Government of the People's Republic of Bangladesh

Ministry of Irrigation, Water Development and Flood Control
Flood Plan Coordination Organization

BANGLADESH ACTION PLAN FOR FLOOD CONTROL

COMPARTMENTALIZATION PILOT PROJECT (FAP 20)

ANNEXES

April 1992

Euroconsult/Lahmeyer International/Bangladesh Engineering & Technological Services/House of Consultants

under assignment to

DIRECTORAAT GENERAAL INTERNATIONALE SAMENWERKING
Government of the Netherlands

and

KREDIT ANSTALT FUER WIEDERAUFBAU
Federal Republic of Germany

2

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CPP (FAP 20) - INCEPTION REPORT (REVISED)
April 1992

TABLE OF CONTENTS
ANNEXES

ANNEX 1 LIST OF TECHNICAL NOTES AND OTHER REPORTS OF FAP 20

TECHNICAL NOTES

Fap 20 Technical Notes are unedited draft papers produced by, and under the responsibility of one or more FAP 20 team members. Technical Notes are papers that form the basis for discussions within the FAP 20 team, so they are part of the process that leads to formal FAP 20 papers and reports. FAP 20 may send specific Technical Notes to professionals involved in other components of the Flood Action Plan for their information, requesting comments and feedback. On request, FAP' and other professionals may also be sent copies of Technical Notes.

TNT-91/01 TANGAIL COMPARTMENTALIZATION PILOT PROJECT AREA IN RELATION TO UPAZILAS AND UNIONS

TNT-91/02 HISTORY AND BOUNDARIES OF THE TANGAIL COMPARTMENT

TNT-91/03 DISTRIBUTION OF FARM SIZE AND LANDHOLDINGS IN THE TANGAIL COMPARTMENTALIZATION PILOT PROJECT AREA

TNT-91/04 MARKETS IN TANGAIL CPP AREA

TNT-91/05 AGRO-ECONOMICS

TNT-91/06 LIVESTOCK SITUATION

TNT-91/07 AGRICULTURAL EXTENSION SERVICE

TNT-91/08 POSITION OF WOMEN

TNT-91/09 NUTRITION AND HEALTH

TNT-91/10 FISHERIES RESOURCES

TNT-91/11 LAND UTILIZATION IN TANGAIL UPAZILA (IN HA.) 1990-1991

TNT-91/12 CPP PROJECT BOUNDARY AND MOUZA MAP

TNT-91/13 SUMMARY OF PRELIMINARY SURVEY OF TANGAIL COMPARTMENT

TNT-91/14 ISSUES/QUESTIONS RAISED AT FAP 20 PRESENTATION AT FAP TEAMLEADERS MEETING (29 AUGUST 1991)

TNT-91/15 COMPARTMENTALIZATION PILOT PROJECT (FAP 20), PRESENTATION OF THE PROJECT

TNT-91/16 TRANSPLANTED DEEPWATER AMAN

TNT-91/17 TANGAIL COMPARTMENT CROPPING PATTERN INFORMATION

TNT-91/18 AVERAGE MARKET PRICE FOR 1987-1991, TANGAIL SADAR

TNT-91/19 FLOODING TIME, CROP DAMAGE AND FARMER'S WAYS OF MINIMIZING LOSS

TNT-91/20 HOUSEHOLD BASELINE SURVEY

TNT-91/21 AGRICULTURAL DEVELOPMENTS IN THE TANGAIL CPP AREA

TNT-91/22 SOME ENVIRONMENTAL ISSUES IN THE TANGAIL CPP AREA

TNT-91/23 WILDLIFE IN THE TANGAIL CPP AREA

TNT-91/24 GROUNDWATER LEVELS IN TANGAIL UPAZILA

TNT-92/01 MULTI-DISCIPLINARY SUB-COMPARTMENTAL SURVEY (METHODOLOGY)

TNT-92/02 SUMMARY OF MDSC-SURVEY FINDINGS; TANGAIL ADJACENT AREA

TNT-92/03 SUMMARY OF MDSC-SURVEY FINDINGS; TANGAIL WESTERN AREA

TNT-92/04 PEOPLE'S PARTICIPATION (SECOND CONFERENCE ON FAP)

TNT-92/05 INSTITUTIONAL ASPECTS OF FAP 20

REPORTS

STATUS REPORT (October 1991)

CONSTRUCTION PROGRAMME 1991-1992 TANGAIL (December 1991)

INCEPTION REPORT - as proposed by the FAP 20 Consultants Team (December 1991)

ANNEX 2 ORGANISATIONS AND INSTITUTIONS CONTACTED

TANGAIL

Union level

Relevant previous and present Chairmen

Upazila level

Women's Affairs Officer
Social Welfare Officer
Public Health Engineer
Agricultural Extension Officer
Livestock Officer
Fisheries Officer
Rural Development Officer

Upazila Health Complex
Local Government Engineering Bureau

Non Government Organizations

BURO
Society for Social Services
Social Development Services
CARE
Grameen Bank
Swarnivar

District level

Deputy Commissioner
Department of Fisheries
Department of Environment
Regional Statistical Officer
Women's Affairs Officer

Service Civil International (Bhuapur Development Project)

DELDUAR

Union level

Relevant previous and present Chairmen

Upazila level

Agricultural Extension Officer
Livestock Officer
Fisheries Officer

DHAKA

WARPO (Previously Master Plan Organization)
Bangladesh Agricultural Research Council
Food and Agricultural Organization
Bangladesh Institute of Development Studies
Association of Development Agencies in Bangladesh
Bangladesh Bureau of Statistics
Department of Fisheries
Department of Environment
Surface Water Modelling Centre
BWDB Design Office
BWDB Surface Water Division

Systems Rehabilitation Project
Early Implementation Project

Non Government Organizations

Service Civil International - Bangladesh
Shapan Adnan and Associates

ANNEX 3 HOUSEHOLD BASELINE SURVEY

Sample size and frame

For the present study the confidence level for the household survey has been fixed at 90% for 2-tailed populations. On the basis of the FAP 12 methodology the sample size for both the farm and the non-farm household survey, assuming clusters of households, works out at 121 (K=1.64, V=0.5, D=0.1, m=5 and d=0.2).

The principles of probability sampling require that the selection of each member of the sample is done in such a way that every member of the total population has the same (non-zero) chance of being selected. As the 1991 census data is not yet available a first stage selection of sample villages/mauza's will be made based on the 1981 census data. From this a selection will be drawn on the basis of probability to size.

The second stage sample frame will be made by conducting a village inventory or census, listing all the households. From this the population will be divided up in the farm and non-farm categories. For both the farm household group this will be done by a linear systematic sampling after the farm households have been listed according to farm size. For the non-farm households selection will also be done by linear systematic sampling after the households have been grouped according to primary occupation. The size of the sample in each village/mauza is determined at five.

Number and spread of sample households

The following number of villages/households are expected to be covered in the household survey:

(see next page)

VILLAGES AND HOUSEHOLDS PER AREA AND TYPE

	Farm H.H.	Non-Farm H.H.	Supplementary H.H	Sub-total	Total
Project area					44/340
rural area	24/120	24/120	10/50	34/290	
urban area			10/50	10/50	
Outside area					44/340
rural area	24/120	24/120	10/50	34/340	
urban area			10/50	10/50	
Control area					44/340
rural area	24/120	24/120	10/50	34/340	
urban area			10/50	10/50	
total	72/360	72/360	60/300		132/1020
Total percentage	35.3%	35.3%	29.4%		100%

H.H. = Household

24/120 = 24 villages/120 households

N.B.
- The farm and non-farm households are selected from the same villages.
- The enumerators are expected to live in the are concerned.
- All female headed households will be surveyed by female enumerators only. The household survey as such is divided into questions to be asked to the senior women in the household and those to be discussed with the male head of the household.
- An extra 10% households will be interviewed to allow for inconsistent forms to be dropped from the final analysis.

ANNEX 4 EXECUTION OF WORKS

Three possible approaches are envisaged for the implementation of the physical works:

(i) Execution of works by enlisted contractors through regular tendering procedures.

(ii) Food for Work programme.

(iii) Motivating the local people to execute the labour intensive works by themselves.

(i) Execution of works by enlisted contractors through regular tendering procedures

Execution of works by enlisted contractors is the standard practice for almost all public sector works programmes in Bangladesh. However, this procedure has several limitations, as enumerated below.

(a) The contractors are usually selected by floating tenders and opting for the lowest bidder. When a considerable number of contractors are competing (which normally happens), the lowest bid is quite often lower than the estimated cost. Especially for rehabilitation works, this is almost always the case. During execution, those contractors try to make profit in various irregular ways, including producing low-quality work and depriving the labourers of their due wages.

The authority has the freedom to reject the lowest bidder but will not do so, mostly, to prevent a court case. An option is, to put in the contract the condition that certain minimum wages should be paid to the labourers. This should then be monitored during construction. Adequate reliable technical supervision might ensure quality of construction.

(b) Land acquisition sometimes creates severe problems in executing the works through contractors. Private land should be acquired before starting any work. But the legal procedures are complicated and lengthy (see FAP 15). If any of the affected land owners succeeds to sue against the acquisition and thereafter manages to obtain an injunction, works may be delayed extensively.

(c) To stick to the time schedule for construction is another problem. It is known that local contractors are not serious about maintaining the time schedule and usually lag behind the required targets, sometimes with a large margin and endangering the project.

In spite of these limitations, execution of works through enlisted contractors is obviously the most appropriate option in most situations. Adequate arrangements should be made with assistance from competent authorities to reduce the set-backs as listed above.

To benefit landless people as much as possible, 30 to 50% of the earth works will be contracted to Landless Contracting Societies (LCS), if available in the area. In case they do not exist, they could be formed with the assistance of BRDB or local NGOs. Of all labour awarded to the LCSs, at least half will be reserved for female LCSs.

(ii) **Food for Work programme**

Food for Work programmes are suitable for labour intensive type of works, that is, earth work. A considerable number of roads and embankments have been (re)constructed under FfW and khals re-excavated. Limitations of this programme are the following:

(a) The quality of work is often poor. A Project Implementation Committee, consisting of influential persons of the local community (usually union council chairman and members) is responsible for the programme. Those persons are less interested in the quality of work, and irregularities are a frequent happening.

(b) The land acquisition problem is usually not addressed in the programme. Since the persons responsible for the implementation of the programme have considerable influence in the community, the small land owners, affected by the project, are cowed down and the works are executed without any land compensation. This has the dubious advantage of going ahead with the implementation of works without going through the intricate legal formalities of land acquisition. The concept of non-payment of any compensation to the affected small land owners is not complying with the policy of FAP 20.

Although FFW offers a "convenient" way for implementation of resectioning and re-excavation of works, FFW will not be introduced in the project; other funds are available.

(iii) **Motivating the local people to execute labour intensive works**

This method is in line with the approach on people's participation. But can people be motivated to implement at least part of the work at their own cost? Furthermore, certain time limits should be kept. Nevertheless there are examples of works partly executed and/or paid for by the population themselves, fully complying with their wishes.

While stressing people's participation, it is suggested to apply this method for the complementary tertiary works (e.g. minor canal excavation or resectioning of bunds) in anticipation of future maintenance activities.

The major pre-requisite for this method will be a flexible time schedule for implementation, e.g. a work, not implemented in 1992, might eventually be implemented in 1993 or not at all if it doesn't fully comply with the wishes of the population or

their willingness to participate. However, the involvement of the beneficiaries in the implementation is essential in order to get the people involved in water management.

This concept, and its consequences, needs approval from the GOB, the donors and the FPCO/POE. A detailed proposal, covering the approach and its consequences (organisation, mobilisation, supervision) will be submitted later during 1992.

Annex 5 SHORT DESCRIPTION OF THE DEVELOPMENT SCENARIOS FOR THE TANGAIL PILOT AREA.

A: Existing situation.

This variant is the base case to be used as a reference for the development scenarios where no intervention in the existing water management will be effected. However, even this option needs interventions mainly related to maintenance and rehabilitation of the existing situation as follows:

- erosion protection and river training works at specific locations on the Lohajang river, the Elanjani river, the Dhaleswari river and the Pungli river.
- rehabilitation of embankments as needed along the Dhaleswari, the Pungli, the Elanjani and the Lohajang.
- construction of new embankments along the Lohajang and the Pungli.
- rehabilitation of roads depending on the rehabilitated and newly constructed embankments.

B: Drainage improvement.

This scenario will include the works as indicated under A as well as the re-excavation of relevant channels, mostly being existent or formerly existent. Development of completely new channels seems inappropriate. In the western compartment halve of Tangail approximately 11 km has been identified as having high priority and 2.5 km of secondary priority. For the eastern halve the investigations are ongoing.

The justification for this option is the reduced inundation during pre and post monsoon periods and possibly improved fish migration routes. The main agricultural benefit would be reduced risk, reduced crop damage and an extension of the dry season cropping season.

Since the improved drainage might have a negative impact on the fisheries development opportunities, special studies will be done and measures will be developed and tested for beel areas.

C: Throttled opening with improved drainage.

This scenario will include the works as indicated under A and B. The inflow of water from the Lohajang and the Pungli will be throttled by means of an open structure aiming

at the dampening of a rapid major water rise. In addition to this the following options will be looked at:

- the impact of throttled openings between the Dhaleswari and the compartment in replacement of the existing culverts.

- the effect of secondary throttling structures between the Lohajang and the compartment.

D: Gated inlet with improved drainage.

This scenario will include the works as indicated under A and B. In addition the inflow of water from the Lohajang, the Pungli and the Dhaleswari and Elanjani rivers will be regulated by means of gated structures aiming at the full control of incoming water.

The development of throttled or gated structures between the Lohajang and the compartment seems as yet without justification. The principal alternative development of this scenario is based on the size of the main inlet. In order to minimize the impact on the hydro-ecological balance of the Lohajang river a large capacity will be tried first. A small capacity which is mainly dictated by agricultural needs may have severe negative impact on fisheries and sedimentation. This latter option may possibly be combined with an outlet at Karatia to reduce back-flow or favour inundation of the compartment.

The capacity of the main inlet can not be assessed without considering the external development options (Closure of northern Dhaleswari, BLE and BRE).

The development of "fish-friendly" structures and operation procedures will be considered with the utmost attention for all gated structures.

E: Regulated inlet with improved drainage and sub-compartment development.

This scenario will include the works as indicated under A, B and C or D (rehabilitation, drainage and (semi-)controlled inlet). In addition throttled or gated structures between the Lohajang and the compartment as well as between sub-compartments will be developed. The objective is the retention of rainfall or flood water on a temporary basis in the higher sub-compartments.

In the existing situation this objective is already satisfied in a natural (semi-controlled) way by means of numerous openings in embankments between the sub-compartments. This option is therefore only justified if the actual semi-controlled situation should be modified or if the inter-sub-compartmental flow should be fully controlled.

F: Other options.

An alternative option might be to develop the compartment without a main inlet in the Lohajang.

This scenario will include the works as indicated under A and B (rehabilitation and drainage). In addition only secondary structures will be developed between respectively the Dhaleswari, the Pungli and the Lohajang and the compartment. The cost of this option will include the rehabilitation of the embankments along both sides of the Lohajang river which is not needed if a major structure in the Lohajang will be constructed (mainly option D).

ANNEX 6 **DISCHARGE MEASUREMENTS**

	DISCHARGE (M3/SEC)		
DATE	LOHAJANG	PUNGLI	ELENJANI
14-Aug-90		307	
16-Aug-90	37		
21-Aug-90		246	
22-Aug-90	37		73
28-Aug-90		294	
29-Aug-90	38		68
05-Sep-90	26	216	55
11-Sep-90	22		
12-Sep-90			40
13-Sep-90		185	
18-Sep-90	23	218	49
25-Sep-90		237	
26-Sep-90	35		100
01-Oct-90		340	
16-Oct-90	82		

ANNEX 7 SOIL ASSOCIATIONS IN THE PILOT AREAS

The Tangail Pilot Project area

In the project area three soil associations can be identified.

A. The ***Sonatala - Dhamrai*** association (approx.2940 ha) is covering most of the gently undulating area in the N.W. of the project area. Soils are mostly grey to brownish coloured silt loam; silty sandy loam on the permeable top of the ridges, downslope becoming more clayey. The area is flooded to shallow, locally moderate depth and remains moist fairly long in the dry season. This association has only minor limitations for agricultural development. With good management and irrigation, high to very high yields could be obtained on most of this land. Provided controlled flooding and drainage is available, three crops -two rice crops and a short duration rabi crop - can be planted every year. The land can be classified as good agricultural land.

B. Like the ***Sonatala - Dhamrai*** association the ***Dhamrai - Sabhar Bazar*** association is situated on the Young Jamuna Floodplain, covering approx.3620 ha in the western and southwestern parts of the project area. On top of the ridges, soils are permeable sandy loam to grey silt loam, changing progressively into heavier and less permeable silty clay loam and silt clay in basins and depressions. The major limitation for agricultural development is the moderate depth of flood over most of the basins and part of the ridges. With flood and drainage controlled and given good management, and the use of HYVs and irrigation, the land could produce two wetland crops and sometimes a short duration rabi crop every year. The land can be classified as good to moderate agricultural land. T. Aman could partly replace deepwater Aman, increasing yields considerably.

C. The ***Silmandi - Sabhar bazar*** association is located on the Older Jamuna Floodplain and covers approx.6780 ha in the eastern and southern parts of the project area. It consists of numerous basins and an intricate network of relatively high floodplain areas, occupying about equal proportions. The major soils of the floodplain ridges consist of grey to brownish silt loam to silty clay loam. Along the Lohajang river there are some recent silt deposits. Top soils in the basins and depressions are impermeable grey clay to silty clay; the more larger, nearly level basin areas have usually more firm silty clay to clay sub-soils. Much of the area is flooded to moderate depth, many basin areas for 4-7 months. The soils remain moist long into the dry season. Only the highest areas become dry by the middle of the dry season. The major limitation for agricultural development is the moderate to, even sometimes, great flood depths in the basins and over many of the ridges. With controlled flooding, and drainage, most of this land could increase the agricultural output by growing Boro and Aman (broadcasted or transplanted) and on the higher ridges an

additional short duration rabi crop. The land can be classified as good to moderate agricultural land.

The Sirajganj Pilot Project area

In the project area, 4 soil associations can be identified.

A. The ***Sonatala - Kamarkhanda*** soil association, in the SE of the project area near Sirajganj town; a small area of approx. 700 ha on the mixed Younger Karatia Floodplain, with grey to olive coloured silt loam, silty clay loam and silty clay soils, suffering from droughtiness in the dry season. Ridges are covering about 75% of the area and shallowly flooded basins are moderately deeply flooded. With balanced fertilizer use and irrigation, good yields can be obtained. In most areas 3 crops per year can be planted. The land can be classified as good agricultural land.

B. The ***Kamarkhanda - Silmandi - Sabhar Bazar*** association is covering approx. 50% of the project area and is located in the western and northern areas of the project (6 500 ha). It is developed in the Younger Karatia Floodplain. Very gently undulating ridges occupy about 65% of the area. Ridges are mainly highland and medium highland; basins are medium lowland. Soils are olive to olive grey coloured silt loam, silty clay loam to silty clay, with droughtiness in the dry season and some intermittent wetness in the rainy season. The land is mainly tripple cropped and can be categorised as good with some moderate agricultural land. Good yields can be obtained with balanced fertiliser use, irrigation and locally improved drainage early in the dry season.

C. The ***Silmandi - Sabhar Bazar*** association of approx. 3500 ha is also developed in the Younger Karatia Floodplain and is located in the central, southern and eastern areas of the project. The landscape comprises of very gently undulating ridges, inter-ridge depressions and rather small basins. Differences in elevation are slight. Soils are sandy to silty loam, silty clay loam and silty clay and are prone to droughtiness in the dry season. Ridges are shallowly flooded, basins moderately deep. The land is mainly triple cropped with some double cropping and can be classified as good to moderate agricultural land. Small scale irrigation, because of the occurrance of sandy soils and balanced fertilizer, can improve crop yields.

D. The ***Silmandi - Chamara*** association is located in the northeastern area, bordering the Jamuna river. It is developed on the mixed Younger Karatia Floodplain and on the very Young Jamuna Floodplain and covers about 2000 ha. Ridges are mainly above flood level. Basins are shallowly to moderately deeply flooded. Differences in elevation are slight. Soils are grey to brown silty loam, silty clay loam to silty clay. The land is pre-dominantly triple cropped and can be classified as good agricultural land. Soils are prone to droughtiness in the dry season. With balanced fertilizer use, irrigation and locally improved drainage, good yields can be obtained.

ANNEX-8

LAND UTILISATION AND IRRIGATION PER SUB-COMPARTMENT (SC) IN TANGAIL CPP
1991-92

Area in ha

SC. No.	Gross Area	NCA	% of Gross Area	Single cropped	Double cropped	Triple cropped	Cropped Area	Cropping Intensity	Irrigation	
									Area	% NCA
1.	675	491	72.7	67	210	214	1129	230	271	55
2.	1286	1089	84.7	122	475	492	2548	234	589	54
3.	640	515	80.8	60	213	242	1212	235	296	57
4.	424	291	68.6	22	124	145	705	242	184	63
5.	794	593	74.9	85	210	298	1399	236	318	54
6.	267	204	76.5	35	67	102	475	233	135	66
7.	328	236	72.0	36	78	122	558	236	161	68
8.	1017	787	77.4	129	275	383	1828	232	420	53
9.	701	638	91.0	132	238	268	1412	221	232	36
10.	518	462	89.1	114	182	166	976	211	217	47
11.	1114	941	84.5	174	364	403	2111	224	322	34
12.	987	790	80.0	80	300	410	1910	241	256	32
13.	540	420	77.7	43	298	79	876	209	150	36
14.	1074	728	67.8	13	528	187	1630	224	361	50
15.	700	498	71.1	20	313	165	1143	230	249	50
Total	11065	8683	78.5	1132	3875	3676	19912	229	4161	48

Annex 9

BANGLADESH FLOOD ACTION PLAN

COMPARTMENTALIZATION PILOT PROJECT

FAP 20

SPECIAL FISHERIES STUDY

PROPOSAL

TANGAIL, April 15, 1992

SUMMARY

S.1 The objectives of the proposed Special Fisheries Study is to collect substantial baseline data on the existing fisheries in the CPP area. The study will take place from april 1992 to april 1992 and will cover the following subjects:

- Frame survey on the number of fishermen, gears and fishing intensity.
- Determination of the catch per unit effort for the different gears or fishing techniques. length frequency distribution and yield per recruits
- Fish migration routes.
- Reproductive behaviour of River and Beel fish.

S.2 The results of this study will be used in the impact assessment of water management scenario's on fisheries and the formulation and design of mitigation measurements and structures.

S.3 The study will be executed in cooperation with FAP 16 (environment) and FAP 17 (fisheries). FAP 20 and FAP 16 will cover the beels, rivers, floodplain, fish consumption, reproduction and migration routes within the CPP area. FAP 17 will cover the major rivers and floodplain surrounding the CPP area. The chosen methodology makes a complete exchange of results possible.

S.4 The costs for this study are estimated at 7,01.500 Tk, salaries excluded.

1 INTRODUCTION

1.1 Within the national context the annual fish production of approximately 840.000 T plays an important role in the economy of Bangladesh. The sector accounts for 3% of GDP, 11 % of export earnings and 70% of the animal protein intake of its population. Inland fisheries and aquaculture are the major contributors of fish, covering respectively 50 % and 22 % of the total production (DOF, 1990[1]).

1.2 The seasonal variations of flow in the rivers and the congestion of water in the depressions of the floodplain are the main factors influencing the behavior of fish communities in Bangladesh.

1.3 Pre-monsoon: The water level in the rivers and depression areas (beels) of the floodplain raises due to the early rains. The rising water invades the nearby plains and organic and inorganic matter lying on the plains enters solution, providing the nutrients needed for biological production.

1.4 The monsoon: The continuous rainfall and the influx of water in the upper catchment areas saturates the main channels, the water continues to rise and eventually spills over through a system of channels inundating the floodplain and the low lying

[1] Directorate of Fisheries, Statistical Yearbooks

depression areas completely. Debris of animal and vegetal origin starts rotting and the availability of nutrients in the water increases rapidly.

1.5 Receding waters: At the onset of the dry season the water in the floodplain start to flow back in the main channels. Gradually the floodplain dries up and the low lying "beels" and "pagars" are cut off again from the main river systems.

1.6 The dry season: Within the dry season the evaporation and drainage of water exceeds the influx of water. As a result the water level in the rivers and permanent water bodies of the floodplain decreases.

1.7 A preliminary survey in the Tangail Pilot Project area, executed in the dry season of March 1991 highlighted that
the fish species can be divided in two groups when their reproductive behaviour is taken into account.

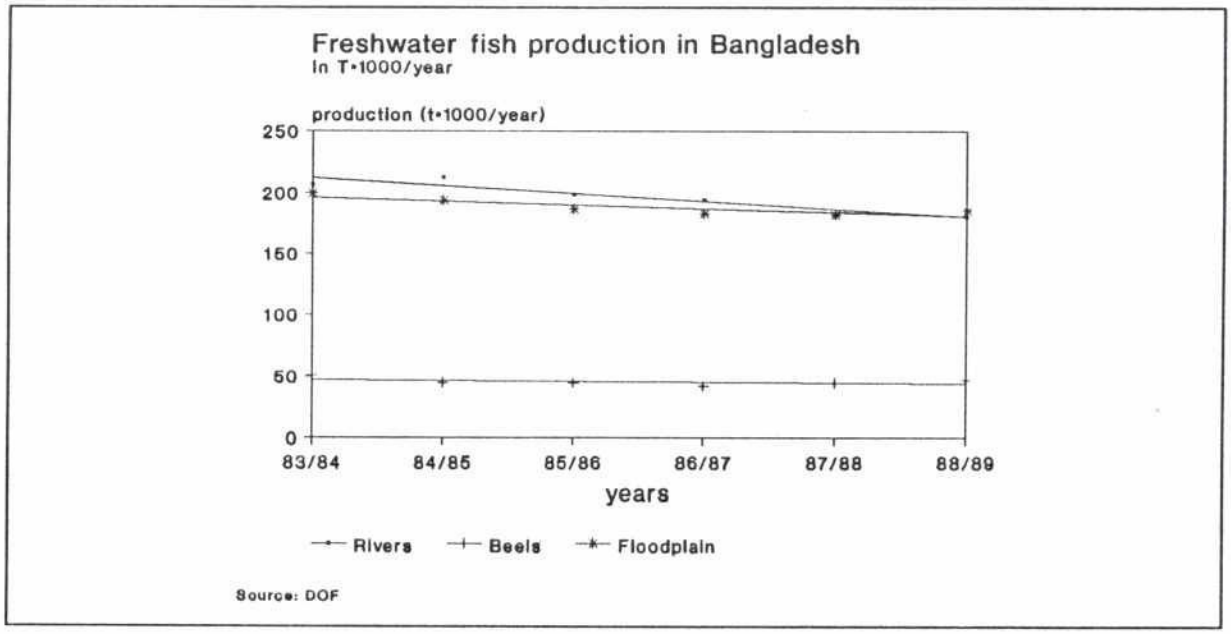
1.8 **River fish**, such as the major carps (Catla, Rui, Mrigal), spawn upstream in the Jamuna river at the beginning of the rainy season. The eggs, larvae, fingerlings and some adults of these species are flowing downstream with the water current into the Daleswari and Pungli river, finally entering the floodplains of the project area from the North side, through the Lohajan River, Sadullahpur Khal and Jugini Khal at the end of June. The inundated floodplain provides the carps all the nutrients needed for growth. The carps are migrating passively back to the main river as soon as the water recedes from the floodplain.

1.9 **Beel fish**, such as snakeheads (Taki, Shol), catfish (Magur), climbing perch (Koi), gouramies (Kailsha), barb (Puti) etc, can survive the harsh environmental condition of the floodplain during the dry season. This group probably reproduces in the pre-monsoon as soon as the water level in the beel rises. First nursing takes place in the inundated areas adjacent to the beels; later on they disperse all over the floodplain, once the river flood water enters. With the receding waters this group migrate back or get trapped in the low lying beels and pagards (ditches and borrow pits) .

1.10 The decline in inland fisheries catches during the last decade (see figure) is a field of major concern.

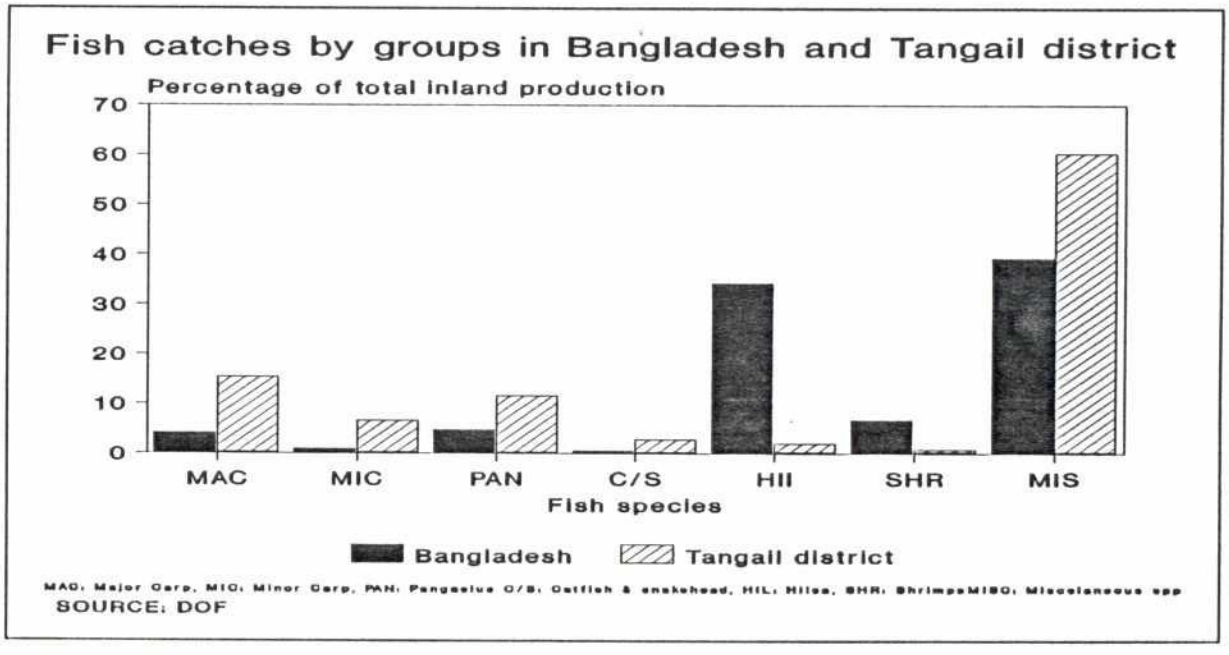
1.11 The objective of the fisheries component of the CPP pilot project is to increase the availability of fish by securing fisheries production and by improving aquaculture, which is only possible with a thorough understanding of the systems

1.12 Studies of the Irrigation Fisheries Development Project (1978-1982) and FAP 12 have indicated that the evaluation of impact of FCD projects on fisheries is hampered by the fact that baseline data on the pre-project situation are scarce. It is realised that it is difficult to obtain baseline data through field surveys of short duration, and a special study of one year, to be started in May 1992,is proposed.



2. THE SPECIAL FISHERIES STUDY

2.1 The study will concentrate on the major carps as well as on the so called

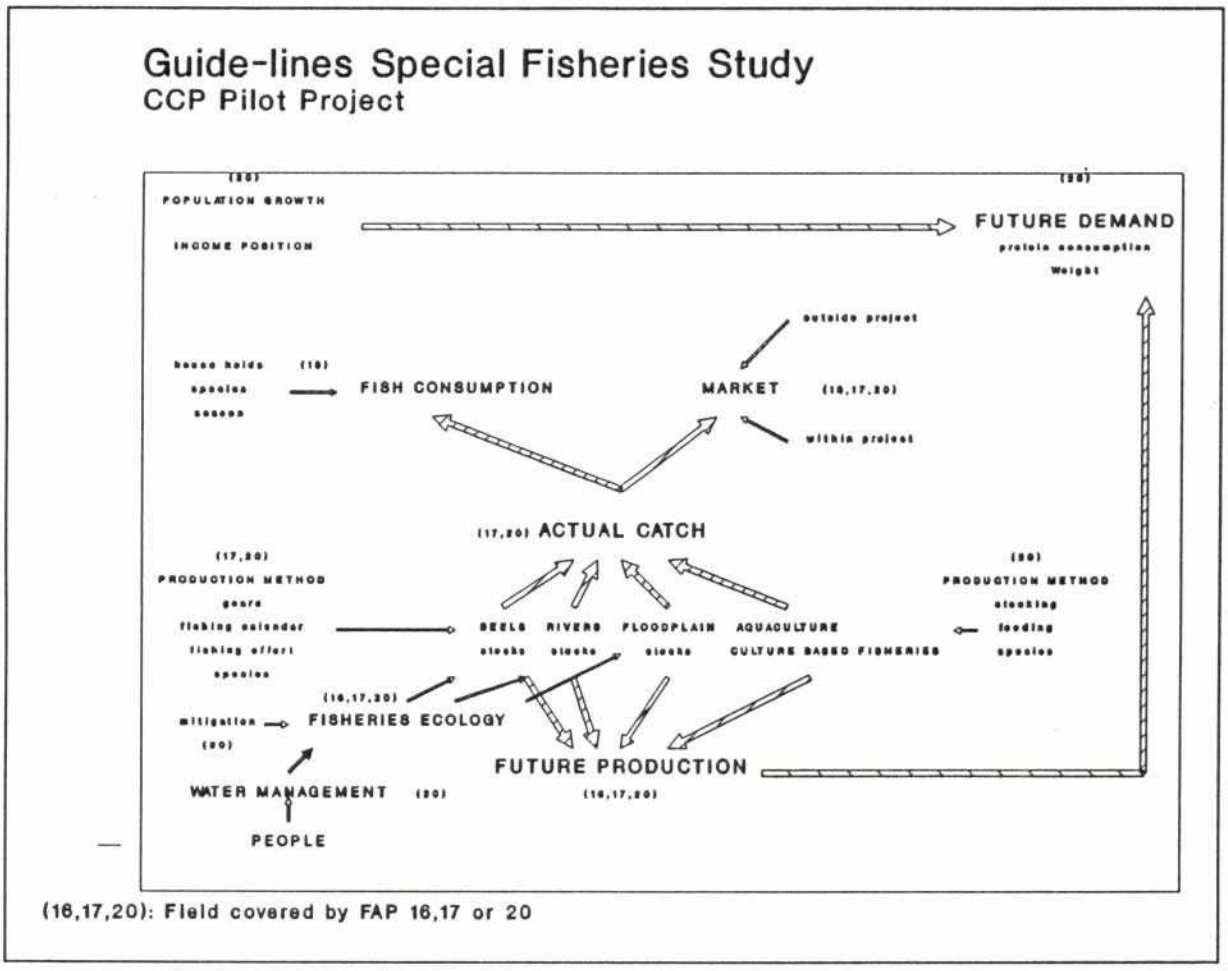


"small" or "miscellaneous" fish species.
The results of a preliminary survey, executed by FAP 16, indicated that the last group contributes largely to the fish consumption in the rural areas of the CPP project.

This group also represents 40% and 60% of the total inland fisheries catch of respectively Bangladesh and the Tangail district (see figure).

2.2 Preliminary results of the multi-disciplinary sub-compartmental survey indicated that a major concern of the people is the congestion of water during the pre- and post-monsoon due to improper drainage facilities. Complete drainage of the early rains could result in delayed spawning of the "beel" fish. As a consequence, there would be competition for between the carp fingerlings and the hatchlings of the "beel" fish, once the river flood enters the beels. Such a phenomenon could have drastic consequences for the survival of "beel" fish and the protein supply during the dry season.

2.3 The study should result in figures on; total catch, total consumption (covered by FAP 16), yield/recruit, growth and a better understanding of reproduction and migration of fish in the different habitats. The results of this study will be used in the impact assessment of water management scenario's on fisheries and the formulation and design of mitigation measurements and structures.



A general guide-line of the work and the linkages with FAP 16 and FAP 17 , and the methodology to be used, is presented below

2.4 Four different fishing habitats are of importance when hydrological and biological components are considered.
For each fishing habitat the following representative sites are selected.
- Rivers: Lohajang, Pungli, Dhaleswari.
- Beels: Jugini beel, Garinda beel and Boro Beel.
- Floodplain: Garinda floodplain Danya floodplain.
- Canals: Jugini Khal, Sadhullapur Khal, Fatepur Khal.

2.5 **Frame survey**: The number of fishermen, used gears and fishing intensity for the different classes and fishing habitats will be determined by bi-weekly standardized counting.

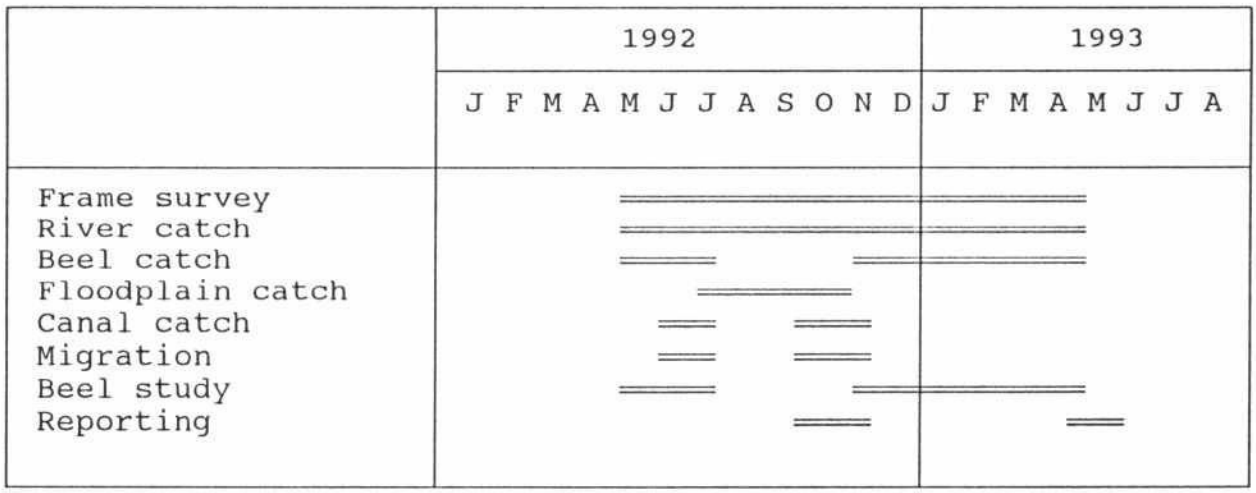
2.6 **Catch assessment**: The catch per unit effort and its seasonal variation of the main gears will be determined.
Catch samples will be analysed on; weight, main species composition and length frequency distribution.

2.7 **Reproductive strategies**: reproduction and migration patterns of fish will be studied by sampling; Jugini Khal, saddulhapur Khal and the Lohajang river at weekly intervals during the early flood period
The samples will be analysed on; larval fish, species composition, year classes, length frequency distribution and for the main species the Gonado Somatic Index (GSI) will be determined.

2.8 **Beel study**: The influence of meteorological (rainfall) and hydrological (water level) factors on the reproduction (GSI) of snakehead (taki), catfish (magur), barbs (puti), climbing perch (koi), gouramy (kailsha) and spiny eel (baim) will be studied.

3. WORK SCHEDULE

3.1 The planned work schedule is presented below.



4. STAFFING SCHEDULE AND REQUIREMENTS

4.1 Two field teams will be formed in order to gather data in the field. Each team consists of two junior biologists and occasional a professional fisherman is attached to it. The two teams are supervised by the senior fisheries biologists of FAP 20 and FAP 16.

4.2 **Junior Fisheries Biologist**: Four junior biologist (M.Sc) are planned (24 m/m)[2]. They are responsible for field data collection; gear counting, fish weighing, length measurements, species identification, determination of GSI in the laboratory.

4.3 **Senior Fisheries Biologist**[3]: A senior biologist (M.Sc), with several years of field experience is planned for 6 m/m. He/She is responsible for the supervision/guidance of the field teams, analyses and organisation of the raw data, monthly report writing and the liaison with FAP 17 and FAP 16.

4.4 **Fisheries Expatriate Consultant**: A senior biologist, with several years of field experience is planned for 3 m/m. Responsible for the overall guidance, start up of the field work and final reporting of the study.

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[2] FAP 16 will take care of 2 junior biologists

[3] In present budget

4.5 **Occasional labour**: 6 m/m of occasional labour, fishermen are planned for special sampling, fish identification, etc.

5. COSTS ESTIMATION

See next page.

5.1 The purchasing and operational costs (salaries excluded) are estimated at 7,11.500 Tk, specifications are given below.

COSTS in TK	(000)			
EQUIPMENT				
	UNIT	NO OF UNITS	UNIT PRICE	TOTAL
Moped	unit	4,0	40,0	160,0
Boat	unit	1,0	40,0	40,0
Engine	unit	1,0	60,0	60,0
Nets	kg	30,0	0,2	6,0
Disection	unit	3,0	3,0	9,0
Balance	unit	8,0	2,0	16,0
Fridgerator	unit	1,0	30,0	30,0
Computer AT	unit	1,0	60,0	60,0
Containers	lumpsum			30,0
Furniture	lumpsum			10,0
TOTAL				421,0
OPERATION				
	UNIT	NO OF UNITS	UNIT PRICE	TOTAL
Laboratory	unit	1,0	100,0	100,0
Petrol	ltr	2700,0	0,0	40,5
Formalin	ltr	100,0	0,2	20,0
Furniture	lumpsum			20,0
Fish samples	kg	2000,0	0,0	60,0
Miscelaneous	lumpsum			30,0
Labour	days	100,0	100,0	20,0
TOTAL				290,5

ANNEX 10

BANGLADESH FLOOD ACTION PLAN

COMPARTMENTALIZATION PILOT PROJECT FAP 20

PROPOSAL FLOOD MANAGEMENT MODEL IN THE TANGAIL COMPARTMENT

TANGAIL
MARCH 1992

CPP 92-2

PROPOSAL 'FLOOD MANAGEMENT MODEL IN THE TANGAIL COMPARTMENT'

TABLE OF CONTENTS

PROPOSAL 'FLOOD MANAGEMENT MODEL IN THE TANGAIL COMPARTMENT'

1. Introduction

According to the TOR of FAP 20 a simple mathematical model has been constructed for the Tangail Compartment, based on the MIKE 11 software. This model can be used by the modelling experts of the consultant as a tool in the planning stage of the project, but is less suitable for the management of the compartment itself. Besides this, it is less users friendly.

The development of this simple model to a Flood Management Model (FMM) aims at solving the mentioned problems. A FMM is a full simulation, users friendly model, which can be used to examine the effects of different operation regimes under different hydrological conditions. It will be an instrument for the identification of water management strategies, the development of (simple) operational rules and guidelines, the consultation of the people in the compartment and for training purposes.

Introduction of the FMM had not been included in the TOR of FAP 20. However, additional modelling activities and cost estimates could be defined when the scope of the Flood Management Modelling part of FAP 25 (Flood Modelling and Management) was finalized [TOR, p.11 and 20].

Advised by its Coordination Advisory Team (CAT), FAP 25 has made a proposal and prepared a Terms of Reference for the development of a Flood Management Model. In this TOR the FMM is presented as a hierarchy/system of models on three levels: national, (sub)regional and local, linked to the flood forecasting model of FAP 10. The output after two years will be:

- a coarse FMM on national level;
- a detailed pilot FMM for the North Central Region, and
- a detailed FMM of the Tangail Compartment.

In line with the TOR of FAP 20, the third model, the FMM of the Tangail Compartment, would be developed by FAP 20 in close cooperation with FAP 25. It would be financed by the Government of the Netherlands through the Technical Assistance budget of FAP 20.

The methodology of the development is described in the TOR of FAP 25. This TOR, a copy of which is added to this proposal (Annex 1), is sent by the FPCO to the Technical Committee for approval, expected on 21 April, 1992.

The purpose of this proposal is twofold:

- to acquire the approval of the donor countries for the proposed set-up of the FMM development for the Tangail Compartment, and

- to get the necessary increase of the Technical Assistance budget under FAP 20.

2. Scope of work.

2.1 Objectives

The long term objective of the Compartmentalization Pilot Project (FAP 20) is:

> *"to establish appropriate water management systems for the development of protected areas so that criteria and principles for design, implementation and operation can be made available for the Action Plan. Specifically this will entail the testing of the compartmentalization concept in the field under real operating conditions .... and trying out water control works and watermanagement system."* [TOR of FAP 20, p.4]

For the mentioned activities a mathematical model is an important tool. FAP 25 (Flood Modelling and Management) proposed to develop such a tool in the form of a user friendly graphics based model designed to assist decision makers in the management of floods. The overall objective is:

> *"to achieve an on-line mathematical model linked to the flood forecasting model of FAP 10, which would provide information to assist in the management and control of floods in real-time with parallel simulation of a range of possible scenarios"* [TOR of FAP 25, p.11]

It will take many years before this objective is reached. The development of the compartment FMM is one of the first steps. Through the development of such a compartment model the problems, which arise in the field will be faced on a manageable scale. Furthermore, the effectiveness of such a tool in the water management of a compartment will be tested. Concluding, the objective of the development of a FMM in the Tangail Compartment is described as:

> to produce, to test and to demonstrate a users friendly, effective, graphics based mathematical model, which provides information for the decision making and the operational aspects of the water management in a compartment

2.2 Output

The output for FAP 20 will be a detailed FMM of the Tangail compartment, based on the MIKE 11 model originally constructed by FAP 20. Through a linkage with a Digital Elevation Model (DEM) it will indicate for specific situations water levels, areas, depths and duration of inundation. Furthermore linkage with the Geographic Information System (GIS) will be tried out through determining impacts in terms of potential crop losses, infra-structural disruption, etc. in graphical and tabular form.

At the end of a two year period, software, guidelines and manuals will be available, not only for the Tangail compartment but also for application in other compartments.

A more detailed description of the output is given in the TOR of FAP 25 (annex 1).

3. Activities FAP 25, FAP 19 and FAP 20.

FAP 20 already built a MIKE 11 model for the Tangail Compartment, based on the earlier Kibria model. Because of the non-availability of a FMM, this model is used in the planning of the water system and the necessary construction works in the compartment. Also for the Sirajganj Compartment such a model will be developed. Both models will have their essential function during the planning phase. The model for Tangail will serve as an input for the FMM.

FAP 20 will develop the FMM for the Tangail Compartment in close cooperation with FAP 25.

The coordination of the development of the FMM on three levels -national, (sub)-regional and local- and the responsibility for the development of the first two FMM is with FAP 25. FAP 25 will carry out general enhancements of the present MIKE 11 software and develop new additional modules. Where these modules are relevant for FAP 20, these development will be in close cooperation between FAP 20 and FAP 25.

For the graphic presentation of the results the experiences of FAP 19 (GIS) will be of great use. The existing good cooperation between FAP 19 and FAP 20 will continue and will be incorporated in the development of the FMM.

4 Schedule of activities.

According to the TOR of FAP 25, the development of the FMM will be carried out in 2 stages:

Stage 1 - Development Phase, and

Stage 2 - Application and Demonstration Phase.

The FMM study will take place over a period of two-year, starting from June 1992.

In FAP 20 this will be preceded by a reconnaissance period during 1.5 months in the period April - June 1992. During this period the modelling expert will acquaint himself with the concept of compartmentalization, the selected alternative water management scenarios and the MIKE 11 model. After this reconnaissance period the development of the Tangail FMM will coincide with the programme of FAP 25. The TOR of FAP 25 (annex 1) gives detailed information about the total programme.

The modelling specialists will take part in the reporting of FAP 25 as described in the TOR FAP 25. Besides they will contribute to the reports of FAP 20, if needed.

5. Organisation and Manning.

5.1 Organisation

The expatriate and national modelling experts are members of the FAP 20 Consultants Team and have the same rights and responsibilities as the other team members. However, in the interest of the overall FMM development they will have intensive contact with the Consultants Team of FAP 25. Furthermore they also will have contact with FAP 19. The experts report to the Team Leader of FAP 20 and contribute to reports, to be published under FAP 20 and FAP 25.

The Team Leader of FAP 25 will fulfil a coordinating role in the FMM development. As such he will be concerned with the technical quality and the progress of the FMM as a whole.

In the interest of the progress the Team Leaders of FAP 25, 19 and 20 will meet periodically.

5.2 Manning

For the FMM development in the Tangail Compartment 12 man months of an expatriate and 24 man months of a national Hydraulic Modelling Engineer will be added to the team of FAP 20. In addition supplementary input of the present expatriate staff is required for two man months.

The input of the expatriate engineer will be divided over six short visits to the project. Divided over the years:

1992: 1.5 months in the first half of the year and 1.5 in the second one;
1993: 7 months;
1994: 2 months.

This programme will be confirmed in the Inception Report of FAP 25

5.3 Job descriptions

Expatriate Hydraulic Modelling Engineer

He/she will have a post graduate degree in irrigation/drainage or hydraulic engineering and, preferably, at least ten years of experience in this field, and also have a solid background in computational hydraulics. He/she will contribute to the general FMM development but focus primarily on the bespoke FMM for the Tangail Compartment.
Although he/she will be stationed in Tangail and will be a member of the FAP 20 team, a part of the work will take place in the Dhaka office of FAP 25.

National Hydraulic Modelling Engineer

He/she will have a post graduate degree in irrigation/drainage or hydraulic engineering and, preferably, a minimum of ten years of experience in water resources/mathematical modelling studies. He/she will work closely together with the Expatriate Hydraulic Modelling Engineer in developing and applying the bespoke FMM model for the Tangail Compartment. He/she will also be involved in establishing and applying of a model for Serajganj Compartment as required under FAP 20.

Annex 11 **MANNING SCHEDULE TECHNICAL PROPOSAL**

Position	Name	Calendar months Expat.	National	1991 M J S N J M M J S N J M M J S N J M M J S N J M M J S N A J A O D F A J A O D F A J A O D F A J A O D F A J A O D
Teaml./L&W use Engineer	P.A. Zijderveld	46		X XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX X XXX
Drainage Engineer	J. Pause	19		XXXXXXXXXXXXXXXXXX X
Drainage Engineer	F. Asgar		10	XXXXXXXXXX
Sociologist	D.R. Frans	22		XXXXXXXXXXXXXXXXXX X X XX
Sociologist	Mrs. S.M.A. Khatun		5	XX X X X
Sociologist	Mr. Moh. Tauhidun		15	XXXXXX XXXXXXX X X
Environmental spec.	A.C. Heringa	4		XX X X
Environmental/fish spec.	A.T.A. Ahmed		6	XX XX XX
Fisheries Spec.	J.C.J. v. Zon	3		X X X
Agro-economist	R. Wiens	5		XX X XX
Agro-economist	F.S. Sikder		5	XX X XX
Agronomist	J.R. Butter	3		X XX
Agronomist	M.A. Khaleque		2	X X
Hydrological Model Spec.	G. Kibria		4	XXXX
Legal Advisor	H.I. Bhuiyan		4	XXX X
Institutional Spec.	M. de Graaf	0.75		X
Project Manager	T.G.H. Jansen	3		....
TOTAL CALENDAR MONTHS		105.75	51	

X = 2 weeks X = 1 month .... = intermittent

ANNEX 12 JOB DESCRIPTIONS CONSULTANTS TEAM

POSITION	:	Team Leader
TYPE OF POSITION	:	Expatriate, long term
POSTING	:	Tangail

DETAILED RESPONSIBILITIES

1 Management of the Consultants Team.

2 Ensure an effective and timely implementation of the Technical Assistance.

3 Ensure, together with the Project Director, that the programmes are carried out according to the objectives and the programme presented in the TOR and the inception report in its ultimate form, taking into account adjustments agreed on in a later stage.

4 Advise and assist the Project Director on the overall implementation of the project.

5 Final control of the constructed works before advising on the reimbursement of the accrued expenditures.

6 Maintain liaison with the Netherlands Embassy, the FPCO/POE and the Team Leaders of related FAP projects.

7 Any other responsibilities assigned from time to time.

POSITION	:	Drainage Engineer
TYPE OF POSITION	:	Expatriate, long term
POSTING	:	Tangail

DETAILED RESPONSIBILITIES

In relation to the Consultants and the Project Team,

1 Advise and assist in designing and supervising all surveys relating to the hydrological environment (including inter-disciplinary surveys).

2 Advise and assist in designing and supervising the execution of a measurement and monitoring programme on hydrological parameters in the project area.

3 Advise and assist on the implementation of mathematical modelling activities in the project.

4 Advise and assist on the development of a series of scenarios for project implementation.

5 Advise and assist on arrangements for implementation of a decision making process and the management of the compartments.

6 Advise and assist regarding the performance of design, construction and O&M procedures of the structural as well as non-structural measures to be implemented under the project.

7 Advise and assist regarding the development of design criteria for compartments.

8 Advise and assist regarding the development of a training programme for the set-up of new compartments.

9 Support the national hydrologist and the mathematical modelling specialist.

10 Maintain liaison with relevant FAP studies.

11 Any other responsibilities assigned from time to time.

POSITION	:	Drainage Engineer
TYPE OF POSITION	:	National, long term
POSTING	:	Tangail

DETAILED RESPONSIBILITIES

In relation to the Consultants and the Project Team,

1 Advise and assist on the execution of all surveys relating to the hydrological environment.

2 Advise and assist on the execution of a measurement and monitoring programme of hydrological parameters in the project area.

3 Advise and assist regarding the development of a series of scenarios for project implementation.

4 Advise and assist regarding arrangements for implementation of a decision-making process and the management of the compartments.

5 Advise and assist regarding the performance of design, construction and O&M procedures of the structural as well as non-structural measures to be implemented under the project.

6 Advise and assist regarding the development of design criteria for compartments.

7 Advise and assist regarding the development of a training programme for the set-up of new compartments.

8 Any other responsibilities assigned from time to time.

POSITION	:	Mathematical modelling expert
TYPE OF POSITION	:	National, long term
POSTING	:	Tangail

DETAILED RESPONSIBILITIES

In relation to the Consultants and the Project Team,

1 Implementation of the mathematical modelling activities in the project in order to make suitable tools for the assessment and development of different project scenarios.

2 Advise regarding the execution of surveys related to the hydrological environment with special emphasis on the modelling aspects.

3 Advise regarding the execution of a measurement and monitoring programme of hydrological parameters in the project area as related to mathematical modelling.

4 Advise regarding the decision making process and management of the compartments on the basis of results of the mathematical modelling.

5 Advise and assist regarding design of the structural measures to be implemented under the project.

6 Advise and assist in the development of design criteria for compartments.

7 Advise and assist in the development of a training programme with special emphasis on mathematical modelling for the set-up of new compartments.

8 Maintain liaison with relevant FAP studies on mathematical modelling aspects.

9 Maintain the position of Local Teamleader of the National consultants.

10 Any other responsibilities assigned from time to time.

11 Team leader of the national specialists.

POSITION	:	Hydraulic Modelling Engineer, Flood Management Model
TYPE OF POSITION	:	Expatriate, short term
POSTING	:	Tangail

DETAILED RESPONSIBILITIES

In relation to the Consultants and Project Team,

1 Implement the Flood Management Model of the Tangail Compartment.

2 Contribute to the general FMM development in FAP 25.

3 Maintain liaison with FAP 25 Flood Modelling and Management, FAP 19 (Geographical Information System) and other projects and agencies in and outside the FAP organisation which are relevant for the FMM development.

4 Any other responsibilities assigned from time to time.

POSITION	:	Hydraulic Modelling Engineer, Flood Management model
TYPE OF POSITION	:	National, long term
POSTING	:	Tangail

DETAILED RESPONSIBILITIES

In relation to the Consultants and Project Team,

1 Assist in developing and applying the Flood Management Model (FMM) for the Tangail Compartment.

2 Assist in the contribution to the general FMM development in FAP 25.

3 Assist, if required, in establishing and applying a model for the Sirajganj Compartment.

4 Any other responsibilities assigned from time to time.

POSITION	:	Sociologist
TYPE OF POSITION	:	Expatriate, long term
POSTING	:	Tangail

DETAILED RESPONSIBILITIES

In relation to the Consultants and Project Team,

1 Advise and assist in designing and supervising all socio-economic surveys including multi-disciplinary surveys and special studies.

2 Advise and assist in designing and implementing systems that facilitate people's participation.

3 Advise and assist in designing and implementing institutional arrangements for the management of compartments, taking into account the advice of the expatriate short term institutional specialist.

4 Advise and assist in designing and implementing the structural and non-structural elements of compartmentalization in such a way as to direct temporary and long term benefits to the disadvantaged, particularly women.

5 In consultation with other CPP team members, maintain close liaison with FAP socio-economic studies as well as other relevant FAP projects.

6 Facilitate the implementation of the multi-criteria "Guidelines for Project Assessment" in project planning and evaluation.

7 Supervise the national sociologists and specialists in the field of institutionalization and environment of the Consultants Team.

8 Any other responsibilities assigned from time to time.

POSITION	:	Sociologist
TYPE OF POSITION	:	National, male, long term
POSTING	:	Tangail

DETAILED RESPONSIBILITIES

In relation to the Consultants and Project Team,

1 Assist in the design, implementation and supervision of all socio-economic surveys and special studies.

2 Supervise and conduct preliminary surveys and institutional and other specific surveys.

3 Assist in the design, implementation and supervision of people's participation related activities.

4 Assist in the design and implementation of all institutional arrangements.

5 Any other responsibilities assigned from time to time.

POSITION	:	Sociologist
TYPE OF POSITION	:	National, female, short term
POSTING	:	Tangail

DETAILED RESPONSIBILITIES

In relation to the Consultants and Project Team, and with particular attention to women,

1 Assist in the design, implementation and supervision of all socio-economic surveys and special studies.

2 Supervise and conduct preliminary, institutional and other specific surveys.

3 Assist in the design, implementation and supervision of people's participation related activities.

4 Assist in the design and implementation of institutional arrangements.

5 Any other responsibilities assigned from time to time.

POSITION	:	Environmentalist
TYPE OF POSITION	:	Expatriate, short term
POSTING	:	Tangail

DETAILED RESPONSIBILITIES

In relation to the Consultants and Project Team,

1 Advise and assist in the Environment Impact Assesment for the Sirajganj Compartment and the monitoring system required, in line with the "Guidelines for Project Assessment".

2 Advise and assist on ecological aspects of compartmentalization.

3 Advise and assist in setting up ecological and environmental studies and trials.

4 Maintain liaison with the FAP Environmental Study (FAP 16).

5 Any other responsibilities assigned from time to time.

POSITION	:	Environmentalist
TYPE OF POSITION	:	National, short term
POSTING	:	Tangail

DETAILED RESPONSIBILITIES

In relation to the Consultants and Project Team,

1 Assist in the Environment Impact Assesment for the Sirajganj Compartment according to the "Guidelines for Project Assessment".

2 Assist in the ecological aspects of the impact monitoring system, in line with the "Guidelines for Project Assessment".

3 Liaison and cooperate with the FAP Environmental Study (FAP 16).

4 Assist in setting up ecological and environmental studies and trials.

5 Any other responsibilities assigned from time to time.

POSITION	:	Fisheries expert
TYPE OF POSITION	:	Expatriate, short term
POSTING	:	Tangail

DETAILED RESPONSIBILITIES

In relation to the Consultants and Project Team,

1 Advise and assist on aspects related to fisheries as element of the impact monitoring system, lined out in the "Guidelines for Project Assessment".

2 Advise and assist on the setting up of fisheries studies and trials.

3 Maintain liaison with the FAP Environmental Study (FAP 16) and the FAP Fisheries Study (FAP 17).

4 Any other responsibilities assigned from time to time.

POSITION	:	Fisheries-cum-environmentalist
TYPE OF POSITION	:	National, short term
POSTING	:	Tangail

DETAILED RESPONSIBILITIES

In relation to the Consultants and Project Team,

1 Assist in the ecological aspects of the impact monitoring system, in relation to the "Guidelines for Project Assessment".

2 Assist in setting up fisheries studies and trials.

3 Work together with the FAP Environmental Study (FAP 16) and the FAP Fisheries Study (FAP 17).

4 Any other responsibilities assigned from time to time.

POSITION	:	Agronomist
TYPE OF POSITION	:	Expatriate, short term
POSTING	:	Tangail

DETAILED RESPONSIBILITIES

In relation to the Consultants and Project Team,

1 Advise and assist on the data collection and analysis of the existing cropping patterns and potential changes.

2 Advise and assist on the setting up of agronomy studies and trials.

3 Work in close consultation with other project team members, government officials and local people.

4 Maintain liaison with the FAP NCR study (FAP 3) and the FAP NWR Study (FAP 2).

5 Any other responsibilities assigned from time to time.

POSITION	:	Agronomist
TYPE OF POSITION	:	National, short term
POSTING	:	Tangail

DETAILED RESPONSIBILITIES

In relation to the Consultants and Project Team,

1 Assist in the data collection and analysis of the existing cropping patterns and potential changes.

2 Assist in setting up agronomic studies and trials.

3 Work together with the other project team members, government officials and local people.

4 Any other responsibilities assigned from time to time.

POSITION	:	Agro-economist
TYPE OF POSITION	:	Expatriate, short term
POSTING	:	Tangail

DETAILED RESPONSIBILITIES

In relation to the Consultants and Project Team,

1 Advise and assist in the data collection and analysis of the existing economic situation as well as the potential situations following compartmentalization.

2 Advise and assist in the economic aspects of the special studies and trials.

3 Guide the implementation of the multi-criteria analysis in project planning and evaluation.

4 Maintain liaison with the FPCO/POE regarding the design and use of the "Guidelines for Project Assessment".

5 Any other responsibilities assigned from time to time.

POSITION	:	Agro-economist
TYPE OF POSITION	:	National, short term
POSTING	:	Tangail

DETAILED RESPONSIBILITIES

In relation to the Consultants and Project Team,

1 Assist in the data collection and analysis of the existing economic situation as well as the potential situations following compartmentalization.

2 Assist in the economic aspects of the special studies and trials.

3 Any other responsibilities assigned from time to time.

POSITION	:	Institutional Specialist
TYPE OF POSITION	:	Expatriate, short term
POSTING	:	Tangail

DETAILED RESPONSIBILITIES

In relation to the Consultants and Project Team,

1 Advise and assist on institutional aspects related to the management of the water system in the compartments, including the design, implementation and evaluation of alternative institutional models.

2 Advise and assist on establishing Local Water Management Boards and underlying committees and/or groups in the Tangail and Sirajganj Compartments.

3 Advise and assist regarding institutional aspects of the (possible) involvement of governmental and non-governmental organisations in FAP 20.

4 Advise and assist on special studies and surveys related to institutional aspects of compartmentalization.

5 Advise and assist regarding the design of a training strategy and training modules.

6 Maintain liaison with the FAP Institutional Study (FAP 26).

7 Any other responsibilities assigned from time to time.

POSITION	:	Training Specialist
TYPE OF POSITION	:	Expatriate, short term
POSTING	:	Tangail

DETAILED RESPONSIBILITIES

In relation to the Consultants and Project Team,

1 Advise and assist on a training strategy covering all the different institutions and individuals involved in management of the water system in the compartments.

2 Advise and assist in the design, implementation and evaluation of all training modules.

3 Advise and assist in the use of all relevant communication tools in relation to training.

4 Advise and assist in identifying capable training institutions (including NGOs) and in working out appropriate arrangements for these institutions to conduct specific training modules.

5 Any other responsibilities assigned from time to time.

POSITION	:	Institutional Specialist
TYPE OF POSITION	:	National, long term
POSTING	:	Tangail

DETAILED RESPONSIBILITIES

In relation to the Consultants and Project Team,

1 Assist in the institutional aspects of compartmentalization.

2 Assist in the institutional arrangements to be made and actions to be implemented in the Tangail and Sirajganj Compartments.

3 Assist in special studies and surveys related to the institutional aspects compartmentalization.

4 Assist in the design, implementation and evaluation of all training activities.

4 Work together with the FAP Institutional Study (FAP 26), in case an input from the compartment level is required.

5 Any other responsibilities assigned from time to time.

POSITION	:	Legal adviser
TYPE OF POSITION	:	National, short term
POSTING	:	Tangail

DETAILED RESPONSIBILITIES

In relation to the Consultants and Project Team,

1 Advise, in consultation with the sociologists and the institutional specialists, on legal aspects related to compartmentalization.

2 Prepare, in consultation with the sociologists and the institutional specialists, draft regulations for the Local Water Management Board and for the underlying committees and/or groups.

3 Any other responsibilities assigned from time to time.