groups are exempted from the requirement that members "belong to the same class or occupation" and should possess "more than 40 decimal of cultivable land" (see article 10 (2) and 10 (3)(d) of the 1987 Rules). This should be certified before any registration efforts are undertaken.

The water user groups in CPP should only apply for legal status when the project staff and the Project Council feel assured that these groups will be the permanent water user organisations and in case it is indeed necessary for the groups to be a legal entity. This would for instance be the case when maintenance functions are transferred to the groups as discussed previously. In the meantime and for pragmatic reasons the present situation will be continued, i.e. water management committees registered with the BWDB.

Relationships with national institutions

Among the government and non government organisations there are 4 types of institutions with a different function with which the water management organisations must define their relationships:

1. The BWDB with the mandate to operate and maintain water management infrastructure, which is responsible for O&M of FCDI projects. The relation with the BWDB will consist of the following elements:
 - operation of the system: tasks and responsibilities and procedures for the actual operation of the system need to be elaborated and formalised in agreements between the CWMC and the BWDB
 - the operation plans as prepared by the WMCs will need to be screened and approved by the BWDB on their technical feasibility
 - maintenance of the system: whereas the ChWMC is fully responsible for the maintenance of the internal chawk infrastructure, for the time being the BWDB will remain responsible for maintenance of the other infrastructure; the SCWMC and the CWMC will be involved in the annual maintenance plan (as incorporated in the ADP) of the sub-compartment and compartment infrastructure; priorities will be indicated for maintenance.

The relationship between the BWDB and the WMCs as laid down in the PPG, will form a framework for the elaboration of the tasks, responsibilities and required procedures

2. Institutions related to the organisation of water user and interest groups, viz. BRDB and NGOs. NGOs will organise the disadvantaged groups and will stimulate their representation in the water management committees at various levels¹⁾. The BRDB and some of the NGOs, which have the capability, will be instrumental in developing the internal organisation of the WMCs.
3. Organisations related to conflict resolution. Emerging conflicts will be handled within the WMCs at the different levels. In case these organisations are not able to solve conflicts satisfactorily, they will be referred to the Local Government in first instance, to the Union Council if the conflict falls within the jurisdiction of the Union and to the Deputy Commissioner, in case the conflict encompasses the union. It will be the task of CPP to elaborate the procedures for conflict resolution and the mandates of the WMCs and the Local Government in this respect which eventually should be incorporated in the Water Management Act.
4. Organisations with an advisory/supporting role concerning water management. The most important organisations are DOA and DOF which will advise on water levels and water and drainage requirements from an agricultural and fisheries point of view.

3.4.8 Development of chawk level water management infrastructure

To date, emphasis has been given to the development of the infrastructure at compartment and sub-compartment level. It is expected that in the process of ChWMC formation many requests will arise for improvements of the water management infrastructure at chawk level. As infrastructural improvements at this level will relate to the direct needs and interests of the chawk water users, it is proposed that priority be given right from the beginning of the formation of ChWMCs. There is a provision for "minor works/unforeseen" under FA. Guidelines have been prepared for the utilisation of the FA funds (April 1996); execution of the 'minor works' will be the responsibility of the SCWMCs. The procedures as outlined in the guidelines will be followed.

¹⁾ This means that representatives of interest groups related to water management would be represented, not NGOs.

3.5 Watermanagement

Compartments in the flood plains of Bangladesh would have the function to reduce floods by temporarily storing runoff waters. In case of the Tangail Compartment the necessity of storing runoff is imposed by outside conditions. It is expected that outside water levels are so high during the monsoon that parts of the Compartment can not drain.

As far as water management is concerned, it needs to be studied what optimal land uses are, under the circumstances. A second subject of study is, whether flooding risks can be reduced on the low lands by improved water measures.

During the first phase of CPP, the Compartment area was sub-divided into sub-compartments, which in turn were split up in chawks. There are 15 sub-compartments in the area, which measures about 13,000 ha. There are about 150 chawks. The sub-compartments and chawks both have a water management function and an institutional function. Improvements in water management will involve local committees, both at chawk and at sub-compartment level.

During the second phase chawks and sub-compartments will be maintained, but it is proposed to adapt the boundaries of the sub-compartments in such a way that each drainage system is fully contained in one sub-compartment. In the past one of the difficulties in water management was, that drainage systems crossed the boundaries of sub-compartments. In managing drainage systems, coordination was sometimes required between two or three sub-compartment committees. The proposed change does away with that complication.

Another change proposed for the Final Phase is that the emphasis shifts from water level control to drainage. During the first phase much attention was given to water level control up to chawk level. That appeared rather complex and not very well manageable. By concentrating on drainage, water management will become easier.

To improve water management, CPP has to establish contacts with the committees. For that purpose Junior Water Management Officers are appointed, who will work under supervision of a Drainage / Water Management Engineer. Their task is to assist the committees in their tasks and on the other hand to identify important water management issues.

There is still insufficient knowledge about the behaviour of water levels around the Compartment during the monsoon. Likewise, the behaviour of the Lohajang river is still unknown. During the first phase of CPP, model calculations were done about flooding and drainage, but the model needs to be adapted to the new requirements. In the first place, it will be simplified. Secondly, the model will be transferred to Tangail office in order to improve the communication about model outputs and the field situation. It is a matter of priority that CPP acquires good understanding of the operation of the Main Regulator.

Parallel with the simplification of the management of the system, gauge readings will be reduced and adapted to Project needs.

3.6 Agriculture

3.6.1 Implications of CPP interventions for agriculture

The implications of improved water management for agricultural production can be subdivided into two broad categories:

1. effects on the seasonal growing conditions in the different land types
2. effects on the options farmers have for using their land and on the productivity of farming

These effects are briefly analyzed on the basis of existing project information, as a point of departure for the agricultural programme.

Effects of improved water management on seasonal growing conditions

Pre-monsoon season (Kharif-I). By the controlled intake and distribution of early flood water it is expected that some pre-irrigation becomes possible, while inundation of low-lying areas can be delayed. Improved drainage should reduce the accumulation of excess water from early rainstorms. This should reduce damage to the standing Boro rice crop and facilitate its harvest as well as preventing damage to young DW Aman seedlings.

Monsoon season (Kharif-II). Better water control should result in an overall decrease in water levels during the Kharif-II season. This is expected to entail a shift in the distribution of land types, based on 'normal flooding depth' in Kharif II, towards less deeply inundated land types¹.

Post-monsoon and rabi seasons. Improved drainage should result in earlier land availability for dry season crops.

Effects on farmers' land use options

If the expected change in land type distribution materialises, this would have a profound effect on farmers' options for cropping. The major effects would be:

1. dry land crops can be planted earlier, allowing a larger area to be planted to winter crops like mustard, wheat, potatoes and increasing the scope for two successive rabi crops (now usually mustard and boro)
2. better drainage should reduce early flooding, resulting in:
 - reduced risk of damage to the standing boro crop
 - more favourable conditions for transplanted and direct seeded Kharif rice
3. lower water levels in the Kharif season should increase the scope for planting high yielding instead of local Aman rice varieties, more productive Aman paddy in replacement of deep water rice and planting deep water Aman in previously deeply inundated land, which was left fallow.

The third effect is the most uncertain and there will be increased risk associated with a change-over in the type of Kharif rice grown. In those areas where decreased flooding depth can be reliably expected, rice production is likely to increase because of a shift to more productive monsoon rice growing practices. This should reduce the reliance on boro rice and opens opportunities for other irrigated rabi crops to replace Boro. Possible crops are maize, sunflower, safflower, summer pulses, (tropical varieties of) tomatoes and even irrigated jute. Alternative irrigated rabi crops would be a real innovation, but their economics and marketing aspects need attention.

¹ It should be noted here that CPP can only be tested on a stand-alone basis. The physical and hydrological situation in a multi-compartment setting is probably substantially different.

Fig -1. Dominant crop calendar by land types and flooding depth.

No	Land types	Flooding depth	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
1	F0-F1	(0.0-0.3)m to (0.3-0.9)m					Sugarcane							
						Boro					T Aman(H/L)			Rabi
			Rabi				Jute					T Aman(H/L)		
2	F1-F2	(0.3-0.9)m to (0.9-1.8)m				Boro					T Aman(H/L)			Rabi
			Rabi				Jute				T Aman(H/L)			
					Boro						T DW Aman			
3	F2-F3	(0.9-1.8)m to (>1.8)m				Boro					T DW Aman			
			Rabi						B DW Aman		T DW Aman			

Rabi crops - Mustard, Potatoes, Pulses, Wheat, Vegetables, etc.

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3.6.2 Objectives of the agricultural programme

The goal of the agricultural programme is to

testing of the agricultural production potential with controlled flooding

In order to attain this goal the following operational objectives are defined:

1. monitoring the actual changes in seasonal growing conditions and in farmers' land use as a result of the project's controlled flooding and drainage interventions
2. exploring, with the farmers, new options for crop production, including new cropping patterns, alternative rabi crops and more productive rice production methods and varieties in the Kharif season.

3.6.3 Activities of the agricultural programme

The activities of the agricultural programme should follow strictly from its goals and objectives. They are grouped into two overall themes:

- monitoring the changes in field conditions and the evolution of farmers' cropping practices and yields resulting from changing water management conditions
- participatory assessment of new options for diversification of crops, cropping practices and cropping patterns.

*Theme I: monitoring field conditions, cropping practices and yields**Rationale*

The project's improved water management is expected to result in changes in farmers' landuse and cropping patterns if they feel confident about these effects. This should lead to increased rice production in the monsoon and increased crop diversification in the dry season. Monitoring of landuse practices will have to take place for a considerable time before significant changes are likely to be observed.

Proposed activities

The following activities will be carried out as part of the monitoring theme:

- monitoring the evolution of land use
- monitoring changes in cropping patterns
- monitoring yields of monsoon rice
- collection of input and output data for economic analysis

The current monitoring tools need revision and should be consolidated to avoid duplication.

CPP-DAE co-operation in monitoring

CPP is a temporary construct, which will cease to exist in the future. It should work as much as possible through existing organisations to ensure sustainability and future continuation of its activities. We therefore propose that monitoring of landuse, cropping patterns and crop yields gradually becomes a joint activity of CPP and DAE.

*Theme II: participatory assessment of new cropping options**Rationale*

Improved water management is expected to open new avenues for farmers to increase the efficiency, variety and profitability of farming. Action research is needed with strong farmer participation to explore novel options in cropping patterns, cropping practices and crop diversification over a sufficiently long period. The remaining life span of the project will not be sufficient and the process will have to continue afterwards.

Since the chawk is the basic water management unit of the project and the Chawk Water Management Committees will have responsibility for water management at the chawk level, the chawk is the logical organisational unit for participatory On-Farm Testing and Demonstration (OFTD). The selection of three pilot chawks with contrasting conditions to initiate the OFTD process are being proposed. Results obtained in the pilot chawks can be demonstrated by DAE in other chawks.

CPP-BARI-DAE co-operation in OFTD

On-farm research in Bangladesh is the task of the Bangladesh Institute of Agricultural Research (BARI) which has considerable experience in participatory on-farm research (OFR). BARI operates a permanent OFR site in Palima, close to the CPP area. In order to ensure long term sustainability of the OFTD work, the project should establish a formal MoU with BARI to jointly conduct OFTD in the pilot chawks.

Proposed activities

The programme carried out in the 3 pilot chawks will extend over the remaining lifetime of the project and beyond. For the 1997/1998 agricultural year the following activities are envisaged in the pilot chawks.

- Establishment of the three pilot OFTD chawks
- PRA of the pilot chawks
- Design and execution of first round of on-farm tests and demonstrations

The on-farm tests and demonstrations will be designed with full farmer participation and will probably address issues such as choice of varieties, shift from Deep Water rice to Aman, diversification of rabi-season cropping, etc. Participatory approaches will be used in all aspects of the work in the pilot chawks. Promising technologies will be extended through DAE.

Some on-going activities will be continued, including demonstration of high yielding rice varieties, using a simplified approach, demonstration of vegetable growing, targeting rural women, and the irrigation survey.

In the coming years the programme in the pilot chawks will develop according to the priorities identified with farmer groups. The emphasis will be on the feasibility of shifting to higher yielding rice growing practices in the monsoon season and on diversification of dry season cropping. Water conditions in the chawks should be monitored and compared with target conditions according to the project's water management guidelines and model predictions. Yield levels and profitability of rabi crops should be monitored and yield gap analyses should be carried out for Boro and T-Aman rice.

3.6.4 Institutional co-operation

Close co-operation will be established with DAE and BARI to facilitate the work of the project and to ensure sustainability and future continuity. The co-operation should be based on clear contractual agreements between CPP and its partners, specifying the services rendered by DAE and BARI and the financial means made available by CPP.

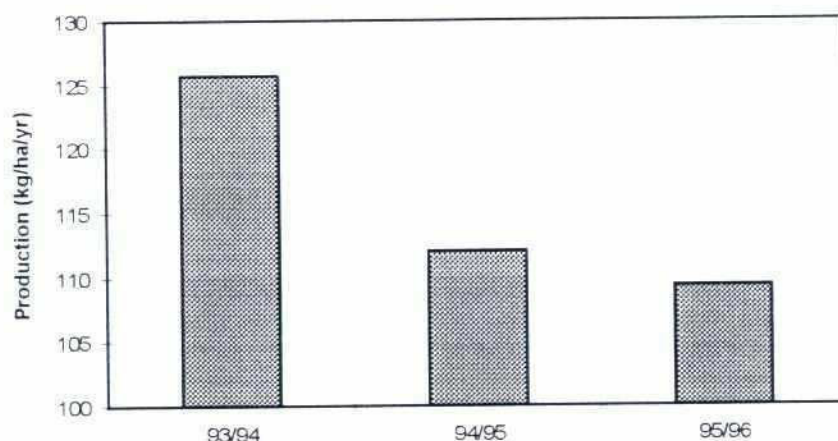
3.7 Fisheries

3.7.1 Objectives

The objective of the fisheries component of CPP is to identify the impact of the water management changes brought about by compartmentalization on fisheries production and to develop and implement mitigation measures, where appropriate.

Impact assessment was started in 1992 through catch assessment, frame surveys and hydrodynamic modelling. Catch assessment and frame surveys provide the fish catch in kg/ha/yr (Figure 3.7.1). Model results (inundation area by depth class) give the opportunity to extrapolate for CPP area for the "with project" and "without project" situations. So far, on the basis of FMM, catch was estimated at 530 T/yr in the 1993 situation (assumed to be without project situation) and predicted as 488 T/yr with project for the same year. The accuracy of the FMM has been put into question so that it has been decided to recalculate the impacts using GIS, with the fish catch data collected continuously from 1992 to date.

Figure 3.7.1: Catch rates of floodplain-beel complex in the CPP area



Recruitment of beel resident fish is important for floodplain production. The project completed a study on reproduction behaviour which, with the findings of the study "beel concept", has been developed to improve understanding of the spawning of the beel resident fish species.

Riverine recruitment is the source of riverine fish in the floodplain. A three year hatchling migration study has been completed and the main regulator has been constructed as "hatchling-friendly". The Lohajang "loop cut" has been proposed which could increase the density of fingerlings in the Lohajang and ultimately the fish production, by reducing the distance from the main river to the main inlet.

Information on 2953 ponds and pagars and socio economic information on the pond owners have also been gathered in a study.

The "beel concept" comprises conservation of beel water during the pre monsoon season to facilitate the beel resident fish species spawning. The idea is to allow the water level of the perennial beels to increase by 1 -1.5 m during the premonsoon season. This could conflict with drainage requirements and the practicability of rising water levels without a negative impact on drainage needs to be individually considered for each beel.

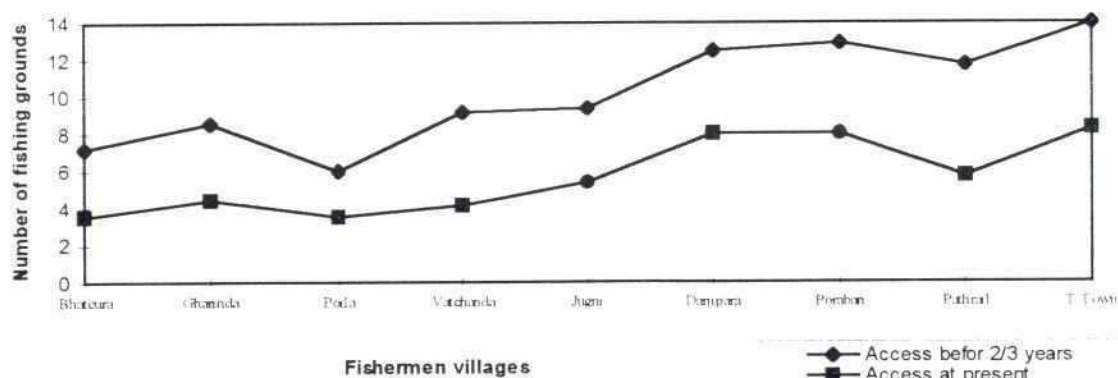
Over-fishing is one of the crucial reasons for capture fisheries decline. The fishing pressure and catchability of the gears in the CPP area will increase further due to the water management interventions. In order to limit the pressure and restore the brood stock for recruitment in the fishery, community based fisheries management is obligatory. CPP will initiate the community based fisheries management in the area through awareness building and try to impose fisheries regulation through peoples participation.

In order to maintain the natural brood stock, the idea of the sanctuary is well understood and reliable support to the natural fisheries production system. CPP will try to establish community managed fish sanctuary in the CPP area.

3.7.2 Mitigation measures

The professional fishing community of the CPP area consider that they will be adversely impacted due to the water management interventions. According to a recently concluded study (SSS, 1997), a total of 261 professional fishermen household were observed within the CPP area. Movements of professional fishermen with fishing boats are seriously hampered because of the water regulators and embankments; also the accessibility to the water bodies are reduced. The water bodies are mostly private property. The owners of the depressed pockets are introducing fish culture and at the same time consider the natural fish of their depression as their property. As a result the fishing community are no longer allowed in to these water bodies. The same study reveals the decreasing trend of the access (Figure 3.7.2). In order to compensate the loss incurred, a compensatory programme has been developed which includes lease of water bodies, skill development training, and facilitating credit lines for the professional fishing community.

Figure 3.7.2: Decreasing trend of fishing right of professional fishermen in CPP area



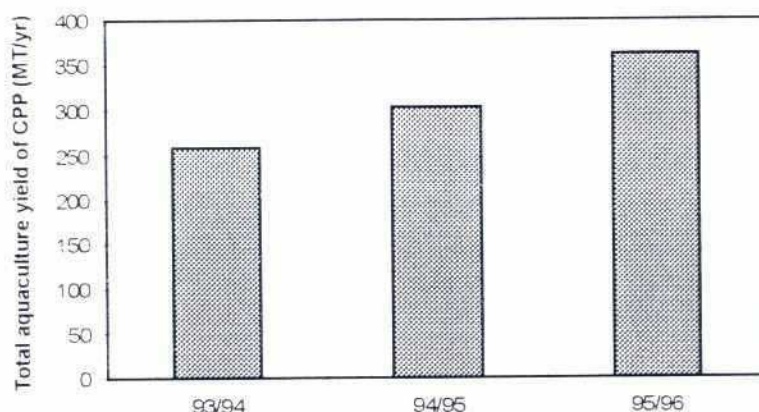
In order to boost aquaculture production in the area, a comprehensive "Aquaculture Extension Programme" (AEP) has been developed and started implementation in 1994 (with the aim of increasing the availability of fish in the area).

To date, a total of 1560 pond owners have been trained, of whom 348 (22%) women. Clusters Ib, II and III have been fully covered. Due to the large number of pond owners in cluster IV, 550 of the 1075 pond owners (according derelict ponds) were selected and invited for training in 1996. 491 pond owners actually participated in the training.

Aquaculture production was monitored in 1994/95 and 1995/96 and compared with the pre-project production level (Tables 5& 6)). Before the AEP started, the average production of the ponds was 1000 kg/ha/crop and 258 MT/year of fish was obtained through aquaculture in the project area. Through the AEP, the production level of the ponds increased considerably to an average of 2200 kg/ha/crop. A total aquaculture production of 362 MT/year has been reached so far, with an incremental production of 104

MT/year. The programme will continue for the total coverage of the area and is estimated to achieve a total production of 440 MT/year.

Figure 3.7.3: Total aquaculture yield of CPP in different years



Monitoring of the fish catch will be continued. Beel water levels of 8 representative perennial beels in 8 sub compartments will be monitored up to 1998. Hatchling concentration will be monitored in the Dhaleswari and Lohajang Rivers after the "loop cut" assuming that this proposal is implemented. Aquaculture monitoring continues and will be completed in 1999, after the completion of the AEP.

In order to check the hatchling friendliness of the main regulator a study on survival rate of the hatchlings upstream and down stream of the structure will be conducted during the monsoon of 1997.

CPP has from its beginning maintained close co-operation with several government and non government organizations in related fields. The fisheries section of CPP maintains liaison with District and Thana fisheries offices, Tangail. The DOF personnel were involved in the formulation of mitigation measures, and implementation of the Aquaculture Extension Project.

To develop sustainable fisheries management in the CPP area, the ongoing programmes of fisheries are to be enhanced. The monitoring of fish catch should be continued until the end of the project. The Aquaculture extension programme will be completed, and a round up programme has been scheduled in 1998/99 to refresh and sustain the technology learned. Monitoring of the AEP will be undertaken along with the round up. In order to strengthen the institutional frame work, close co-operation with DOF, BAFRU, BRAC, FRI, CNRS and other GOs and NGOs will be maintained.

3.8 Environment

3.8.1 Environmental Activities (1st Phase CPP)

The potential environmental effects of the compartmentalization concept were assessed in an *EIA case study* by FAP 16/19 in 1992. Baseline survey data were analysed for two scenarios: future situation 'with project' and 'without project'. It was predicted that compartmentalization will have both beneficial and adverse impacts on a set of important environmental components. Mitigation of some of the negative impacts could be possible, although several residual impacts would remain. A brief outline of an Environmental Management Plan was developed, including impact monitoring and a proposal for institutions (outside CPP) responsible for implementation. This programme proposed by FAP 16/19, however, never materialised within the institutional setting and the financial and organisational capacity of the CPP.

Therefore, CPP started a programme for *Environmental Survey and Initiatives* in mid 1993. It formed the basis for the Environmental Management Plan for CPP which was finalised in mid 1994 (TN 94/11). The EIA-impact prediction matrix for Tangail CPP was refined and adjusted to field verification by the use of new CPP data sets and a monitoring programme was initiated to further examine the real changes relating to important environmental components such as groundwater availability, soil fertility changes, land use changes, wetland status, etc. Some other important impacts were monitored by other CPP sections such as effects on fisheries, navigation and agriculture.

The Environmental Management Plan (EMP) is based on the concepts of sustainable and environmentally sound development outlined by the National Environmental Management Plan (NEMAP 1994) and strategies for water and flood management outlined by the FCPO (1995). The EMP has four main elements: the Environmental Protection Plan, the Environmental Monitoring Plan, Public Participation and the Implementation Framework. The *Environmental Protection Plan* is the key element and covers general guidelines for anticipatory planning to achieve environmentally sound planning and design of water management structures and agricultural development. *Mitigation planning* aims to reduce the adverse impacts, e.g. for fisheries, integrated pest management, and navigation. *Compensation planning* aims to address residual impacts, such as wetland losses and land acquisition for construction purposes. *Contingency planning* aims to further minimise natural hazards or accidental events and the *Resources Management Plan* aims for preservation and enhancement of common resources such as social forestry, embankment plantations, aquaculture developments, and waste management in rural areas. The EMP also proposed *environmental impact monitoring* of soil fertility, groundwater levels, water pollution and support to other CPP sections to monitor fisheries and (agricultural) land use changes. The *compliance monitoring* should ensure that all CPP activities are in line with sector policy guidelines and legal obligations. The implementation of the EMP started in 1994 with surveys, impact monitoring and social forestry.

A preliminary assessment of CPP impacts is not possible, given the short time since implementation of major water management structures and their operation by the people, although some trends regarding the status of natural resources in the project area can be observed:

1. There is a further and accelerated decline in wetland (aquatic) habitats associated with conversion into intensively cropped agricultural land (individual initiatives of farmers).
2. There is an overall diversification of cropping pattern and the cropping intensity (yields per year) is slightly increasing, mainly due to an increase in dry season irrigation.
3. There is a further decline in biodiversity in terms of habitat diversification, migratory (wildlife) fauna and species diversity.
4. There is a sharp decline in habitats favourable for floodplain and beel fisheries, but on the other hand, there is a considerable development of pond and culture fisheries in many areas. CPP is supporting local initiatives in culture based fisheries through a special fisheries programme.
5. There is a decline in drainage congestion in most agricultural lands due to dredging of khals under the CPP. Drainage congestion was the major 'flood concern' identified by local people (EIA case study 1992).
6. Bank erosion and local sand deposition (from major rivers, khals) has almost stopped due to CPP activities. These issues also had been addressed by local people before CPP started.

7. There is some development of homestead plantations and embankment plantations. The potential of improving embankment plantations is not yet fully realised by the CPP, bank erosion protection, fodder and fuel production in 'common resources'.
8. There is still an increased shortage of biomass (fuel) energy, due to increasing restrictions of free access to common goods (common property land) and the steadily increasing demand.
9. Road communication improved due to new construction works under local government and partly due to the rehabilitation of existing embankment roads by CPP, navigation in khals and floodplains (during monsoon season), however, is further hampered by some of the CPP structures and/or new roads constructed by local government.
10. Natural water flow in floodplains is further hampered by embankments and roads constructed by local government or local initiatives (non-CPP activities). In most cases there is a lack of co-ordination and communication between the implementing agencies.
11. Water quality in most khals and many ponds is very poor, especially in Tangail town or other rural settlements; water quality in beels can vary considerably.

However, it is too early to quantify these general observations. Many of these trends may be not directly or indirectly related to the CPP specific activities and it will be the challenging task of the final phase of CPP to differentiate the general trend of development changes from the diverse impacts of CPP.

There are many factors influencing the flooding pattern in the CPP area; CPP water management structures and operation of these structures by local water committees are only two elements in the whole system. Full scale testing of the entire compartmentalization and subsequent analysis is needed to identify the direct impact of CPP, especially regarding the operation of the Lohajang regulator, the main inlet and outlet sluices of subcompartments. Simple operational rules of these structures need to be developed to guide the decision-makers (for gate operations) for optimising water management in their own chawk/subcompartment and without imposing adverse effects on other up- or downstream areas. Given the existing hydrological and topographical data, relevant flood model calculations still need to be further verified under field conditions to compare the following discharge scenarios with and without CPP project: pre-project situation (natural flow vs. flow with existing embankments and no or poor operation of sluices, drainage congestion); flood control (with CPP structures and all CPP gates are closed) vs partial flood control (with CPP structures and operation of in- and outlet gates by water committees).

3.8.2 Environmental Management Plan (CPP-Final Phase)

The 'Reformulation Report' emphasized the continuation of the on-going water management activities and recommended the further assessment of environmental viability, sustainability, and replicability of the CPP approach, including groundwater availability, water quality, soil fertility, and bio-diversity impacts. It also recommended that for the adjacent areas, mitigation measures are to be further formulated in close consultation with all sectors of population. The ToR state the need to ensure that the project specifically addresses any negative impacts through mitigation measures during the project and a provision for the mitigation of failure after the project finishes. These mitigation measures include structural investments inside the outside the compartment, environmental interventions, planning and consultation procedures and the internalisation of externalities.

The updated EMP is focused on the following activities:

- monitoring of soil fertility changes under intensified crop production
- monitoring of the effects of flood protection (compartmentalization approach) on the fertility of soils
- biodiversity monitoring in sensitive habitats, beels and homesteads
- homestead forestry and embankment plantation
- monitoring of agro-chemical use and storage, integrated pest management (IPM) training
- groundwater availability monitoring
- water pollution in groundwater, ponds, khals and some sensitive beels (fisheries)
- disease incidence monitoring (public health issues, related to water related diseases)
- environmental education and training programme, dialogue with local people and the interested public on environmental issues

- support to and collaboration with other CPP sections regarding the monitoring of impacts such as land use changes, agriculture, fisheries, and navigation.
- development of environmental indicators to monitor and evaluate the sustainability of the CPP approach in terms of important environmental components (in close collaboration with the M & E section of the CPP).

The details of the programmes and monitoring activities are shown in the updated EMP (February 1997). The final EIA appraisal is scheduled for mid 2000 with a review of the predictions of environmentally adverse or beneficial impacts as outlined in the EIA case study (1992). Recommendations for holistic environmental management plans for water and flood control projects will be elaborated for the final evaluation in the year 2000, with special emphasis on environmental protection, mitigation and compensation planning.

1. Soil fertility monitoring programme
2. Biodiversity monitoring programme
3. Agro-chemical monitoring programme
4. Integrated pest management (IPM) programme
5. Groundwater availability monitoring programme
6. Homestead forestry programme
7. Embankment plantation programme
8. Water pollution monitoring programme
9. Public health (disease incidence) monitoring programme
10. Environmental education, training and dialogue programme

3.9 Women and Development

3.9.1 Introduction

Nowadays the lives of women in Bangladesh are profoundly affected by the socio-economic changes arising from increased landlessness and poverty. Poverty is increasingly breaking down the traditional family support system and pushing women out of their homes in search of employment directly needed for their survival. In the GoB policy women are considered as partners and as change agents of development. The Fourth Five Year Plan (FFYP: 1990-1995) acknowledges the growing role played by women in agriculture, aims at mainstreaming of women in development increasing women's participation in education, health and family planning, agriculture, industries, trade, services, environment and natural resources sectors.

During Phase I of CPP the Women and Development (W&D) Section has ensured that Women and Development is approached with a positive attitude by project staff and related organisations. In addition to gender awareness creation, the W&D Section has strengthened women's self-confidence by paying attention to women's participation in the water management committees, by organising skill training workshops for women, by creating employment opportunities and literacy development for women groups and by the dissemination of information.

The change from Phase I to Final Phase was a useful moment to learn lessons from the past. For this reason a participatory survey has been executed that has looked into the level of women's participation in the water management committees and into possible effects of project interventions on gender relations and on the position of women. The survey concluded among others that women are less represented in the committees than men and have no participation in structure operation, or say in other committee affairs. This is either because women feel shy to talk among men, or because women are not well informed about the water management system, the role of the committees, their responsibilities, etc. Women expressed their interest in being included in the committees for different reasons: farmer women because they felt directly affected by water control issues, landless women because they considered the committees as an opportunity to have access to jobs, and fishery women because they wanted to defend their interests related to a decrease in fishing opportunities, which is one of the consequences of the project. The survey concluded that women's present status of participation in the committees should be improved, and that new thought should be given as to how much and in which area this participation is to take place.

In the final phase of the project, the W&D Section will continue with the promotion of employment opportunities for women through Embankment Maintenance Groups as well as with the organisation of various mitigation measures for women who risk being negatively affected by the project (fishery women, women in adjacent areas). During this second phase, however, the major focus of the W&D section will be on the active involvement of women in the water management committees, on agricultural trial and demonstration activities, as well as on the monitoring of project effects on gender relations.

3.9.2 Women and Development Objectives

The project's overall Women and Development policy goal is to develop and promote a gender sensitive approach for water resource management takes into account the water-related interests of different categories of women as well as men, promotes women's empowerment and active representation in all decision making levels, and enables women to benefit to the same extent as men. This will be realised through the following specific objectives:

- * to realise the representation of women's interests and their active participation in decision making in project institutions, systems and O&M
- * to develop approaches to improve women farmers' access to and control over agricultural resources, information, skills and benefits
- * to develop mitigation measures with women who will be negatively affected by project activities
- * to develop gender awareness and skills among stakeholders
- * to assess the effects of the project on gender relations and women's socio-cultural, economical, political and physical position.



3.9.3 Approach

Women's interests in water management will be included in the overall project components, activities and institutions. During this second phase of the project more attention will be paid to farming women than to landless women. This is because women of farming households are more directly affected by changes in water management than landless women, and because there are indications that the positive effects as anticipated by the project do not affect women farmers as positively as male farmers. Specific activities with and for women will be organised when it is necessary to overcome constraints to women's participation and to strengthen women's capacities to participate on an equal basis with men.

Women's Participation in Institution Building and Decision making

In the final phase of the project a change is already proposed to take place in women's representation in the committees, to realise a better reflection of women's interests in water management. Women from different categories of farming households (high, medium and low land) should be represented in the committees on such a basis that they will be able to raise their voice and make their interests clear. This will be made more feasible and acceptable through the increased attention that the project will give to women's role in agriculture (see Chapter 3.6). It implies that the number of women in the committees will have to be increased through representation including farmer women of different types of land. It also implies that the level and quality of women's participation will have to be increased. For these reasons it is proposed that the project sets a requirement for a minimum of 35% women to be represented in the committees. Special empowerment of the women committee members is important, for instance through training in additional knowledge and skills (e.g. principles of water management, conflict management, self-confidence, techniques of presentation, of management of meetings, etc) and through special meetings with and networking among female committee members.

Women and Agriculture

During Phase I, CPP has primarily worked with landless women and male farmers. Male farmers have been involved in the committees and have also been targeted through agricultural extension, demonstrations, pest control, etcetera, whereas female farmers hardly played a role in the project. As is shown in the appraisal of the Water Management Organisations, crop patterns have changed in many farming households. Instead of one single crop it has in some areas become possible to grow two to three crops of high yielding variety of paddy annually. Mustard and other Rabi crops are also being grown now. This was not possible before the start of the project. The WMO appraisal report also states that the increased production has resulted in an increased workload for both men and women farmers. It is not clear to what extent the changes in workload have resulted in equal benefits for both male and female farmers. Men continue to be the main decision makers on the income derived from agriculture.

Existing studies into the role of female farmers in Bangladesh, as well as field visits in the Tangail project area, show that women participate in agriculture either as agricultural labourer, as members of a male headed farming household, or as independent farmers. This last group is composed of either women who are heading a household on their own (female headed households), or of women whose husband is employed elsewhere (female managed households). The involvement in agriculture of these different categories of female farmers is different, in particular with respect to land ownership and decision making.

In the framework of the CPP agricultural programme, on farm testing and demonstration (OFTD) activities will be implemented with farmers in the three pilot areas i.e. 3F, 28 C and 19E. For this purpose, CPP will closely collaborate with BARI and DAE and field teams will be stationed in the pilot chawks composed of a CPP extension overseer and the DAE Block Supervisor of the chawk. PRA activities will be executed with a view to better understand farmers life and needs, and new crop varieties and technologies will be tested and monitored.

During discussions in the field women made it become clear that they wanted to participate in the trial and demonstration activities and that they wanted to be selected as trial and demonstration farmers. They stated that the extension activities should sometimes be organised in mixed groups in which women participate together with men, but other times women would prefer to work in special groups with women only. It will thus be an important challenge of the project, the agricultural and the W&D Sections to develop strategies to involve women optimally in the trial and demonstration activities.

The active involvement of women in the on farm trial and demonstration programme should among others result in

- equality in the number of female and male trial and demonstration farmers
- women farmers adopting new crops, techniques and technologies
- women farmers groups who are trained in new technologies and are able to disseminate the information and skills
- a better insight into the needs and potentialities of different categories of female farmers
- experience with various approaches on how to involve women in agricultural change as a result of compartmentalization.

To achieve the above results the W&D section will assist the OFTD programme with the following activities:

- * Gender capacity building
- * The integration of W&D issues in the PRA activities which are foreseen in the programme in order to make sure that a better insight will be obtained into the actual roles and responsibilities of female and male members of farming households, their access to and control over resources, organisational capacity and decision making power
- * Introduction of new technologies: Among the options in new technologies that will be presented to the male and female farmers, special attention will be paid to answer specific needs of female farmers
- * Trial and demonstration farmers (m/f) will be identified and trained, and depending of the subject of interest, female, male and mixed farmer research groups will be created with a view to optimise the access to and spread of information among women
- * Monitoring of effects on gender relations: During the on farm trials male and female members of farm households will be requested and trained to monitor wanted and unwanted effects on gender relations in the household, with emphasis on workload, control over (new) resources, productivity, decision making

The establishment of the senior OFTD supervisory team as proposed by the agricultural section will include the W&D consultant and the sociologist. The field team that is established for each of the three pilot chawks (composed of one CPP extension overseer and one DAE block supervisor) will be strengthened by a female extension or field worker who is experienced in agriculture/livestock development, but also in issues related to the organisation, training and empowerment of women. These three female field workers (who will also have to be based in the field) will be recruited by CPP from the labour market. At chawk level the W&D Section project should identify strong women from the villages who are willing and capable to operate as local extension auxiliaries.

3.9.4 Monitoring of effects on gender relations

The W&D has a specific tasks to monitor the effects of project interventions on gender relations in the project area. This should be done in direct relation to the above planned W&D activities. Target locations for the monitoring on project effects on gender relations are the three pilot chawks selected in the framework of the CPP agricultural programme. The overall M&E activities executed by CPP could serve as control data. Target groups of the monitoring exercise are farming households of whom the female farmers participate in the OFTD Programme, fishery households that participate in mitigation measures and households of landless women involved in EMGs.

Some of the major determinants of gender relations, such as the gender division of labour, control over resources, and changes in knowledge and skills will be monitored and worked out in monitoring sheets and/or be monitored in a qualitative way. Before the start of these monitoring activities, the W&D Section will obtain a good insight in gender relations in the local context and undertake an inventory and analysis of existing data on the three chawks, and collect additional data if needed. The sociologist, member of the Project Team, will be in charge of the monitoring component. She will be assisted by the W&D consultant and W&D assistants.

Supporting Measures

In order to optimise the effects of the work of the W&D Section a number of supporting measures and activities will be undertaken, of which the most important are:

- regular gender training for project staff, GO's, NGO's, committee and selected community members
- eliminate gender biases out of extension, information and training materials

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- development of videos, folders, etc 1) to promote CPP among women and women's organisations and 2) to promote Women and Development experience in CPP among other organisations and projects
- representation in Project Information Center

3.10 Information dissemination

3.10.1 General background

A precondition for asking people to participate in project activities, is their access to adequate information on the related subjects. CPP, since its inception, has consulted the PAPs in different ways. Being a new project in concept and process approaches, it is an imperative to let everyone have his or her say. Criticism continues locally, nationally and internationally on FAP in general and CPP in particular. But it is observed that much of the criticism results from inadequate information and ignorance. To address this need for correct information, the project, in 1995, has restructured the total information dissemination mechanism. An Information Dissemination Center has been opened Tangail in 1994. Regular discussion sessions with journalists have been arranged. These efforts have created an atmosphere of positive understandings of successes, failures and limitations. These pioneering efforts of the project have resulted in a recommendation "to create a public documentation and information centre for water sector planning at WARPO and on information dissemination centre at BWDB project sites" in the Joint Statement of Government of Bangladesh and its Development Partners on the Bangladesh Water and Flood Management Strategy signed on December 04, 1995. It should also be stated here that thematic groups will be formed who will discuss certain topics with various GoB/NGO. These thematic group can be organized around certain themes with presentations for a relevant project audience (see also Chapter 5.1).

D.G. WARPO supported the idea of setting up a national Information Dissemination Centre in Dhaka, which should not limit itself to FAP 20, but would receive support and information from the project as appropriate. Exact modalities were not finalised, but the principle was established.

According to the ToR (Final Phase).

"The project must work closely with national institutions and develop a range of materials and dissemination media to ensure that the lessons learnt will directly feed into policy and planning approaches to water resources management. The last period of the project should be used to ensure that complete appraisal of the viability of the approach is made and that appraisal methodologies are institutionalized within the GoB.

3.10.2 Information Dissemination Center at Tangail

The information dissemination mechanism consists of two elements.

1) Resident Unit.

The project information center is located in the heart of Tangail town close to the public library and Municipality. The center is staffed with an Information Officer and two associates. The center provides the following information and services:

- General information on project concept, planning procedures and implementation schedules.
- Technical aspects including hydrological modelling and detailed structural works.
- Different sector issues like agriculture, fisheries, environment etc.
- Institutional settings at the Compartment, Sub-compartment and Chawk level.
- Several other social issues, in particular related to women in development.
- Important issues and information on the project interventions in Bangla and in English.
- Documentary films on CPP in general and other topics are shown regularly.

Since the opening, approx. 3-4000 visitors are using IDC's facilities; yearly Pprofessionals, scholars, journalists, policy makers, students, businessmen, NGO executives, GoB officials, house wives, farmers, teachers and others from students were the largest group visiting the IDC.

2) Mobile Unit

Information campaigns are organized from time to time at village level using a mobile van through display boards, print material distribution and video shows.

Mobile van : In order to bring information of the project at the doorstep of the rural people, a show using a mobile van is arranged frequently. About 5100 people attended thirty mobile van shows arranged at different places.

Various media-formats have been used to special audiences:

In-house programmes, video-shows, footage for Bangladesh TV and International TV.

Staffs at (inter)national workshops and conferences, briefing sessions with local and national journalists, etc.

Meet the Press

The project is giving attention to this effort of 'Meet the Press'. Regular briefing sessions with individual or group of journalists are taking place. Journalists are also taking active interest in project activities and are attending field level functions.

Press coverage

The project has been focussed many ways by local and national dailies, weeklies covering wide spread of subjects.

The Press Speaks : Compilation of the Press Coverage

All the available press coverages on CPP has been compiled and consolidated in a Technical Note (TN 95/05). This note, when released, became instantly popular and additional prints were made. Subsequently, another version with english translations of Bangla news stories was released.

Technical notes & working papers

The output of the project includes a series of reports, guidelines and manuals (CPP, ToR page 6). In Technical Notes and Working Papers, survey results, findings, proposals etc. are presented. Publications prepared by the project since inception are included in the "List of Publications" which is updated regularly.

3.10.3 New Avenues for information sharing

In view of the preceding information presented and the experiences obtained so far, it seems that there are still opportunities which have not been explored in order to disseminate transparent information on a regular-basis to various audiences. Through the establishment of the (resident and mobile part) of the Information Dissemination Center CPP, a wide variety of audiences has been covered already.

Bringing this idea even more advanced, discussion have been held at WARPO and the implementing agency BWDB. The potential usage of BWDB facilitate (Department of Public Relation), the upcoming development of a national water master plan and the subsequent restructuring of WARPO itself into an apex organization, all transpire the need for an effective information mechanism.

Although substantial improvements have been made in this respect, comparing the situation with pre-Information Dissemination Center time, it is necessary to embark on new ways to bring the message across. It is therefore proposed to perform a new study which will be composed of two parts

1. The information mechanism from a project point of view and how it will feed into the national system, and
2. The international scene, how to cover that, seen from a local (i.e. Bangladesh) context.



3.11 Mitigation measures

Mitigation measures are direct concern of adverse impacts of project activities. The CPP is predicted to have four major kinds of adverse impacts. These are loss of water based transportation, increased agrochemical use and pesticide contamination, reduced open water fisheries production, and loss of seasonal wetland area and its habitats. A few other negative impacts may likely to occur in the field of ground water quality and quantity, soil fertility and sedimentation, biological species diversity, vector borne disease incidences, etc., but these assumptions are subject to verification from impact monitoring results. The adverse impact predictions of the CPP are such that, the project will i) reduce passenger trips and goods transportation along the navigational routes from 292000/year to 260000/year, and 900 ton/year to 850 ton/year, respectively, ii) substantially increase the use of fertilizer and pesticides from the present amount of 4800 ton/year and 11700 kg/year, respectively based on, iii) reduce capture fisheries production from 530 ton/year to 488 ton/year, and iv) cause a loss of 1148 hectares and 3131 hectares aquatic area during monsoon and post-monsoon period, respectively. A mitigation plan was developed as part of the Environmental Management Plan of the first phase of the project. This included i) construction of a boat mooring place at Ramdevpur and 2.7 km long road with accessibility to Tangail town to facilitate passenger and goods transportation ii) training of farmers on integrated pest management practices to mitigate the increased use of agro-chemical pesticides iii) facilitation of natural hatchling migration by allowing free flow through all sections of the river bed iv) motivation and training of wetland sensitive area people on community wetland conservation programme. Implementation of the first two mitigation measures have been completed while the other two are to be covered during the final phase of the project.

In order to ensure adequate measures the following mitigation steps are proposed to undertake during the final phase.

- * Continuation of the IPM training programme with a target of i) establishing 2-3 new IPM schools every year as well as, in total some 10 new schools in areas of ecologically sensitive beels and other waterbodies with significant fish production in SCs 1-2, 4-7 and 13-16 ii) conducting annual refresher courses for all the previously trained 210 farmers and iii) establishing two demonstration sites for more intensified and on-farm training.
- * Implementation of natural hatchling migration mitigation plan through removal of sand rim/bar from the mouth of Lohajang river and gate operations as detailed up in the first phase EMP.
- * Special measures for sustaining the livelihood of professional fishermen by i) arranging permanent lease of all khas water bodies and providing credit facilities as well as technical training to professional groups, ii) developing skill through training for other means of livelihood like, gear making, weaving, animal rearing, vocational works, adult education etc. for the dependent members of the professional fishermen community
- * Implementation of environmental awareness and education programme through social gathering, meeting, video display, etc., in order to promote the community wetland management ideas among local people at two selected wetland sites (i.e. Boro Beel in SC10 and Atia Kumari Beel in SC 14).
- * Special measures for women for i) flood preparedness training in the adjacent areas, ii) promoting their participation and benefit in the fishing community training programme, and iii) monitoring of effects on gender relations in three pilots Chawks selected under agricultural programme.

CHAPTER 4: MEASUREMENT OF ACHIEVEMENT

4.1 Introduction

The overall scope of M&E is to monitor and evaluation the changes inside the compartment boundaries and in the adjacent areas compared with the pre-project situation. This will, in turn provide a management tool to guide the project management to make necessary adjustments for reaching the overall objective of the project. M&E is to assess whether project results were achieved in available, sustainable and replicable way. According to the Reformulation Mission, M&E in this pilot project has the following three objectives: (pg 26, ref...):

- First, it attentively keeps track and interprets performance of the established physical and organisational structures to develop and implement remedial measures to mitigate the impact of the project or improve its performance;
- Then, M&E supports the overall assessment of viability of the compartmentalization concept; and
- Finally, it contributes to the further improvement of the planning mechanisms in the water resources sector, providing feedback for future developments. This implies close interaction with national activities in this field and in particular with the establishment of a new WARPO.

The ToR (Final Phase) addresses this issue as (see also vol 2, annex 2). "The Effectiveness of the project as a pilot will depend on the improvement of the monitoring and evaluation of the project, both technically and with the integration of a broad range of concerned parties in the review of the project's implementation. This includes the establishment of an M&E capacity beyond the project period" (see also Chapter 5 and 6). CPP is to focus on three issues: notably viability, sustainability and replicability.

Viability of the compartmentalization approach

In the first place, CPP has to make clear whether the compartmentalization approach, as it has been implemented in Tangail, is technically, economically, socially and environmentally acceptable. This means an answer to the question whether technical components of the project perform properly. It also implies the achievement of a number of economic and financial target values, this is that as result of the project the population as a whole is better off. Moreover, CPP's activities should not lead to a degradation of social structures, they should instead lead to a more even distribution of power and wealth, if the concept is really socially justifiable. Finally, the project should not impact negatively on the environment, unless measures are taken to mitigate against negative environmental effects.

Viability indicators:

- Data on flood damage reduction as compared with the non-intervention situation which prove that the concept is attractive from the economic point of view;
- Economic indicators such as IRR, NPV and B/C ratio, which equal or exceed commonly accepted viability levels;
- Understanding of the perception of the population of their social position; and
- Data on positive environmental impacts and possible degradation, and on mitigation measures that clearly indicate a bettering of environmental conditions.

Sustainability of the approach

Sustainability comprises the ability of the compartmentalization concept to work and continue without outside help. This means that once CPP's activities terminate, the compartment should be able to stand on its own feet with the constructed hydraulic infrastructure, created institutions for water management, and achieved improvements in its social-economy. Sustainability, not only implies that the compartment is able to "muddle through" after the project terminates, it means equally that it can handle emergency situations, do the necessary repairs, etc.

Sustainability indicators

- Stability of the institutional base for the O&M of water management infrastructure;
- Effectiveness of guidelines and rules for water management;
- Co-operation between water users and water management implementators, which is reflected in part by the number of complaints water users lodge about water management; and
- Effective arrangements for O&M of hydraulic infrastructures, including adequate financial provisions

Replicability of the compartmentalization approach

Replicability reflects the way in which the specific CPP situation, once it proves viable and sustainable, could be replicated elsewhere in Bangladesh. The important question is whether Tangail's boundary conditions (those elements which cannot be changed by man), notably topography, climate, soils, and the specific flood regime of the Jamuna, influenced the choice of solutions for the CPP's compartmentalization in such a manner that the project is in fact unique and not replicable. This would mean that the specific combination of topography, climate, soils, flood regime, and remoteness (distance to the metropolis of e.g. Dhaka) is hardly found elsewhere in Bangladesh. Or could it be that the boundary conditions in fact only served as parameters for design and implementation, while the principles used and advantages gained are reproducible elsewhere? Then it would mean that replication is possible.

Replicability indicators

When trying to evaluate the replicability of compartmentalization approaches, the likely indicators are:

- A compartmentalization approach which is first and foremost effective in the particular context of Tangail, but whose:
- Boundary conditions are not unique in the Bangladeshi context;
- National policies and guidelines that promote compartmentalization;
- Acceptance of the approach by government organisations active in water resource development and management; and
- A judicial and administrative structure to legalise the institutional set-up and collection of water charges.

4.2 Description of CPP's setting

Why the Tangail compartment was chosen

The reason for selecting the Tangail area to implement the compartmentalization concept was two-fold:

- The existence of a protected area where embankments were made by local people; and
- The physical location of the Tangail area in the Jamuna floodplain, which would make the application of this concept possible.

Moreover, the availability of data on flood conditions and agriculture in the compartment also played a role. However, little information existed on the social conditions in the area, nor was there information on a number of key elements like transport conditions, economic, institutions, and the position of women. Through the base line survey executed during the first phase of the project, it has been attempted to correct this situation.

The importance of Tangail's specific conditions

In monitoring the achievements in the Tangail compartment, stock should also be taken of specific "outside" conditions such as topography, climate, soils, etc. These conditions could have a determining influence on the achievements of CPP, although this may as well not be the case. So when considering indicators for the viability, sustainability and replicability of the concept, they should be held against the "mirror" of the Tangail compartment's boundary conditions.

4.3 Monitoring and Evaluation during CPP's First Phase

A special unit was made responsible for the monitoring and evaluation of activities of the technical sections engaged in the project during the First Phase. During this phase, the basis for monitoring was established with a baseline survey, and a household survey. Somewhat later CPP identified a comprehensive list of indicators which was, however, not actively used for M&E. The majority of the sections in CPP continued to execute their own monitoring programme, without much linkage to the M&E activities. Details of the sectoral monitoring activities are listed here:

- Agriculture, where monitoring activities concentrated on agricultural practices in 250 plots from 4 clusters covering an area of approximately 40 ha, covering the 1994 and 1995 crop seasons. For the demonstration of T.Aman (HYV), the Agricultural Section has selected, together with DAE, 30 demonstration plots from clusters Ib, II, III and IV for testing water management.
- Fishery monitoring concentrated on the perception that water management resulted in a reduction of the seize of water bodies i.e. rivers, beels, etc. and that as a result the number of fishermen declined. To capture this aspect, CPP conducted special fishery studies over the period from April 1992 to April 1994, which also served as baseline data for further monitoring and research activities. Moreover, the Fishery Section executed a catch assessment and fishing effort survey from April 1992 to December 1995. Also, there was an inventory of ponds, starting in 1991 and completed in March 1996. Finally, hatchling samples from 1992 to 1996 are stored in the project laboratory.
- In institutional development activities took place, but were not monitored formally. However, the results achieved during the first phase provided already some sort of indicator. By September 1996, the population, with the backing of CPP, created 100 Chawk Committees (CC), and 15 Sub-Compartmental Water Management Committee (SCWMC). In the Project Council (PC) or Compartmental Water Management Committee (CWMC) headed by the Deputy Commissioner, 72 members were selected with provisions of another six members for co-operation.
- In the field of environment a number of monitoring programmes started during phase one of CPP. CPP executed a comprehensive Environmental Impact Assessment (EIA) in 1992. A social forestry programme, being a part of Resources Management Plan started with the objective of preserving and enhancing floral species in the project area. Moreover, Integrated Pest Management (IPM) training began in April 1994 for farmers, and concentrated on biological pest control methods in order to mitigate the adverse effects of pesticides in the crop fields. From the 13 DPHE tubewells, 9 BADC DTW, 4 BWDB observation wells records on the static ground water table are collected on yearly, monthly and weekly basis. Then, the Environmental Section prepared a work plan for investigation of the soil fertility status at 27 selected plots, from both inside and outside the project. An Environmental Laboratory was finally set-up in March 1995.
- In CPP, involvement of women is felt necessary with a view to create self-reliance among women, creation of employment opportunities, increase of income generation activities for them. During the First Phase, 1,164 women attended meetings/workshops like women training programme for farm families (49), manure making by water hyacinth (34), formation of LCS (596), formation of EMG (67), net working for women (32), orientation meeting (144), follow up workshops (32), International Women Day (50) and training on fishing (192). Besides, 909 women attended meetings on creation of employment opportunities and income generating activities.

Little can be concluded as too much remains unfinished

CPP is a Pilot Project and both structural and non-structural measures are yet to be accomplished in full. At this stage, it will be inappropriate to make any judgement on its performance and ability to achieve its objectives. But it would be noteworthy to remark that CPP faced tremendous opposition from local, national and international circles. At the moment, target groups of the project are enthusiastic to co-operate with the project activities. A wide range of activities has been put in hand. A focus on impact measurement is now required, which makes formulation and monitoring of appropriate indicators a high priority. If project

evaluation demonstrates its viability, sustainability and replicability, it can be used as a model for other areas in the floodplain.

4.4 Baseline Data

The concern for measuring CPP's results

Assessing the viability, sustainability and replicability of the compartmentalization approach should include as to whether the adoption of the approach has led to an increase in agricultural income, has reduced flood damage, has enhanced the co-operation among water user groups, etc. The success of compartmentalization will only be proved if it is pegged against the situation as it existed in the compartment before CPP started its activities. This underlines the importance of base line data, which should be extracted from the baseline and household surveys carried out early in the First Phase of the project.

Recollecting the past proves sometimes difficult

In some instances base line information is difficult to assess. In particular where it concerns fisheries, there is little or no information available from the pre-project period, mainly because CPP's Fishery Section has no equivalent at the Thana level. The establishment of the Fishery Section, meant that for the first time some development actions took place in the compartment. To a lesser extent this also applies to the institutions and the women's development activities of CPP. Before the project started little or no activity took place, and hence little information is available about the situation in those days.

4.5 Analytical model for M&E

Choosing an analytical model

The choice of an analytical model for constructing an effective M&E system is a critical one. While multi-criteria analysis (MCA) is a very suitable tool for presenting the M&E results, it lacks transparency as to why certain indicators have been selected and others not, it does not provide insight in the relationship between activities and results, and it does not take note of project assumption, risks and conditions. As such, it is very suitable in presenting performance indicators for the compartmentalization concept, but it becomes less suitable when an evaluation is also needed of actions vis-à-vis results, or when one tries to review the impact of assumptions, risk and conditions. Logical frameworks could provide this type of integrated reflection on project objectives and activities, although they also have limitations.

Preference for a logical framework

A suitable model for constructing M&E indicators is based on the so called Objective Oriented Project Planning method initially developed by GTZ (German Development Corporation), and made the cornerstone for formulation, monitoring and evaluation of projects by the Directorate General of Co-operation of the European Commission¹. With an integrated analysis, called a logical framework, one brings into perspective the objectives, purpose, results and activities of the project in a schematic way. A logical framework provides in a nutshell the project, and it relates (integrates) objectives to activities. As an example Figure provides a simplified logical framework for CPP.

¹ For detailed information on the method reference is made to the Manual on Project Cycle Management (Integrated approach and logical framework) which was published in 1993 by the European Commission.

Figure 4.5.1: Simple Logical Framework for CPP activities

INTERVENTION LOGIC	OBJECTIVELY VERIFIABLE INDICATORS	SOURCES OF VERIFICATION	ASSUMPTIONS, CONDITIONS AND RISKS
<i>Overall Objective</i>	<i>Indicators</i>	<i>Sources</i>	<i>Assumptions, etc.</i>
To enhance economic production, improve environmental security, and reduce poverty in the floodplains of Bangladesh	Indicators like GDP/capita, cropped area, literacy rate, etc	National statistical publications (BBS)	Agreement between the GOB and donors to fulfill this plight
<i>CPP Purpose</i>	<i>Indicators</i>	<i>Sources</i>	<i>Assumptions, etc.</i>
To define appropriate water management methods for the development of protected areas, which can be replicated in Bangladesh	Global indicators that provide a means of verifying the purpose	Often evaluation reports provide insight	Agreement between the GOB, GON and GOG
<i>Specific Results</i>	<i>Indicators</i>	<i>Sources</i>	<i>Assumptions, etc.</i>
(1) Viable, sustainable and replicable compartmentalisation approaches	Technical, economic (IRR, NPV, B/C), social and environmental feasibility;	Project M&E publications; multi-criteria analysis	Acceptance by the GOB and the GON of the TAPP;
(2) Integrated water resource management options for different sections of the rural population	institutional structure for cost recovery, water management (guidelines and rules) and institutional base (nos. of complaints about SWMC and CWMC)		Acceptance by local population
(3) Policies and guidelines for the development of integrated water resource management			
<i>Project Activities</i>	<i>Means</i>	<i>Cost</i>	<i>Assumptions, etc.</i>
(1) Construction	(1) Technical assistance	Contributions:	Agreement between involved parties on
(2) Water management	(2) Programmes	Bangladesh: Tk	TAPP;
(3) Institutional development	(3) Equipment	248.64 M	Availability of funds
(4) Agricultural development	(4) Surveys	TA Netherlands:	
(5) WID	(5) Construction	Hfl 15.21 M	
(6) Fishery and aqua-culture	(6) O&M cost	FA Germany: DM	
(7) Environmental protection		13.50 M	
(8) Support: GIS, Economics, M&E			
<i>Pre-condition:</i>			GOB provides the juridical and administrative structure for improved water management

Sequencing

The implementation of the project's activities depends fully on the pre-condition that the GOB should provide the judicial and administrative structure¹. Then a logical link could be established between CPP's activities and its assumption, risk and conditions (bottom part of the framework), to the achievement of the CPP's results. In the next step there should be a logical relationship between the results, and their assumptions, risk and conditions on the one hand, and the project purpose on the other hand. Finally, the combination of project purpose and assumptions, risk and conditions, should make the relation to the overall objective transparent.

¹ The M&E Section takes the point of view that this is a pre-condition. At the completion of CPP it may happen that this pre-condition could not be fulfilled, and consequently it will be up to the project to define which minimal conditions would be necessary to make the compartmentalisation approach anyhow successful.

A logical framework is the traditional tool for M&E

A logical framework is more than a presentation form for projects, it also provides ways of checking the achievement of objectives, purpose and results and gives an overview of the inputs that will be required. However, the main criticism in using logical frameworks for M&E, rests on the fact that they are geared towards providing information on physical and financial progress, whose value is limited for impact monitoring. And as such, it is believed that the effects of the project's activities and the resulting impacts should be brought to the foreground by making some alterations to the framework.

The modified M&E logical framework

It is proposed to amend the logical framework from Figure 1, so that it reflects better what effects and impacts project activities should have. In the columns next to the objectives, purpose and results, each logical frame provides monitoring indicators and sources for verification. It should be remembered, that the classical framework lacks these indicators when it comes to activities, because it assumes that the provisions of means and money would be enough as monitoring indicators (see annex 1G).

Verification will not be a CPP task

The achievement of this objective fits within an overall development strategy for Bangladesh, where CPP is only one of the activities. Monitoring of the achievement of this overall objective cannot be considered a task of CPP alone; it is more a task of national planning organisations involved in development.

What is required to fulfil this overall objective

The overall assumption that defines the potential for reaching this objective is that the Government of Bangladesh and those of all countries that have pledged money for the Flood Action Plan, have some degree of mutual agreement on how to stimulate economic production, reduce poverty and achieve a sustainable development for the population living in protected areas in Bangladesh. Without such a consensus it seems hard to see how such an overall objective could be achieved. Consequently, it is clear that monitoring the achievement of this objective falls outside the scope of CPP.

Boundary conditions which the indicators should "mirror"

The prevailing physical, climatic and social economic environment in which the project takes place, defines by and large what is possible, and to what extent it could be replicated. Investment cost per ha for instance is an indicator whose value is largely influenced by these boundaries conditions, as is operation and maintenance of structures. Factors that may be important in valuing the indicators include the given hydrology (type, discharge), topography (slopes, natural drainage system), soil quality (potential cropping intensities and yields), population densities, distribution and number of urban agglomerations, water borne activities (transport), and limiting factors such as wetlands.

4.6 Defining CPP's Indicators

From project activities to indicators

The activity part of the logical framework gives a list of all the activities to be executed by CPP in the current phase of the project, with their direct effects and expected impacts. All these project activities relate to the work of technical sections of the project, and hence it provides a base to identify for each section a number of project activities, together with outcomes to be realised, direct effects, and impacts to be expected. At this first stage of the M&E process, there will be no critical evaluation of project activities, as it is assumed that the formulation mission has performed its task. At a later date it may be necessary to bring changes to project activities, if and when monitoring proves that certain activities are sub-optimal.

Data from secondary sources

Indicators that fall outside the influence of project activities will have to be provided from secondary sources, e.g. statistics on market prices for inputs and production (agriculture, fishery, livestock). Information which is available at the Thana level and at the DAE should be collected and compared with the indicators collected by CPP. Where possible, data on the adjacent areas of the compartment should also be assembled.

Flood damage

Although the Agricultural Section of the project would follow what happens in case of flood damage to crops, accepted and official data should also be collected. Base statistics on flood damage are necessary for the technical and economic analysis of the compartmentalization approach (see also Annex 1H). Information which is available at the Thana level and at the DAE should be collected and compared with the indicators collected by CPP's Agricultural Section. Where possible, data on the areas adjacent to the compartmentment should also be assembled.

Situation in adjacent areas

The effect of the compartmentalization approach on the adjacent areas needs to be assessed in order to evaluate the impacts of the concept. It is likely that there will be a negative impact on flood conditions in these areas and hence on crop losses, damage to public and private property, cropping patterns and intensities.

The pre-project yardstick

It should be remembered that all indicators the project defined and will define have to be held against a pre-project yardstick. It is stressed that data on the pre-project situation should be as realistic as possible and be an average of "good" and "bad" years. It is considered that the year (see Annex 1G) 1992 would represent a suitable reference for the pre-project situation. Part of the collection work of indicators concerns grouping of comparable pre-project indicators. It should be noted that most pre-project data from within the project area are not be very representative for a compartmentalization concept, because the main peripheral embankment existed already for more than two decades. An attempt is also being made to measure some parameters outside the project boundary, so as to partly reflect the "without-project" situation. The main source of information would be provided by existing statistical publications, project documents and supplementary information collected at the Thana and DAE levels.

Ex-post household survey

At the start of the first project phase a household survey was commissioned to an external agency. Data of this survey are available, but have not been very accessible for project staff. An attempt will be made to evaluate the validity of these data and to enter them in a data base for use by the technical sections of CPP. Moreover, emphasis needs to be placed on an ex-post household survey, after termination of the project. Such a survey could provide a very good insight in the perception of the population of what CPP has achieved.

Table 4.6.1 provides an overview of all the different indicators and data expected to be collected as part of the CPP's M&E activities. For each of the indicators and data sources the rationale for its inclusion in the M&E activities is provided, so that the table needs no further explanation.

Table 4.6.1: Preliminary list of CPP indicators and data collection activities and their respective rationale

No.	Section: Indicators	Rationale
	<u>Engineering</u>	
1	General Information on Expenditures made by CPP on support services e.g. Training, consultancy etc.	Besides, the project related cost, there are likely local and national institutional costs like Project Director/Executive Engineer's Office for a workable administrative setup.
2	Investment and O&M cost per ha for structures, embankments, excavation, etc. with and without mitigation measures and making a differentiation as to how much unskilled labour has been used.	Cost of structures such as regulators, sluice gates, embankments, excavation of drainage systems. O&M including mitigation cost is required to alleviate negative effects.
3	Document with water management guidelines and rules for each relevant structure in SC.	Without guidelines and rules it is impossible to arrive at a viable & sustainable compartmentalization approach.
4	Record of gauge readings for key water management structure.	Gauge reading will provide insight in the effectiveness of guidelines & rules framed.
	Sedimentation Measurement of waterways	Compartmentalization will reduce sedimentation by creating stable hydrological settings.
	<u>Institutions</u>	
5	Number of existing WUG, SCWMC & SCWMC/PC, their involvement in O&M, their objectives. Composition (Number of members, who do they represent), nos. of office bearers who they are.	Institutional structures for implementing water management guidelines & rules will facilitate sustainability of compartmentalization approach.
6	Elements for an appraisal of decision making within WMC: <ul style="list-style-type: none"> • internal regulators SW/PC: structure, lines of command, meeting schedule • information flows between committees and CPP/BWDB • physical and non-physical tools (office accommodation, transport). 	The effectiveness of water management committees depends for a large part on their ability to make the right decision. This largely depends on the parameters mentioned in the indicator.
7	Records of complaints about water management by SCWMC & PC.	To obtain written as well as verbal complaints without any threat will give a good indication of effectiveness of water management rules & guidelines.
	<u>Agriculture</u>	
8	Cropping Pattern Survey per SC.	To follow what effect compartmentalization has in reality on crops, variety, land use etc. Any changes in cropping pattern are likely to be linked to the fact that water regimes have changed.
9	Cropping pattern monitoring plots & monitoring program of farming systems for input use & yields.	Collection of farm economic data on agricultural income & value added will reflect economic impacts of compartmentalization.
	Dependency on agriculture services.	Usage of HYV will increase the dependency on services like improved marketing, efficient input supply & competent extension services, agricultural credit etc.

No.	Section: Indicators	Rationale
10	WID Number of women and function held in WUG, SC, PC, their social position and education and distribution of groups and committees with women over the compartment.	Number of women holding function in the committees and also can make use of their position effectively depends on their social position & education.
11	Numbers of meetings & workshops on awareness raising, skill development, legal aspects and rights, how many persons participated and where the meeting or training was held.	Recording nos. of women attending workshops is an indication that women could better defend their position in the committees along with others.
12	Number of contracts issued to EMG & LCS, number of persons involved in EMG & LCS, distribution of the contracted EMG & LCS over the compartment, duration of EMG & LCS contract and amount of Taka paid out.	Transfer of money and promotion of managerial skills, social position of women changes, which would have a bearing on their acceptance in WUG or SC committee's function.
13	Survey of the perception of women on their social status and power.	With a better perception of the social status and power, it would give women a better chance to function in WUG or WMC at SC or PC.
14	Expenditure pattern by women and landless of EMG & LCS.	Through investigation of expenditure pattern of women earned with maintenance of infrastructures it should be possible to see how much rests in compartment & how much seeps away to outside.
15	Fishery Catch assessment and fishing effort survey in a representative number of sites in the compartment, making distinction between subsistence and commercial fishing.	Compartmentalization has negative effect on fishing. The catch assessment and fishing effort survey already in existence will provide the indicator to assess the impact.
16	Recording of Beel water levels (Beel concept)	Water levels in the Beels, provide an indicator for the reproduction potential to fish. Hence, water management influences Beel water levels.
17	Survey of hatchling migration.	Reduction of migration would also have a potential negative effect on commercial & subsistence fish production and this is an indicator for the viability of the approach.
18	Number of persons receiving aqua-culture training and nos. of training, location of sites where aqua-culture training is given and monitoring of inputs and outputs in aqua-culture with one pond owner in each group.	Aquaculture is not part of the compartmentalization approach but it is a mitigation measure and training in aqua-culture provides an opportunity to offset negative effects.
19	Environment Soil Fertility Monitoring	This will provide a means to verify the EIA's prediction of possible long term adverse impacts on soil fertility status as a result of project activities.
21	Bio-Diversity Monitoring & Social Forestry	Compartmentalization on biological species diversity is an important aspect. This will provide a means to verify EIA's prediction of long term negative impacts on wetlands and its habitats.
22	Integrated Pest Management (IPM) Training	Increased use of pesticides may lead to serious negative impact on biological diversity. IPM training may cause reduction in pesticide use.

No.	Section: Indicators	Rationale
23	Agro-Chemical and disease incidence monitoring	Compartmentalization approach is likely to bring changes in cropping pattern & hence possible use of increased agro-chemicals in the crop fields which would adversely affect the quality of natural environment such as soil and water.
24	Social Forestry Programme	The program will lead to protection & enhancement of floral diversity through community participation in planting trees.
25	Environmental Education and Training	Necessity for the development of the level of environment education & raising public awareness on environmental concerns.
26	Ground Water Availability Monitoring	The fluctuation of ground water table is likely to take place with controlled flooding & flood water management. Ground water use for dry season irrigation is an important aspects for table fluctuation & water availability.
27	Water Pollution and disease incidence monitoring	Compartmentalization may influence the river water and rain water flows & therefore will create obstruction against spread & dilution of pollutants by natural means. Increased use of agro-chemicals is likely to deteriorate both surface & ground water quality. A change in the hydrology of the compartment could affect public health to the better or worse. Records kept at union health centres would offer an opportunity to monitor it.
28	<u>Economics:</u> Collection of base statistics: Cropping pattern, yields, price, livestock, population, etc. From Thana Statistical Office and DAE.	Collection of base statistics is necessary for the economic analysis of the compartmentalization.
29	Crop damage, damage to public and private property and economic value of crop losses (Thana Flood Relief Officer)	Collection of base statistics on flood damage is necessary for technical & economic analysis. Information is available at Thana level (DAE) & compared with CPP (Agriculture) data.
30	Collection of statistics and Indicators that make a comparison with the situation in the adjacent areas possible: Cropping pattern, yields, flood damage to crops, property and infrastructures (Thana level offices)	Effects on the adjacent area needs to be assessed in order to evaluate the benefits of the concept. It is very much likely that there will be a negative impact on flood condition in these areas and may have dramatic changes to cropping pattern & intensity.
31	<u>Monitoring and Evaluation:</u> Review of actual M&E indicators and appraisal of assumption, risk and conditions that define the implementation of activities.	M&E is not confined to the collection of indicators, but as much to the validity of these indicators to follow project activities.
32	Appraisal of the validity of assumptions, risks and conditions that influence the achievement of projects results.	It is believed that these assumptions, risk & conditions should be reviewed annually in order to establish their possible impact on the project.
33	Evaluation of existing information of the pre-project situation: agriculture, fishery, institution, WID, environment, economic data (e.g. prices, crop losses, flood damage).	The pre-project situation forms the basis against which progress is evaluated. As such it is eminent that there is a full consensus on this data, otherwise they are useless for evaluation later.
34	Co-ordinate actions for a household survey to be done after completion of the present project phase in 2000 or 2001	As a means of comparison with the results of the household survey done at the start of the project, the ex-post household survey should provide insight in the perception of the population of the achievements of CPP.

4.7 Economic Analysis

Value added and gross margin in agriculture

Improved water management may result in more favourable conditions for agricultural production by delaying early floods in the Kharif I season and by lowering of water levels in Kharif II season combined with faster drainage of water of late floods at the beginning of the Rabi season. This may allow further intensification of agricultural production by permitting a switch from broadcast Aman to transplanted Aman. This may be accompanied by a more intensified use of the Rabi season through its prolongation to April. Actual developments in total cropped area as well as per crop in addition to yield levels will be monitored. The incremental benefit, expressed as the value added and/or gross margin of agricultural production per unit of area for each sub-compartment will be determined. The most important data required are the result of the collection programme discussed before, including yields per crops, cultivated areas per crop and season, level of inputs per crop, family and hired labour, draught power, tractor, irrigation and other costs per crop and unit. For all of above data, prices need to be identified and monitored throughout the project period.

Economic indicators

The economic indicators recommended here concern Internal Rate of Return (IRR), the Net Present Value (NPV) and the Cost/Benefit Ratio. All of these indicators are commonly known and widely accepted as a yard stick for the assessment of development projects. In order to present above indicators in financial and economic terms, conversion factors must be used to eliminate distortions generally connected to financial prices in order to reflect the economic opportunity costs of resources and commodities. The Guidelines for Project Assessment were published in 1992 (FPCO, October 1992), of which an up-date may be required. At the same time, the cost of capital (interest rate to be used) should be determined and provided by the same source.

4.8 M&E and Economic Programme for the period from 1997 to June 2000

M&E in the first year of the project needs to concentrate on the assembling a data reflecting the pre-project situation, and on the continuation and perfection of on-going monitoring activities. Data collection with respect to the construction and operation of structures has to continue. The on-going activities fulfil the requirements for M&E. But, in particular the work of the agricultural, fishery and environmental sections needs to be supported and co-ordinated. Moreover, actions are needed to start the collection of data with respect to institutional development and women's activities.

M&E section presents the programme for monitoring and evaluation in 1997 - June 2000. In the bar chart attached all data collection subjects have been mentioned together with the period when activities are running. The data collection will be a continuous process and these data will be mainly collected by the technical sections and furnished to the M&E section for use in their reports in due time. Data collection subjects, processing and publication responsibilities are given in the table appended. The bar chart is only indicative in nature. In preparing this bar chart due care has been taken in terms of indicators and what is possible. At a later date whenever M&E system is operative and data collection takes place, it will be necessary to critically evaluate this list and see if indicators have to be added or skipped. The M&E activities will continue up to the project period, i.e. June 2000 and beyond that it should be taken over by BWDB on continuous basis.

The economic analysis of the project needs to take place in the year 1998 and at the end of the project in 2000. While it would not be possible to modify the activities of the project when the economic analysis is limited to an ex-post analysis, CPP will make a preliminary economic analysis at the end of 1998. The results of this analysis should provide the project and its management with a clear indication whether the activities are giving an acceptable economic return.

CHAPTER 5: CPP'S SET-UP, AND WORKPLAN / BUDGET

5.1 Project organization, co-ordination and linkages

Introduction

One of the main identified shortcomings in the Phase I institutional setting of CPP is the lack of co-ordination mechanisms at district as well as at national level, in particular the institutional embedding of CPP within the GO (and NGO) structures at district and national level. While the water management organisations will be basically constituted by water users, all government and non government agencies which have a role to play in achieving the objectives and outputs, should be represented in the project organisation.

The project organisation for CPP, Final Phase is defined in the TAPP (October 1995). A few weak points in the project organisation which need to be resolved are discussed here.

Co-ordination at national level

In the first phase a number of events took place that probably could have been avoided if a better inter-ministerial co-ordination had existed. The closure of the Dhaleswari and the railway and road to the Jamuna bridge are examples of plans of other Ministries that had considerable impact on the plans of CPP.

Problems in the relations between Departments/agencies at District level cannot be solved or avoided at that level, but only at national level through consultations between Ministries. The exact demarcations between the responsibilities of BWDB and LGED is, for instance, a case in point.

The CPP is a pilot project with potential consequences for the whole of the flood plains, which is a national affair. The Project Council is a strictly Tangail oriented body, which will not have much attention for aspects of replicability of the compartmentalization concept. Discussions on replicability should not only take place within the Ministry of Water Resources, but should be made an inter-ministerial matter.

These are three reasons for establishing a high level inter-ministerial Steering Committee for CPP for co-ordination at national level. At the moment the project is guided and monitored at national level by the CPP Steering Committee, composed of BWDB-officials, and representatives of the Ministry of Water Resources, WARPO, the Planning Commission and the German and Netherlands embassies. BWDB chairs the Committee. Other actors in the project such as line agencies (MOA, MOFL) and NGOs are not represented here. The Committee has not been effective in fostering co-operation with other Ministries. It lacks the broad membership to address the co-ordination adequately and decisions taken by the Committee were in many cases not followed up, apparently due to the fact that it did not have sufficient authority.

Because of the prevailing vertical institutional setting, a National Steering Committee should be established at ministerial level. The membership of the Steering Committee should therefore be expanded to also include Ministries that either are stakeholders in CPP (for instance the Ministry of Agriculture) or whose plans could have adverse effects on the activities of CPP (for instance the Ministry of Communications). The following Ministries should therefore be included: Water Resources, Agriculture, Fisheries, Local Government and Rural Development, Communications, Land, and Women Affairs. The Chairman of the BWDB and the Director General WARPO should also be members. To represent the NGOs active in the project area, one representative of an NGO umbrella organisation should also be member. Both the donors (The Netherlands and Germany) continue to be represented by an official of each of their embassies.

To enhance its authority and effectiveness, it is necessary that the Secretary of the Ministry of Water Resources chairs the Steering Committee and that the other Ministries are also represented by their Secretaries or their replacements.

The Committee should meet every quarter.

The Terms of Reference of the proposed Steering Committee should be wider than the co-ordinating activities performed earlier. The fact that Ministries which have no direct stake in CPP, are also represented should not prevent the Steering Committee from taking on administrative responsibilities such as the approval of the Annual Work Plans of CPP and the acceptance of the progress reports. The Committee should also continuously assess the sustainability of the institutional arrangements in CPP. Similar set-up has been applied in other project.

Co-ordination at Compartment and District level

There are presently three forms of co-ordination at Compartment and District level:

- (a) the recently established Project Council
- (b) the Extended Project Team, created by a Government Order in May 1992
- (c) the District Technical Committee, a non-project co-ordinating mechanism

Project Council and CWMC

Co-ordination at the Compartment level is presently ensured by the Project Council, currently called CWMC. The different roles of the project organisation, line agencies and water management organisations who are now all participating in the PC should be defined. After termination of the CPP, the water management activities will be the responsibility of the CWMC, while the other (supporting and advisory) activities related to agricultural development and conflict resolution would be the mandate of the line agencies co-ordinated by the DC. Therefore it is necessary that this separation of tasks is reflected in the organisational set-up from the beginning.

The proposed phased introduction of the new WMCs (Chapter 3.4.4) will require in due time to reconsider the composition of the new CWMC as the highest echelon of the WMCs in the compartment. Since the line agencies would have no role in this new CWMC, an additional forum may be needed where CWMC and important agencies meet. This could be the Project Council-new style (to be renamed after the end of the project). The PC would be constituted of:

- the CWMC
- District heads of relevant co-operating line agencies and local government
- NGOs
- CPP representatives

The PC will be chaired by the DC. Its main task is to co-ordinate and monitor the implementation of the project. The PC will meet monthly.

The Extended Project Team

The Extended Project Team consists of five executives of Government agencies in Tangail: Deputy Director DAE, Executive Engineer BADC, Executive Engineer LGED, Deputy Director BRDB and District Fisheries Officer. Regular meetings however only took place in the period from January to April 1993. Despite the sub-optimal operation of this Team, it was further expanded by a Government Order in July 1995 to ten officials. Added were District Forest Officer, Administrator Tangail Pourashava, Executive Engineer DPHE, Deputy Director Women Affairs Directorate, Deputy Director Environment Directorate. Although collaboration between CPP and other Departments certainly took place, especially in case of DAE, Fisheries, BRDB and LGED, these achievements were the result of bilateral contacts rather than of the existence of the extended Project Team. The Team did not function as a co-ordinating platform. Probable reasons are: no instructions from higher levels to participate in the Team and differences in status between the officers.

Co-ordination transcending bilateral contacts is extremely important because of inter sectoral linkages. It is therefore proposed to abolish the extended Project Team and establish a *Technical Committee* from members of the Project Council. In regular meetings, consultations can take place on the plans of each of the institutions and on the progress of the implementation, insofar as plans and activities are related to CPP interventions. The Technical Committee should advise the PC and its Executive Committee on technical matters. The fact that the PC supervises, as it were, the functioning of the Technical Committee, combined with instructions from higher level to attend the meetings, will certainly help to enhance its effectiveness. The following Government Departments/agencies should be invited: Department of Agricultural Extension,

Department of Fisheries, BARI-Tangail (in view of their role in the On-Farm Testing and Demonstration Programme (see chapter 3.6 Agriculture), LGED, Department of Women Affairs, BRDB and an NGO representative. The Jamuna Multipurpose Bridge Authority, not a member of the PC, can be invited when needed.

The District Technical Committee

The District Technical Committee consists of 40 officers of all Departments and agencies in the District. From CPP, the Executive Engineer of the BWDB participates. It meets once a month and is chaired by the Deputy Commissioner. This Committee has too many participants and is too general in nature to serve effectively as a co-ordination platform for CPP.

Co-ordination within the project team

The project team consists of a team provided by the BWDB, headed by the Project Director (Superintending Engineer BWDB) and a team comprising Bangladeshi consultants and expatriate consultants. The range of disciplines in the consultant's team is much wider than the one in the BWDB project team, which means that not every consultant has a counterpart from BWDB. Co-ordination within the combined project team is thus more of an interdisciplinary nature than co-ordination between counterpart and consultant. Indeed most of the consultants find counterparts in other Departments (such as Agricultural Extension, Fisheries) or have no actual counterpart at all (for instance the Institutional Development specialist). In the Consultants Team a number of sections are created, such as Engineering, Water Management, Agriculture, Fisheries, Environment, WID, Economics, Institutional Development and Monitoring and Evaluation. These Sections are very small, in most cases consisting one or two staff members.

Although the contacts between individuals - sections and between BWDB - consultants have been frequent, the project needs to adopt more internal co-ordination mechanisms aimed at problem solving. For that purpose, small multi-disciplinary thematic or 'issue-oriented' groups will be formed, consisting of BWDB and consultant project staff, when relevant extended with one or two people from other agencies. These ad-hoc groups, formed around a theme, issue or problem will be fora for the generation of new ideas, brainstorming and discussing project policies in a particular area, as well as a co-ordinating mechanism for implementing clusters of activities. Some examples are:

- approaches to developing the new ChWMCs and SCWMCs
- on-farm testing and demonstration
- people's participation in infrastructure maintenance
- monitoring trends in landuse

The thematic groups will also organise seminars around their theme with presentations for a relevant project audience and invited participants from other organisations. The project will organise at least one monthly seminar about an important project-related topic of current concern. The Team Leader and the Project Director will assign the monthly seminar to one of the thematic groups on a rotational basis.

Visiting expatriate consultants will also present a seminar on their particular field of interest during each visit. This will improve the professional interaction with project staff outside their immediate discipline.

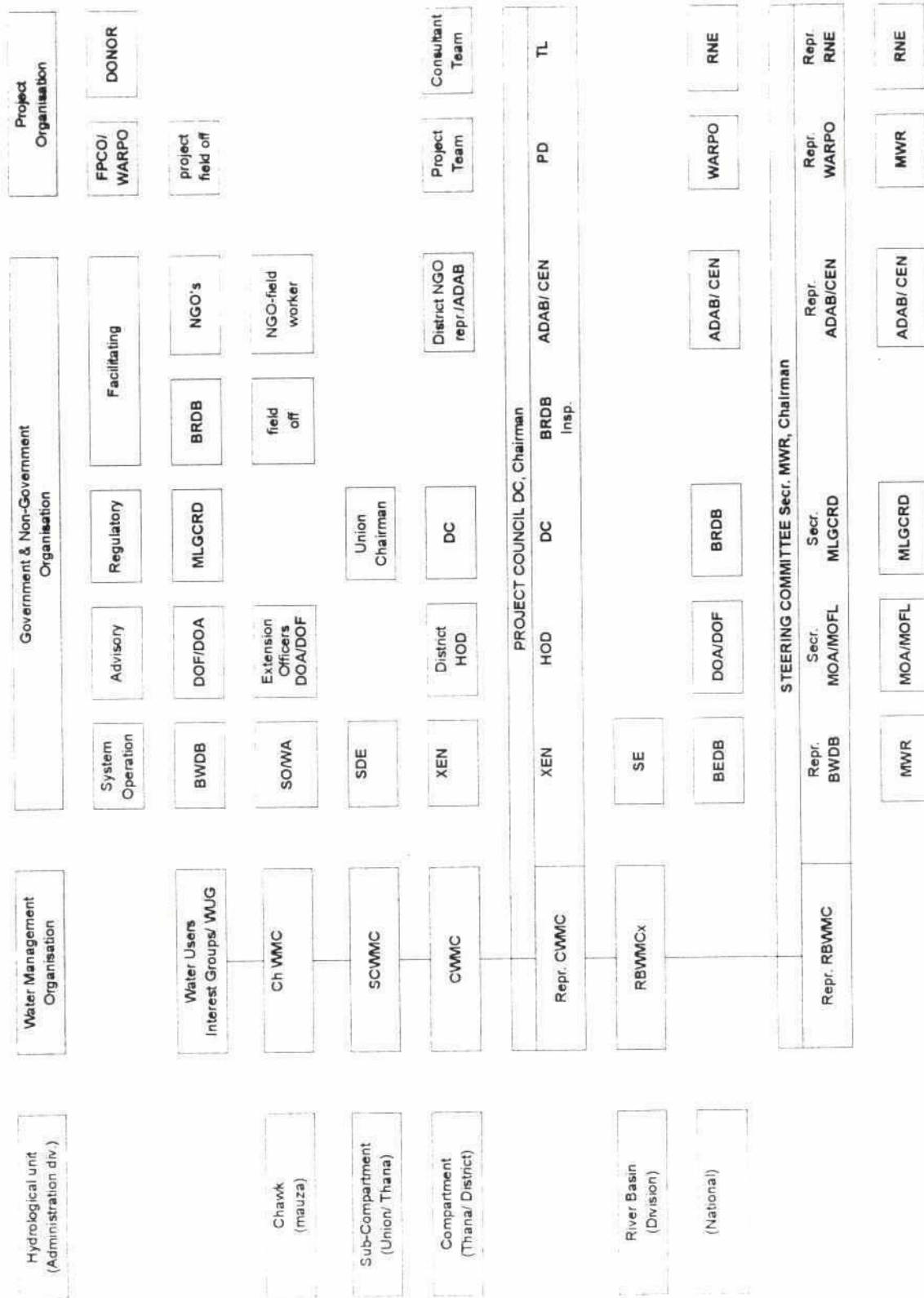
Contractual arrangements with line agencies

More of the work which was previously carried out by project staff will in the future be carried out by or in close co-operation with line agencies. This is crucial for the sustainability and continuity of project activities. Examples are the landuse survey, which will be gradually transferred to DAE and the On-Farm Testing and Demonstration Programme which is being set up in co-operation with BARI and DAE (see Chapter 3.6 and Annex 1B). Contractual arrangements are developed for that purpose, on the basis of MoUs with the collaborating institutions. The project, being the client for the services of the line agencies, makes the necessary funding available.

Other activities currently carried out by project personnel will be screened with a view to possible transfer to other agencies following a similar format.

Figure 5.1.2: Compartmentalization Pilot Project : Institutional Setting

COMPARTMENTALIZATION PILOT PROJECT INSTITUTIONAL SETTING



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Personnel requirements in Institutional Development

Institutional matters are crucial for the success of CPP. Many of the existing institutions have probably to be reshaped. For the Institutional Development Section that brings with it the drafting of proposals on the new compositions and on the tasks and responsibilities of each of the institutions (with clear distinctions between policy matters and operational matters, and between decision making powers and advisory functions). Other activities to be carried out by the Section are

- The actual formation of the revised institutions. Much thought and attention should be given to the electoral process: the way in which members of the primary groups elect their representatives in the SCWMCs and the members of the SCWMCs elect their representatives in the Project Council
- The members of the reshaped committees will need training before they can adequately function. The management of the groups (chairperson, secretary) will in many cases need assistance from the project staff to have the meetings properly prepared and conducted
- The pilot character of the CPP makes it imperative that much attention is given to monitoring and evaluation in order to evaluate compartmentalization. Monitoring of the activities of around 100 primary level committees, 15 secondary level committees, a Project Council and a Steering Committee will be a time consuming affair.

All these activities are too heavy a workload for a one person Section. The Institutional Development Section should therefore be strengthened with at least one additional consultant, and preferably two. One of the two consultants could be head of the Section, also responsible for the workings of the SCWMCs, Project Council and Steering Committee, while the second staff member would be responsible for the primary groups and for training (see also Chapter 5.2 and 5.4).

5.2 The CPP-Team

The CPP Team consists of two teams who are performing the duties and responsibilities of CPP

According to the TAPP, the following tasks are to be executed and allocated to the following teams:

Project Team

Consultants Team

The project will be implemented by a combination of a Project Team, from the GoB, a Consultant's Team provided under contract from the technical assistance budget of the project and personnel from a wide range of other government and non-government agencies. The Technical Assistance Project Proforma (TAPP) of the GoB (2nd revision) gives the definition of the overall management of the project and the division of labour between the Project Team of the GoB and the Consultant's Team as follows:

"The project will be executed by the Bangladesh Water Development Board (BWDB) of the Ministry of Water Resources. The Flood Plan Coordination Organization (FPCO) of the same Ministry will coordinate and monitor the Pilot Project activities BWDB will provide a Project Team for the execution of the project and the Netherlands Technical Assistance Programme will provide Consultants to formulate plan layout and to advise and assist the Project Team. FPCO will nominate specialists to monitor progress and to coordinate activities with other relevant Flood Action Plan activities" and

"The Project Team is responsible for execution of physical and institution building works till June 1998 and then full operation for two years specially during monsoon. In performing the aforesaid works, the responsibilities will include surveys, designs, tendering, supervision of construction including quality control, non-structural intervention such as earthwork through LCS, preventive maintenance works through EMGs, EMP activities, mitigation measures etc., operation and maintenance, monitoring and data collection, organisational aspects etc. The Project Director is assisted by one Executive Engineer, one Deputy Director and other officials augmented from other ministries. The Executive Engineer will be in-charge of the surveys, construction, O&M and monitoring etc. and will maintain constant liaison with the

Consultant Team for the implementation of the activities. Beyond the Project Team, BWDB Design Office will prepare the designs of all the project features on the basis of design criteria and relevant data.

It further specifies:

"The Project Team provided by BWDB would be augmented as necessary by local consultants. Because of the integrated nature of the programme, the team is composed of specialists from the various ministries and organizations involved in rural development, including Agriculture, Fisheries, Forests, Local Government Engineering Department, Bangladesh Rural Development Board (BRDB), the Department of Environment and BWDB. For the project to be as effective as possible, a close definition of individual assignments, roles and responsibilities will be necessary.

Regarding the consultants team it states:

"The consultant team will assist and advise the project team in the preparation of plans, the lay out of the project and the quality control of the implemented works. Development of conceptual strategies and their testing will be of major significance. The team will have a major role in providing training to all parties involved in the preparation, operation and evaluation of the implemented works. The consultant will cover land and water use, flood control and drainage in the formulation of an integrated water management, socio-economic and institutional aspects, information dissemination, aspects of women in development, environmental issues, fisheries and other relevant disciplines. "The team consists of expatriate and national experts as described in Chapter 6.2 (and Appendix A/1 and A/2 of the TAPP). Additional numbers of BAEs (Bilateral Associate Experts) is made available from the DGIS on contract basis. A gradual phasing out of consultants is planned. The tasks will be handed over variously to the project team, related GoB agencies, NGO partners and importantly to Compartmental and Sub-compartmental Water Management Committees".

The Project Team consists of the following personnel:

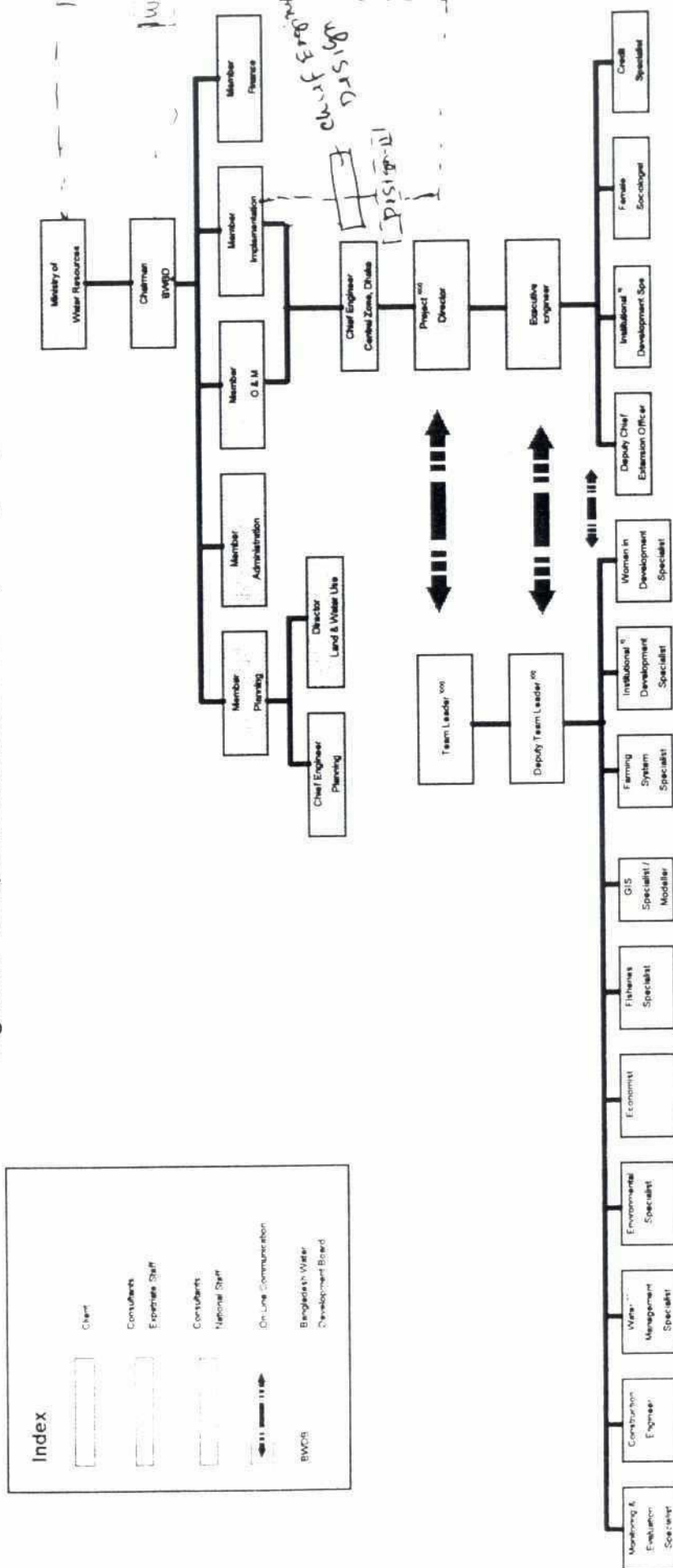
Project Director (1; permanent)
 Deputy Project Director (1; permanent)
 Executive Engineer (1; permanent)
 Deputy-Chief Extension Officer (1; permanent)
 Female Sociologist (1; permanent)
 Institutional Development Specialist (1; from 1 July 1998 onwards to June 2000)
 Agricultural Extension Overseer (4, deputed from Department of Land and Water Use, permanent)
 Credit Specialist (1; from 1 July 1996 onwards to June 2000)

The Consultants Team consists of the following personnel (according to technical/financial proposal):

Team Leader (1; expatriate, permanent)
 Deputy Team Leader (1; local consultant, permanent)
 Monitoring and Evaluation Specialist (2; expatriate and local, limited)
 Environmentalist (2; expatriate and local, limited)
 Economist (2; expatriate and local, limited)
 Women in Development Specialist (2; expatriate and local, limited)
 Institutional Specialist (2; expatriate and local, limited)
 Fisheries specialist (2; expatriate and local, limited)
 Agronomist (2; expatriate and local, limited)
 GIS specialist (1; local, limited)
 Project Manager (1; expatriate, limited)
 unallocated

Figure 5.2.1: Compartmentalization Pilot Project Organogram

Fig. 5.2.1 Compartmentalization Pilot Project Organogram



The Monitoring & Evaluation Specialist will be selected from the Consultants' team to the Project Team after July 1998.
 The Deputy Team Leader will be a Staff Officer (National) who will work closely with the institutional specialist.
 The Project Director will be a Staff Officer (National) who will work closely with the institutional specialist.
 The Project Director will be a Staff Officer (National) who will work closely with the institutional specialist.
 The Project Director will be a Staff Officer (National) who will work closely with the institutional specialist.

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Figure 5.2.2 Staffing schedule - Integrated Team Compartmentalization Pilot Project (Final Phase)

Figure 5.2.2: Staffing Schedule CPP

[illegible]

TOTAL
DECEASED IMMEDIATE RECRUITMENT
AS HAVING ALL THE NO. CRACK SPECIALISTS
CAN TAKE PLACE FOR ON INSTITUTIONAL SPECIALISTS

), The Credit Specialists and Sociologists (Lumina) will be financed under Financial Assistance (Augmentation Team) as a core unit on the

In July '98 this institutional development specialist from the consultants team will be started to the Augmentation Team. The management from Government Bangladesh has only been identified for ranks at executive engineer position and higher.

...). The manpower input from Government of Bangladesh has only been identified for ranks at executive engineer position and higher. The technical assistance experts are financed directly under DGI/S and are therefore not budgetted for under the CPP-budget (TA).

.....) The lateral associate experts are financed directly under DGS and are therefore not budgeted for under the CH-Budget.)

a) According to technical proposal June 1995

Furthermore, two positions under the Bilateral Associate Expert Program are under request. One position for GIS/Land and Water Use, one position for Fisheries. The GIS/Land and Water Use position is assumed to be filled up in June 1997, while the equivalent position for Fisheries is expected to be filled up during third quarter 1997.

The entire framework within which and the manpower planning in which is required to work, puts heavy emphasis on coordination and management. Especially the movement and coordination of the (expatriate) non-resident team is a task which requires careful planning within the existing team.

The tasks divided between the resident and non resident consultants team is clearly defined. Although the actual man months allocated to the non-resident team is relatively high in comparison with the resident team, it is determined that the entire responsibility for the Consultants team remains with the resident team. The full program has to be planned, discussed and carried forward by the resident team; the non-resident team only advises and assists.

During the preparation of the technical/financial proposal for the Final Phase, it was proposed to assign the deputy team leader also the task of water management. Although the Deputy Team leader accomplished this combined task (but had to resign from his post because of medical reasons), it is felt now that the deputy team leader should also put emphasis on the institutional aspects due to the institutional changes proposed in Chapter 3.4 and 5.1. Therefore, the following changes/adjustments regarding institutional and other matters, are hereby proposed:

Only those positions are mentioned which are required to be adjusted and fine tuned, or have special requirements. The other positions which have not undergone changes, will consequently not be specified as they remained the same as originally planned in the Technical Proposal (June 1996).

Deputy Team Leader / Institutional Specialist

The increased and more complicated workload towards institutional re-organization, makes it appropriate to have two consultants positions share this workload. It is therefore proposed that the Deputy Team Leader has an institutional background, with which(s) he can provide additional backing for the institutional specialist¹⁾.

Watermanagement

The Chapter 3.3 and 3.4 have highlighted the lack of sufficient on-the-ground practical field experience which could assist in developing guidelines for the water management of this compartment.

Proposed is the following set of measures:

- appointment of mid-level drainage/water management engineer (1 permanent) in the engineering section.
- appointment of an expatriate hydrological modelling engineer who can transfer the hydrological model, so far developed, from the SWMC to the Project Office in Tangail (approximate time frame 6-8 months, financed under "Contingencies", TA-budget).
- appointment of cluster field teams, whereby in-depth local knowledge can be fed back into the management. These cluster field teams consist of agriculturalists, water management engineers, institutionalists, women in development staff etc. This approach is completely in line with the renewed emphasis on acquiring detailed field knowledge, which is essential for a fully understanding of the institutional setup, its constraints and practical implications. These cluster field teams have been organized in collaboration with the project team, where 4 agricultural extension overseers are assigned to (all staff financed under TA except the agricultural extension overseers), and

¹⁾ The credit specialist and the institutional specialist (both financed under Financial Assistance), which are part of the Augmentation Project Team (see Chapter 5.4), can be assigned specific tasks regarding institutionalization in collaboration with the Consultants Team.

- The bilateral associate expert in GIS/Land and Water Use will also get a task in the coordination of these teams. These teams will have weekly sessions with the relevant persons in the various sections.

Agronomist/Farming Systems (national consultant)

Originally 19.5 manmonths were allocated against this position. In view of the intensive field program in relation also with the OFTD-schemes, it is hereby proposed to cover the entire period between 15/9/1996 and 30/6/2000 by allocating 9 manmonths from "unallocated" to this point.

These 9-months past time. These past time assignment would take place between 1/6/1997 and 1/1/2000. The actual usage of time would depend on the prevailing availability and flexibility of manpower and the work pressure (18 manmonths past-time, 9 manmonths full-time).

Women in Development Specialist (national consultant)

The same allocation of manmonths was available for the Women in Development Specialist. The newly allocated 9 months additional, can be stretched, and in this case the 19.5 manmonth, from which 7 have been used, remains 12.5 manmonth between 1 May 1997 and 30 June 2000. As it is preferable to have continuation in this position, an additional 38 month - 25 month equals 13 manmonths, which would be 6.5 month full-time.

Hydrological modeller (expatriate and/or national consultant)

From the very outset of the project (Original ToR, June 1990), important contributions were expected from the hydrological/mathematical modelling, in order to assist in developing a useful tool which would assist in the water management of the area.

Through intensive collaboration with FAP-25 (Flood Hydrology Study) which later converted in the Surface Water Modelling Centre (SWMC), a hydrological model, originally perceived to yield results at national and regional level, proved also to be useful for "compartmental" and "structure operation modeling". In a later stage, a derivative model, based on the previously developed Flood Management Model, was put into operation which would give much more interpretative results than the previous approaches. This derivative model takes the Flood Management Model as the base for detailed calculations on the impact of certain water management strategies on agriculture, fisheries, infrastructure and urban development. Certain assumptions regarding the relation of water level and damage/profit had to be assumed.

The detailed field information made available to the computer program, allowed to have an assessment with such detail. However, certain physical areas within the compartment do show instability of the FMM which in turn causes the model results less valid for proper interpretation. It is therefore proposed that an additional input for a minimum 6 months with the following objectives:

1. validate/calibrate the model for the 1996 hydrological data.
2. adjust the input files for the main and other peripheral structures to test the sensitivity of the model for minor fluctuations in measured water level.
3. assess the problems with the instability of the FMM, especially in relation to geographical areas of cluster II and cluster III.
4. assess the behaviour of the Lohajang under different rainfall conditions and different operation scenarios at the Main Regulator.
5. study the behaviour of the internal drainage system under different rainfall conditions.

The work should be done by a hydrological modeller who is familiar with the field conditions, and consequently can interpret the results accordingly. Main emphasis should be on the interpretation of the results rather than on the mechanical operation and running of the model. Furthermore, it is also proposed to have the model at a more interactive-friendly location, based thus in Tangail at the project headquarters. The necessary training for the hydrological modeller will be initiated at the Surface Water Modelling Centre.

after a few weeks, computational facilities will be made available at the Tangail project office, such that operating and proper interaction can take place among various specialists

Enhanced Coordination

It is also proposed to make the short term (expatriate) inputs as clustered with other disciplines and short term inputs as possible. Furthermore, two positions (agronomist and wid) are altered. Their input is changed from relatively longterm (few months duration, full time with few months interruption) to longer duration and part time with less interruption. This embeds more continuation and more guarantee for sustainability.

Coordination of the work under the various sections, and especially under the M&E section

The temporary set-up of the consultants team, inherently embedded in a project environment with a limited time frame, requires close coordination between the project team under GOB/FA and the consultants team under TA funding. Both short term and long term objectives should be addressed, not only regarding the actual activities both also regarding long term manpower planning.

The following diagram gives an overview of all personnel (senior positions) involved, both at project and consultants team and the current proposed time frame. A substantial revision and reshuffling has been performed on the organogram, time frame as presented in the technical proposal of the consortium, dated June 1996.

Clustered inputs

- short term inputs should be clustered as much as possible to create an environment which is conducive for heavy integration among disciplines and whereby major decisions can be focussed.
- In principle these clustered overlaps between the resident team and visiting team should be programmed at least two times per year (preferably once during dry season and once/twice during monsoon season)

Coordination and organization training programmes

Under CPP Phase 1 the training coordination for the various sections was performed as part of the assignment of the institutional specialist. During CPP (First Phase) it became apparent that a full time training officer (mid-level) is more effective, once(s)he is properly trained.

5.3 Action Plan and Manpower Planning

According to the reformulated objectives of the project for this Final Phase, elaborated on the new approach has been performed in Chapter 3. In a nutshell, the various main issues have been discussed while entire setting for each subject has been dealt with separately in annexures which follow the same main sequence as in Chapter 3. Elaborated workplans have been made and explained in the respective annexures.

The following main issues are planned:

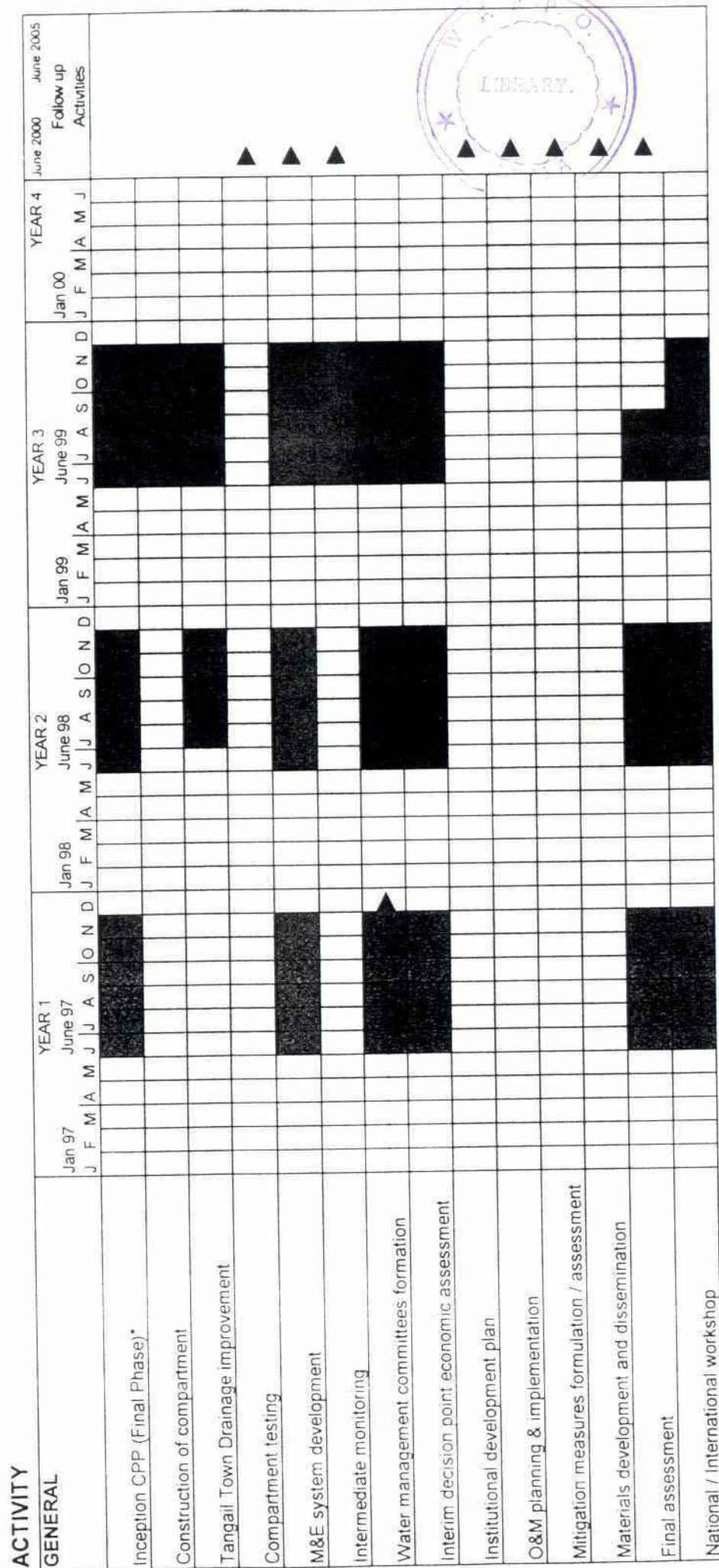
- institutional setup formation of watermanagement committees in various levels
- establishment of smooth working M&E
- establishment of OFTD-scheme
- mitigation plan
- development of information dissemination mechanism
- final assessment

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Table 5.3.1: Action Plan January 1997 - June 2000

Table 5.3.1: Action Plan January 1997 - June 2000

TIME FRAME



Monsoon
Special Activities

*) Inception point CPP-Final Phase from 1 October 1996 - 1 April 1997.

5.4 Financial Assistance

The total Financial Assistance package (structural and non-structural activities) as determined and allocated in the 2nd revised TAPP (March 1996) distinguishes the following categories (see Table 5.4.1).

- 1 Major regulator
- 2 Minor regulator
- 3 Modification of sluice
- 4 Bridge / culvert
- 5 Bank protective works
- 6 Road development
- 7 Embankment re-construction
- 8 Re-excavation channels
- 9 Tangail Town drain
- 10 Mitigation measures
- 11 Unforeseen
- 12 Miscellaneous
- 13 O&M during construction
- 14 Survey & investigation
- 15 Project equipment
- 16 Augmented project team

A careful analysis has been made, based on detailed field knowledge and financial constraints. Furthermore, achievement as per June 1996 have been calculated, the contracted value for FY 1996-1997, the programme for FY 1997-1998, for FY 1998-1999 and for FY 1999-2000 (Table 5.4.1). A further analysis of the functionality of already implemented interventions will be performed during the 1997 monsoon. Deviation from planned physical activities for FY 98 and beyond may take place based on these observations and analysis.

The first nine categories do not require further explanation. However, serial 10-16 does require further explanation.

Mitigation measures (serial no.10)

Mitigation measures will take care of any negative impacts during the project and a provision for the mitigation of failure after the project finishes. These mitigation measures include structural investments inside and outside the compartment, environmental interventions, planning, and consultation procedures and the internalisation of externalities.

Mitigation measures for adjacent areas focus on structural interventions such as improved drainage, flood proofing and the construction of refuges.

Mitigation measures for only inside the compartment take several forms. Mitigation measures for fisheries and environment will be included. For mitigation measure of fisheries sand rim of Lohajang river will be removed. This will facilitate the entry of the first flood water critical for the inflow of the hatchling into the CPP area. Aquaculture development is a part of CPP. The beel concept and subsistence fisheries are mitigation measures.

According to the Reformulation Mission (October/November 1995) it is mentioned that mitigation measures should be formulated which should also cover the period after the project finishes, if found necessary.

A first "glimpse" of the necessity for formulating mitigation measures after the project finishes, can be performed at the interim decision point economic assessment, determined at December 1998-February 1999.

Table 5.4.1: Financial Assistance (FA) programme - cost schedule (in Lakh Taka) for structural and non-structural activities

Table 5.4.1: Financial assistance (FA) programme - cost schedule (in Lakh Taka) for structural and non-structural activities

Sl No	Item of works	Unit	TAPP		Achievement upto Jun-96		Contracted for 1996-97		Programme for 1997-98		Programme for 1998-99		Programme to 1999-2000		Cost difference to TAPP	
			Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Surplus	Shortfall
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Major regulator	Nos	15	864.18	11	774.76	3	156.66	1	65.00	-	-	-	-	-	132.24
2	Minor regulator	Nos	44	785.50	34	563.72	8	96.20	2	91.39	-	-	-	-	84.19	-
3	Modification of sluice	Nos	5	13.14	4	2.92	-	1.72	1	2.50	-	-	-	-	6.00	-
4	Bridge / culvert	Nos	33	392.40	21	292.66	8	79.12	4	72.87	-	-	-	-	-	52.25
5	Bank protective works	Place	5	117.77	5	113.78	-	10.28	-	-	-	-	-	-	-	6.29
6	Road development	K M	3.20	52.36	3.2	51.91	-	12.88	-	-	-	-	-	-	-	12.43
7	Embankment re-construction	K M	38.10	321.56	37.65	263.35	20.67	61.00	-	1.00	-	-	-	-	6.21	-
8	Re-exavation channels	K M	129.83	780.24	39.08	212.55	57.11	63.13	11.71	53.57	-	-	-	-	77.99+373.00 FFW1	-
9	Tangail town drain	K M	1.70	300.00	-	-	-	300.00	-	104.00	-	-	-	-	42.00 FFW2	104.00
10	Mitigation measures	Item	1	134.61	1(part)	60.10	1	62.00	1	12.51	-	-	-	-	-	42.00
11	Unforeseen	Item	1	400.00	-	-	1	50.00	1	100.00	-	-	-	150.00	-	-
12	Miscellaneous	Item	1	68.24	1(part)	5.43	1	1.50	1	20.00	-	-	-	21.31	-	-
13	O&M during construction	Item	1	639.32	1(part)	87.18	1	60.85	1	120.00	-	-	-	150.00	71.29	-
14	Survey & investigation	Item	1	298.52	1(part)	186.33	1	40.00	1	25.00	-	-	-	40.00	-	17.81
15	Project equipment	Nos	36	47.72	28	44.35	5	3.60	2	3.00	-	-	-	-	-	3.23
16	Augmented project team	Item	1	114.22	1(part)	42.60	1	6.00	1	6.00	-	-	-	6.00	47.62	-
Total				5329.78		2691.64		1004.94		676.84		301.00		367.31	243.30+415.00 FFW	370.25
Cumulative						2691.64		3696.58		4373.42		4674.42		5041.7	888.05	

*) The quantity in respect of re-exavation of channel/river/khal has been reduced and some portion has been implemented under FFW resulting surplus amounting to Tk 450.99 to be utilized in Tangail Drain

**) Amount for Tangail Town Drain increased as per actual design.

1) FFW - includes the work of re-exavation of Lohajang river & Lohajang loop cut.

2) FFW - includes the work of refuge sites.



Mitigation measures for environment are defined as:

- Environmentally sound planning
- Mitigation planning including the beel concept and in approved natural recruitment as well as changes to design structures and other intervention to permit improved navigation and transportation.
- Contingency planning for floods, including a flood disaster plan, the construction of refuges and the provision of emergency O&M where structural failure occurs
- Resources management planning including a wetlands conservation strategy, a social forestry programme for embankment and homesteads, waste water management proposals and water quality improvement measures.

Unforeseen (serial no.11)

Unforeseen investments during the testing phase is a unforeseen mitigation to widening existing structures, special facilities for boat transport or fish migration all within the project boundaries. A total of Tk. 50.00 lakh, 50.00 lakh, 100.00 lakh, 150.00 lakh and 50.00 lakh, should be allocated in between 1st and 5th year for compartment testing and finalizing of the constructions in adjacent areas. Total comes to 400.00 lakh taka. Some modification took place as the FY 96-97 did not allocate any budget against this item and the available budget was allocated against 4 financial years. The CPP initiated guidelines for minor works, stipulated that a maximum of Tk.200 lakh can be (see Annex 1A for details) allocated for this.

Miscellaneous (serial no.12)

Expenditure beyond any specific head will go under miscellaneous head, such as closing of bridge opening and other preventive measures during flood. This "miscellaneous" can be allocated both within the compartment or in the adjacent areas.

O&M during construction (serial no.13)

The FPCO guidelines for Project Assessment indicates certain standard rules for the calculation of O&M during construction.

Survey & Investigation (serial no.14)

In the second revised TAPP this is allocated for implementing the Environmental Management Plan and Post-Project Household Survey.

Project Equipment (serial no.15)

The necessary project equipment has been purchased already.

Augmented Project Team (serial no.16)

Under Financial Assistance part of the budget is allocated to financing the Augmentation team. The function of the Augmentation team is (According to the Second Revised TAPP, pg 36) to add special expertise (consultants) to the Project Team in order to make the team widely "disciplined" to be able to coop with these tasks. Between July 1996 and June 2000, one (female) sociologist (48 manmonths), one credit specialist (48 manmonths) and one institutional specialist (24 manmonths). Until 1 April 1997, from these 120 manmonths only 9 manmonths have been used so far. As part of the capacity building of the BWDB, an early embedding of an institutional specialist would be most appropriate at this moment. Furthermore, also the job description of the credit specialist could be adjusted such that the allocated finances could be used. The need for a credit specialist at the moment has not been foreseen as of yet.

200

Table 5.4.2: Financial Progress and Planning Clusterwise for physical works 1996-2000

Table 5.4.2: Financial Progress and Planning Clusterwise for physical works 1996-2000 (all figures)

PHYSICAL WORKS	TOTAL		PROGRESS	REMAINING WORKS	PLANNING FOR FINANCIAL YEARS			
	TAPP	Requirement			1996-97	1997-98	1998-99	1999-2000
Ia Periphery	687.80	691.80	685.29	6.51	6.51	0.00	0.00	0.00
Ib SC 9, 10, 11	573.65	565.99	509.02	56.97	56.97	0.00	0.00	0.00
II SC 5, 6, 7, 8	505.65	531.07	409.98	121.09	74.48	46.61	0.00	0.00
III SC 1, 2, 3, 4	650.41	559.05	481.18	77.87	17.87	60.00	0.00	0.00
IV SC 12, 13, 14, 15	292.59	499.31	104.15	395.16	245.16	150.00	0.00	0.00
V Tangail Town (SC-16)	300.00	404.00	0.00	404.00	300.00	104.00	0.00	0.00
VI Adjacent areas	617.05	185.75	76.03	109.72	80.00	29.72	0.00	0.00
Sub-Total :	3627.15*	3436.97	2265.65	1171.32	+200.00 (FFW)	+173.00 (FFW)	0.00	0.00
Mitigation measures **	134.61	176.61	60.10	116.51	62.00	12.51+42.00 (FFW)	0.00	0.00
Unforeseen ***	400.00	400.00	0.00	400.00	50.00	100.00	100.00	150.00
Miscellaneous ****	68.24	68.24	5.43	62.81	1.50	20.00	20.00	21.31
Total Investments (FA)	4230.00	4081.82	2331.18	1750.64	694.49	+215.00 (FFW)	120.00	171.31
O&M (FA)	639.32	568.03	87.18	480.85	60.85	120.00	150.00	150.00
TOTAL	4869.32	4649.85	2418.36	2231.49	755.34	469.84	270.00	321.31
Land aquisition (GoB)	1770.07 (including cost of escalation)	1463.12	828.12 (368.00 adv.)	635.00	+200.00 (FFW)	+215.00 (FFW)	50.00	0.00
TOTAL	6639.39	6112.97	3246.48	2866.49	1340.34	+215.00 (FFW)	270.00	321.31

*) The total amount of physical work is quoted directly from the TAPP, the internal distribution over the various clusters is not !

**) It includes actions related to fisheries, navigation measure, but exclusive of adjacent areas.

***) It includes minor and fine tuning works arising from water management tests in the sub-compartments.

****) It comprises works other than specific head e.g. closing of bridge opening and other preventive measures during flood.

5.5 Technical Assistance

Table 5.5.1 identifies the major allocations of finances after the detailed planning and programming for the various sectors within the project, including the overall project requirements.

According to DGIS codes, the following categories can be distinguished

DGIS-code	Description
300	Staff (short-term, longterm consultants, local support staff, reporting)
400	Purchases/Investments (programmes/equipment)
500	Operational Costs
600	Training and Courses
800	Contingencies

For DGIS-code 300 Staff, some changes have been proposed in comparison with the technical/financial proposal. These changes are described in Chapter 5.2.

For DGIS-code 400, Purchases/Investments, the base for the allocation is the detailed programmes which have been described in the annexes while the compiled versions are explained in various sections of Chapter 3 (institutions, water management/engineering, agriculture, fisheries, environment, women in development, monitoring and evaluation, information dissemination).

For DGIS-code 500, Operational Costs, an assessment has been made on the current cost allocation.

For DGIS-code 600, Training and Courses, part of the sector-specific trainings have been incorporated here. Furthermore, interdepartmental cooperation is also included here.

For DGIS-code 800, Contingencies, a proposal is under preparation for the adjustment of the hydrological model such, that practical application is possible directly at the project location and one further proposal is being prepared to engage an independant organization/institute that can assist to enhance the processing of land acquisition procedure formalities.

Table 5.5.1: Financial planning technical assistance component, Compartmentalization Pilot Project, Final Phase, Oct. 1996 - June 2000.

TABLE 5.5.1: FINANCIAL PLANNING TECHNICAL ASSISTANCE COMPONENT, COMPARTMENTALIZATION PILOT PROJECT - FINAL PHASE, OCT. 1996-JUNE 2000 *)

CONSOLIDATED FIGURES

DGIS-Code	1996	1997	1998	1999	2000	TOTAL
300 CONTRACT STAFF COSTS						
300 Expatriate Staff	802,546.00	1,104,558.00	1,096,366.00	1,008,269.00	1,044,608.00	5,056,347.00
Local Support Staff Reporting						
					Sub-Total: 300	5,056,347.00
400 Purchases/Investments						
400A Programmes	103,400.00	413,600.00	413,600.00	413,600.00	206,800.00	
Institutions	20,000.00	200,000.00	100,000.00	100,000.00	80,000.00	500,000.00
Watermanagement/Engineering	10,000.00	40,000.00	30,000.00	20,000.00	10,000.00	110,000.00
Agriculture	2,000.00	20,000.00	25,000.00	25,000.00	15,000.00	87,000.00
Fisheries						100,000.00
Environment	5,000.00	30,000.00	25,000.00	25,000.00	15,000.00	100,000.00
W&D	10,000.00	60,000.00	40,000.00	30,000.00	10,000.00	160,000.00
M&E/Socio-Economic						100,000.00
Information Dissemination						130,000.00
					Sub-Total: 400A	1,287,000.00
400B Equipment						264,000.00
					Sub-Total: 4000B	264,000.00
					Sub-Total: 400A+400B	1,551,000.00
500 Operational Costs	41,250.00	165,000.00	165,000.00	165,000.00	82,500.00	618,750.00
(Transport, maintenance, motorcycle, cars, office running, stationaries, telephone bill)						
					Sub-Total: 500	618,750.00
600 Training and Courses	15,760.00	63,040.00	63,040.00	63,040.00	31,520.00	236,400.00
(Every section has included training; these trainings also partially course general trainings for committees)						
					Sub-Total: 600	236,400.00
800 Contingencies						
Outstanding specific proposals for Hydraulic Modelling						373,125.00
Guidance Procedures for Landacquisition						
					Sub-Total: 800	373,125.00
						7,835,622.00

*) Finalization of the Inception Report (draft, Final Phase) was prepared during first quarter 1997; expenses were already made for various line items for which the estimates are included here and allocated against 1996 and 1997, according to actual expenditure timing

5.6 GoB Contribution

The allocation of GOB's funds is mainly confined to GOB personnel and land acquisition payment. The main positions under the implementing agency (BWDB) have been indicated already in Chapter 5.3.

The Assessment Of Progress On Land Acquisition

Table 5.6.1 gives an overall view of the land acquisition status, starting from the allocation made in the TAPP, to the progress upto June 1996 and the programme for FY 96-97 and FY 97-98. The total amount of land required, as originally estimated when the TAPP was formulated, has been reduced from 346 ha to approx. 190 ha. This sharp reduction of land is due to the project's efforts to obtain wheat allocation under FFW programme. This FFW programme which will cover two fiscal years, has started in FY 96-97, and providing that sufficient progress is obtained, a further allocation of wheat will be made in FY 97-98.

According to the MoU of the Donor Review Mission (February-March 1997), the following recommendation has been included:

"The mission wishes to see the full support of the BWDB to arrange for all outstanding payments and wishes to be monthly informed on progress being made. The project is requested to provide assistance to all persons, who have not yet received full compensation. If needed, the project may also utilize the services of an NGO for this purpose"

A proposal for this study will be submitted before 1 July 1997 to WARPO.

Table 5.6.1: Land acquisition status, CPP-Tangail, March 1997

Table 5.6.1: Land acquisition status, CPP-Tangail, March 1997

Sl No.	Requirement of land as per TAPP		Progress of work upto June'96		Programme FY '96-97		Proposal submitted to D C	Approved by DLAC	Approved by Ministry	Estimate received	Fund placed/adjusted	Land possession received	Quantity pending (ha)	
	Quantity (ha)	Cost (lakh Tk.)	Quantity (ha)	Cost (lakh Tk.)	Quantity (ha)	Cost (lakh Tk.)							D C 1996-97 (ha)	Land Ministry 1996-97 (ha)
1	346	1617.10	76.457	828.12	111.00	665.00	114.487	94.439	57.143	26.505	26.505	25.822	72.143	16.522
				(368.00 advanced)										

- N.B.: 1) Land compensation for 1996-97 amounting to Tk. 508.00 lakh (368.00 during 1995-96 & 140.00 during 1996-97) has been paid in advance and estimate amounting to Tk. 153.30 has been received for 26.505 ha. only and amount has been adjusted from advance.
- 2) Out of pending 72.143 ha with D C proposals for 11.771 ha have been dropped due to change of planning and demand of beneficiaries.
- 3) Total land will be required 181.23 ha and not 346 ha as originally planned when the TAPP was formulated. The quantity has been reduced due to implementation of reexcavation of channel/river under FFW.

CHAPTER 6: BEYOND 2000

M&E beyond June 2000

In the year 2000, sufficient information should be available, to assess the compliance of the overall project objective against the background of the overall development objective. One note of caution should be expressed here is that in case during the monsoon of 1997, 1998 and 1999 the hydrological situation is less than normal, that a judgement on the working of the Tangail compartment as a viable, sustainable and replicable exercise in Bangladesh which is economically feasible, may have to be postponed. Therefore, it is proposed project document will be prepared which takes the financial, organizational setting into account and which provide a framework for further monitoring of CPP Tangail after the end of the CPP Final Phase under a "skeleton-staff arrangements" with additional funding from various sources. A post-project evaluation period of minimal 5 years after the end of the Final Phase would be most appropriate.

Embedding of CPP's experiences at national level

In many publications on water resources management in Bangladesh, the word "flagship" has been mentioned as a synonym for CPP. In many respects, the activities as they developed, emerged, evolved and settled down in the project area, have undergone quite a number of changes. The definition and application of people's participation is one striking example where many interested parties have expressed their own opinion and interpretation to it.

The entire institutional framework at field level in the CPP-area, which is now in the middle of a re-assessment, is a product of significant field experience and evaluation, a product which can rarely been seen at such detailed level in Bangladesh. It would therefore be rather inappropriate to see these lessons, knowledge and expertise fade away and/or disappear before it can be used/applied in similar projects in Bangladesh, or for that matter in other countries with similar settings.

As CPP has acknowledged this task and responsibility in an early stage, an Information Dissemination Centre was opened at District level in December 1994. A continuous flow of information is available for anybody, any party and apparently the need and requests for information increases. The implementing agency (Bangladesh Water Development Board) has made it mandatory for any new project under implementation to organise a permanent information centre, based on CPP's example.

As this in itself is an accomplishment and achievement (to make information as transparent as possible), one should not forget that this idea has to be inserted into a national system, preferably at WARPO/BWDB level where the support is available to perform these tasks. A real commitment to disseminate this information on a national basis, is not present. It would be a task which would be necessary for the implementor of the National Water Master Plan to build on the experiences and lessons learnt from CPP in this respect.

Prudent change in attitude from a project approach to a process approach

The experience CPP had in conceptualizing, developing, applying and modifying the various stages of people's participation, has given on-depth information which is crucial to understand the field level and its decision-making process. This same process can, if properly applied given an opportunity to covering the relationship between water management institutions and beneficiaries who are represented in those committees. If the proposed institutional framework will have sufficient impact, then the project can generally embark on gradually handed over responsibility of O&M to beneficiaries, whereby the "outside" financial assistance to accomplish should be phased out in the long term.

The handing over of responsibility of O&M from the implementing agency to a process of beneficiaries participation should be a cautious and gradual process. Handing-over of this responsibility before properly working institutions are in place, should definitely be avoided.

