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)

TANGAIL CPP INTERIM REPORT

ANNEX 1.3 : MULTI-DISCIPLINARY SUB-COMPARTMENTAL SURVEY; MAIN VOLUME

September 1992

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

under assignment to

DIRECTORAAT GENERAAL INTERNATIONALE SAMENWERKING
Government of the Netherlands

and

KREDITANSTALT FÜR WIEDERAUFBAU
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ANNEX 1.3: MULTI-DISCIPLINARY SUB-COMPARTMENTAL SURVEY:

MAIN VOLUME

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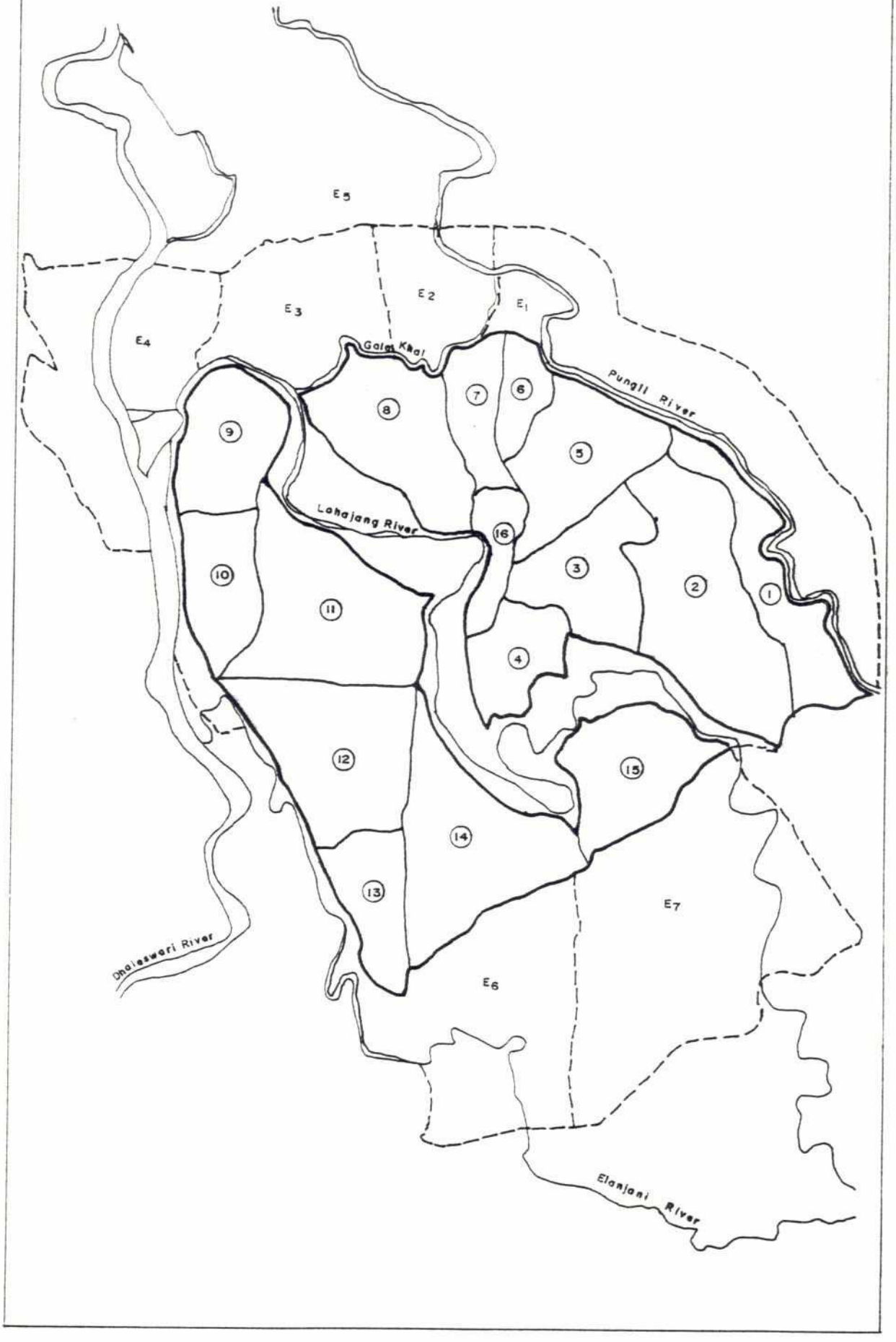
MAP OF AREAS SURVEYED



1 INTRODUCTION

The pilot project nature of FAP 20 calls for an experimental type of approach to project design and implementation. FAP 20 therefore needs both detailed and extensive information on the existing and, in due course, on the post-project situation. To gather this information FAP 20 will conduct a rather comprehensive baseline survey.

The TOR mentions the following about the main objective of the baseline survey:

> *"Provide and verify data on hydrological, engineering, agricultural, socio-economic and environmental aspects prior to, during and on completion of the pilot project."* [TOR, page 9].

One of the major aims of FAP 20 is facilitate sustainable development through water management. Previous studies have highlighted that, to achieve this aim, one has to involve the people of the area in all phases of the project. This starts at the time of planning and design. Future participation can only be expected to the extent that the project addresses the needs of the local population.

To enable sustainable development FAP 20 has put much emphasis on people's participation. The Multi-Disciplinary Sub-Compartmental (MDSC) survey has been the tool developed specifically to identify the needs of the different interest groups in the area.

1.2 Objectives of the report

Much data has been collected during the MDSC survey. All information is written up and stored on diskette. Through the word-processing "search" facility anyone can access to this information. This will be particularly relevant for the different specialists as the project develops.

For easy reference a summary of the most obvious data has been compiled in this main volume. This MDSC survey main report combines the data from both the area inside the boundary of the Tangail CPP as well as the adjacent area (see 2.6).

1.3 Organization of the report

Following this introduction, the projects background and the study areas are described in chapter 2. Chapter 3 deals with the methodology, Chapter 4 summarizes the information from the eastern halve of Tangail CPP. Chapter 5 covers the western part and Chapter 6 the adjacent area.

Appendix 1 contains the information on sub-compartments 1 - 4, Appendix 2 covers sub-compartments 5 - 8, E1 and Tangail town, Appendix 3 the sub-compartments 9 - 11 as well as the *Lohajang* floodplain, Appendix 4 sub-compartment 12-15, Appendix 5 the *Pungli* floodplain and northern sub-compartments E2 - E4 and finally Appendix 6 deals with the *Dhaleswari* floodplain and the southern adjacent areas E6 and E7.

2 PROJECT BACKGROUND AND STUDY AREAS

2.1 Project background

Following the disastrous floods of 1987 and 1988 several studies were undertaken to investigate how to protect the country better against the devastating effects of the floods. The results showed alternatives, with on the one side 'full protection' and on the other side 'living with the floods'.

Bangladesh adopted the outlines of an Action Plan for flood control and drainage in June 1989 and the Government of Bangladesh requested the World Bank to assist in preparing a Flood Action Plan (FAP). This request was endorsed at the G-7 meeting of industrialised countries in July 1989, which called for the international community to help find solutions to the flood problem in Bangladesh which are 'technically, financially, economically and environmentally sound.' The FAP was in turn endorsed at a special conference of the Government of Bangladesh and donor organisations in London in November 1989, and is presently being implemented.

The FAP comprises a number of studies and pilot projects which are expected to lead to water resource management and related projects, with an emphasis on flood control and drainage. In the first two years of the Plan, 1990-92, Regional Water Resource Development Planning Studies are being undertaken to identify alternative water resource management strategies for different regions of the country. These will be followed by feasibility studies for priority investment projects. A number of complementary socio-economic and environmental studies are being carried out in order to improve understanding of the impact of flooding and of Flood Control, Drainage and Irrigation (FDC/I) projects, and to recommend economic, social and environmental guidelines and criteria appropriate for use in planning and implementing such projects. While the emphasis of the Regional Studies is on flood control and drainage, other problems such as saline intrusion will also be addressed.

The main focus of the Flood Action Plan is defined by the Government of Bangladesh in the well-known Eleven Guiding Principles. Emphasis is given on 'controlled flooding' and 'controlled drainage'. Floods would be controlled in such a way that maximum profit can be achieved from the beneficial effects of river water flooding, while minimizing the disadvantages. The Action Plan comprises twenty-six components and supporting activities. The Compartmentalization Pilot Project - FAP 20 - is one of them.

2.2 The compartmentalization concept

The concept of compartmentalization is introduced in the GOB/UNDP study "Bangladesh Flood Policy Study" (May 1989). According to the Flood Action Plan, which resulted from this study, the areas behind the right and (planned) left bank of the Brahmaputra would be subdivided into compartments.

The flood water will flow into the compartment and spread over the area in a semi-controlled way by means of regulating structures in the primary embankments along this river and the gated or ungated openings in the secondary embankments between the compartments. The structural and non-structural measures to achieve this can be called the macro (main) system.

The way the flood, as well as the drainage of excess rainfall, has to be controlled will be determined by the demands from inside the compartment. The required structural and non-structural measures for water management within the compartments can be called the micro (minor) system.

The concept of compartmentalization is instrumental for the implementation of water management interventions.

The following definition will be used:

> *A compartment is an area in which effective water management, particularly through semi-controlled flooding and controlled drainage, is made possible through structural and institutional arrangements. Compartmentalization is linked to area development with sound water management as the main agent. A compartment will be sub-divided into sub-compartments and operational water management units.*

So far it is not clear yet what the "optimal" size of a compartment will be nor what factors should determine the boundaries of the compartment. The boundaries of the Tangail pilot area are formed by the existing embankment.

It is obvious that a compartment can be a large area and that hydrology, topography, existing infrastructure, landuse and administrative boundaries are important factors to consider. In analogy with an irrigation system, it is possible to make a distinction between the macro (main) system and the micro (minor) system. Clearly, to make the participation of the beneficiaries in Project planning, design, construction, operation, maintenance, monitoring and evaluation successful, it will be necessary to subdivide the compartment into rather small units.

2.3 Objectives of the Compartmentalization Pilot Project

The overall objective of FAP 20 is:

> "*....to establish appropriate watermanagement 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.*" [ToR, page 4].

Specifically this will entail the

> "*...testing of the compartmentalization concept in the field under real operating conditions, addressing all relevant socio-economic, institutional and environmental issues and trying out water control works and water management systems.*"[ToR, page 4].

FAP 20 has to produce not only the structural works and an institutional set-up for the compartments Tangail and Sirajganj, but also criteria, guidelines, manuals and a training and demonstration programme for the establishment of other compartments.

2.4 Baseline survey and study framework

The involvement of FAP 20 in a compartment starts with a **reconnaissance survey**. This survey is conducted by a few members of the CPP Team, takes a few days and aims at getting a general picture of the area.

This survey is followed by a **preliminary survey** of the whole compartment. All disciplines in the CPP Team are involved in this survey. The aim is to get a multi-disciplinary overview of the situation, mainly based on secondary data, and to tentatively decide on the sub-compartmental boundaries. The team members report their findings in Technical Notes. These are then discussed and result in a "SUMMARY OF THE PRELIMINARY SURVEY" of the compartment. This information is the starting point for the baseline survey.

Next comes that **baseline survey**. Some parts of this survey are done by members of the CPP Team while other parts are conducted by specialized local firms. The results of the baseline survey will be used in two ways. First of all the results feed into the design phase of the compartment. Secondly the information gathered will be used in monitoring and ultimately in the post-project evaluation.

On the basis of the outcome of the baseline survey a **monitoring programme** will be designed measuring key indicators on a regular basis throughout the project lifetime.

Finally the experimental nature of the project calls for in-depth **special studies** to supplement the broad surveys. The reason is that there are areas, relevant to compartmentalization, where existing practices are clearly in-effective, as well as areas about which little is known and/or where there are few if any solutions. The baseline information is used to up-date the tentative list of special studies drawn up during the inception phase.

2.5 Different components of the baseline survey

The baseline survey comprises the following four surveys, each with specific aims and objectives;

- The **household survey** is designed to provide statistically valid baseline data mainly covering social, economic and agricultural issues. The survey is of the questionnaire type. This data will be used to some extent in the planning process, but the main use of this data will be in the multi-criteria analysis of the alternatives, and the post-project evaluation.

- The **topographic and hydrological surveys** provide vital information for the planning, the mathematical modelling and the post-project evaluation. This survey includes levelling, recording water levels and discharge measurements.

- The focus of the **multi-disciplinary sub-compartmental (MDSC) survey** is the interrelation between all the relevant facets of life in each sub-compartment. Typical items are history of the area, environment, transport, fisheries, rural industry, hydrological situation, agricultural status etc. Data is collected using a Rapid Rural

Appraisal approach. The main use of the information is in planning and design. At the post-project evaluation stage the data will again prove useful as qualitative, descriptive baseline information.

- Through the **institutional survey** information is gathered at the compartmental level regarding the institutions relevant to water management. The information is gathered using open ended checklist questionnaires. The data is feed into the design and implementation of the institutional development.

The Tangail CPP Interim Report Annex 1.1 covers the household survey, Annex 1.2 the topographic and hydrological survey, while this Annex 1.3 covers the MDSC-survey and Annex 5 (Institutional report) the institutional survey.

3 METHODOLOGY

3.1 Geographic coverage

The MDSC-survey covers two basically different geographic areas. The first one is the **area inside the main borders** of the CPP project. This is the area that is expected to benefit from the project. However, in spite of all-out efforts to prevent this from happening, it is likely that at least some in this area will be negatively influenced, for instance through land acquisition, loss of boat transport facilities or access to common capture fisheries resources.

The second area to be influenced by the CPP project, and therefore to be covered by the MDSC-survey, is the **area adjacent to the project boundary** but hydrologically or socio-economically linked to it. The impact in some parts of this area could be negative.

The first distinct adjacent are is that up-stream from the Tangail CPP area, North of the *Gala Khal* and the River *Lohajang* between the rivers *Pungli* and *Dhaleswari* up to the road from *Bara Basalia* to *Mirpur*. The second is the area between the western embankment of the CPP to the right of the river *Dhaleswari* with as the northern boundary the road from *Mirpur* to *Kali Keutil* up till *Bhangabari* to the South. A third area lies in *Delduar* Thana south of the southern boundary of the CPP area, with as western boundary the river *Elanjani*, as eastern boarder the *Karatia-Dhaka* Road, and as southern boarder the *Elashin-Delduar-Pakula* Road. Finally the fourth area is that to the East of the project, i.e. the river *Pungli* and its left floodplain. Here the influence of the CPP is likely to be minimal but a stretch of about half to one km East of the river has been surveyed.

3.2 Objectives of the mdsc-survey

The objectives of the MDSC survey are, for each sub-compartment;

1 To get a broad, inter-disciplinary, descriptive overview of the existing situation.

2 To identify the existing water management related situation, particularly the different ways in which water resources are used and the problems caused by flooding and/or drainage congestion.

3 To find out people's opinion on the potential solutions, structural and non-structural, to overcome the constraints identified.

3.3 Background to Rapid Rural Appraisal in the MDSC-survey

As mentioned an adjusted version of the Rapid Rural Appraisal methodology will be used to conduct the MDSC-survey. FAP 12's methodology for conducting RRAs, as detailed in their *METHODOLOGY REPORT (MAIN VOLUME)*, has been followed whenever possible. Extensive use has been made of the book by Ali Mohammad, *RRA, CONCEPTS, METHODS & APPLICATION*, Bangladesh Agricultural Research Council (1990).

The following definition of a RRA has been used:

> *"A systematic, but semi-structured, activity carried out in the field by a multidisciplinary team and designed to quickly acquire new information on, and new hypotheses for, rural development."* (Ali Mohammad, p. 2)

The background that lead to the development of the RRA methodology is dissatisfaction with the traditional questionnaire type surveys. These are considered to be too top-down, time consuming, expensive and inflexible at the time of implementation. The output is often difficult to analyze, often not that relevant to people's needs and is not that helpful when it comes to planning and design of a project.

Questionnaire type surveys fall short of expectations particularly when it comes to defining the actual situation in terms of problems and potentialities, interrelationships between the physical conditions and human activities and between the different categories of people. The RRA is generally seen to be a better tool to get the more qualitative data.

In FAP 20 the MDSC-Survey and the more traditional household survey (see 2.5 above) are designed to complement each other.

3.4 Key elements of the MDSC survey

Characteristics

The MDSC is based on the RRA methodology. RRAs are known for a few key elements. These are that RRA are;

- semi-structured (open to new ideas but not without focus),
- field-centred (knowledge from the rural people themselves),
- multi-disciplinary (involving the different "worlds" of different disciplines),
- done by a team (group learning),
- done quickly (2 days),
- often come up with new information (do away with myths, superstitions and exaggerations),
- often generate new hypothesis (easy analysis and therefore new solutions),
- aimed at development (giving the poor a chance).

Fundamentals

There are a few fundamentals that are part of the RRA methodology. The first is that representativeness and accuracy is achieved via triangulation and iteration. Triangulation is systematically combining research methods, team composition and varying sites/respondents to get a complete picture. Iteration is accomplished by semi-structured interviewing which helps maintain flexibility in questioning and hypothesis building.

The second fundamental point of the RRA methodology is that of learning through indigenous knowledge. Here the assumption is that outside expert may have in-depth knowledge of a particular subject, but often lack the kind of integrated locality specific knowledge that the people of the area have. The RRA methodology acknowledges the

importance of such local knowledge and the RRA approach intends to bring such knowledge into the planning process.

The third basic point of the RRA is that the work is done by an inter-disciplinary team. This has many obvious advantages over a team of people of only one discipline. Apart from the normal advantages, the RRA methodology seeks to stimulate sharing of information and insights between the different disciplines. This is particularly relevant where unexpected, and therefore questionable, information becomes available. An inter-disciplinary team might help direct further data gathering, verification and if necessary in-depth research.

Finally flexibility majors in the RRA approach. Depending on the information collected questions or their sequence can easily be changed and new questions added.

Required characteristics of team members

Not every professional is suitable for conducting an MDSC survey or RRA. The following characteristics are considered essential;

- willingness to learn,
- commitment to people,
- cooperative attitude,
- professional skill and
- healthy and hard working.

Methods and tools

RRAs and the MDSC survey are carried out using the following "tools";

- semi-structured interview,
- direct observation (field walks, transects, central places),
- interview guides and
- check lists.

The MDSC survey methodology differs from the normal RRA, in as much as finding out the opinion of the people themselves is considered to be the prime aim. Therefore "direct observation" plays a supportive role, rather than being the basis for the final "assessment".

Data presentation techniques

- Village maps (physical and socio-economic details)
- Transects (land-use, opportunities, constraints to agr.dev.)
- Crop calenders (planting and harvesting cycles)
- Seasonal calenders
- Animal feed calenders
- Time related data trends
- Village institutes
- Cross-section diagrams
- Activity/labour schedules
- Decision trees

3.5 Application

Focus of the MDSC

The core of FAP 20 is water management, and the main effect of compartmentalization will be on the timing of flooding, the speed of water level changes and possibly water levels. Because the main direct impacts of water management inside the compartment will be on those living in the rural area that area will be covered extensively.

The process of urbanization is likely to continue in the decades to come. One of the main reasons to choose the Tangail CPP area was in fact that a large proportion of its population (40%) live in an urban setting. This is assumed to reflect the future situation in major parts of the floodplain in the decades ahead. Therefore the needs of the urban section of the society must be taken into account in the FAP. FAP 20 will accordingly cover the urban population as well.

MDSC survey team composition

Controlled flooding and controlled drainage are at the core of compartmentalization, Therefore the MDSC survey team included a Drainage Engineer.

Within the rural area the farm households are distinct from the non-farm households. The former are likely to obtain most of the structural and direct benefits. The non-farm households are likely to only receive temporary and secondary benefits. Therefore both groups are treated as distinct populations, with their own domain. An Agronomist on the MDSC survey team interviewed farmers while the male Sociologist related to the landless, artisans etc.

Fishermen communities, as well as subsistence fishermen may be negatively affected by water management. Therefore the Fisheries specialist on the MDSC survey team collected information on this side of life in the floodplain.

Water, in all its aspects, is important to women. They bear most of the responsibility for raising children and keeping all household members health and going. Furthermore women are most vulnerable during floods. Therefore the MDSC survey team includes a female Sociologist who interviewed women of all categories to find out their views on water and its management.

Training

The MDSC survey team has been given a two day training course before starting the survey. To focus the information gathering during the survey, participants spent time clarifying their understanding of objectives of the FAP as a whole, and of FAP 20 in particular.

Each specialist then developed a tentative checklist and these were discussed to find areas of overlap and gaps.

Practical matters

The first day of the survey the team would find a person with detailed knowledge of the locality to advise on where to start and which villages to cover. As the Drainage Engineer had toured the area extensively, he normally pre-planned each field visit.

The survey schedule was made to allow two days field work per sub-compartment. These vary in size from 600 - 1500 ha, with a population of 5.000 - 15.000 people (except Tangail town with over one Lac.). Every third day was used for report writing. As the original schedule was very tight, it did not allow for (short) follow-up visits to verify specific issues. These were left till after completion of the main survey.

Interviews

Interviews included some, but few, key respondents. They were mainly approached to find out general information about the locality.

Group interviews of randomly selected individuals, but all from the same interest groups, were the norm. Such groups were useful to get information on a variety of subjects, get an idea of the consensus about the information and the range of variation in areas such as yields. Group interviews were particularly useful to avoid the interviewer having to "question" information supplied as group members would often argue amongst themselves. Care was taken to interview people from different classes/occupations, even within the same interest group (marginal and large farmers etc.).

Whenever interviews of a group of people indicated that a sensitive area had been touched upon (such as why a *khal* was closed by someone without the consent of others), then individuals were interviewed as follow-up.

In all interviews care was taken that the people of that particular interest group could voice their own opinion. More than once local elite or students would "volunteer" to speak for others. Such interpreters were tactfully asked to allow everyone to speak for him/herself. If this had no result then the interview was cut short.

Interviews were normally held in locations where people felt at home. Interviews started with an introduction, including the interviewer mentioning his/her name, that he/she had come from the BWDB, that the BWDB was about to start a programme in the area and that the BWDB wanted to know the opinion of people from all walks of life about the existing water related situation, the main problems and potential solutions. The interviewer asked the respondents whether they could spare the time. Normally the interviewer use *"apni"*, not *"tumi"*, asked permission to write responses down and thanked the respondent at the end.

During the training much stress was laid on the principle that no "leading" questions could be asked. Only probing questions (who, what, where, when, why and how?) were allowed. There are two main reasons for this. The first is that leading questions distort the interview. The second reason is that in the Bengali culture villagers would see the interviewers ("educated officials from the city") as (much) higher in status than themselves. In response, they would give the kind of answers that they think would please the interviewer. Not asking leading questions made such a "guided" response difficult.

Team interaction

Team interaction has been stimulated to cross check data and for inter-disciplinary cross fertilization. To facilitate this, the team members lived together in the CPP guesthouse. An effort was made to ensure that staff would remain with the team through-out the period of the MDSC survey. Apart from the Drainage Engineer who left for Kuwait, all did complete the survey.

Report writing

Ultimately the success of the MDSC survey depends on the completion of a meaningful report, i.e., a source of comprehensive and reliable information allowing better design, planning and decision making.

Each specialist drafted his own section. These were then compiled in a draft sub-compartmental report. That draft was circulated for comments and discussion. Team members produced a summary of their findings in the form of comparative tables as well as descriptive paragraphs. These were then compiled.

When a particular part of the survey was completed a meeting was held with the MDSC survey team and the other relevant CPP staff. This resulted in a number of follow-up visits which were done by a number of the team members. They reported back to the cobrdinator who then finalized the report.

Practical arrangements and planning

A total of 25 sub-compartments were surveyed by the multi-disciplinary team. Of these 17 are inside the CPP boundaries and 8 outside. The plan was to cover all internal and external sub-compartments in 13 weeks. In practise the survey took two weeks longer because staff were busy with other responsibilities (FAP conference etc.).

Field work was expected to take on average 2 full working days per sub-compartment, which it did. The team did most fieldwork from early morning till about two o'clock. A 4-wheel drive vehicle was assigned to the MDSC survey team for travel to and from the sub-compartments. Most movements within the sub-compartments were done on foot.

A computer as well as the office secretary were at the disposal of the team. Report writing, compelling and particularly editing took considerable more time than originally anticipated.

The Tangail CPP Executive Engineer was appointed the Team Leader of the MDSC survey. Due to other priorities he could not accompany the team very often and he sent an Sectional Officer to replace him. A deputy Team Leader was selected from among the other team members.

The expatriate Sociologist was available to back-up the MDSC survey team. He went with the team during the first few sub-compartments, but had to drop the fieldwork due to other responsibilities. He did spent considerable time on report editing.

3.6 Checklists used

The MDSC survey team used check lists to guide their interviews. The following lists were prepared by the different specialists.

HYDROLOGY

Surface Water

1. Rainfall, Locations where (early/late) Rainfall causes damage, Drought, monsoon and dry season
2. River Water flow
   Quantity & time
   Flood flow direction & time
   Existing Control structures. Type. Size. Location
   Existing Navigation, Water supply, Industry
   Aquatic vegetation
   Sedimentation, silt and sand (history).
   Possible ways to control flood & time.
   Erosion (History & cause/History of river/Possible remedy
3. Drainage
   Flow direction & time
   Area. Time. Effects
   Reason for congestion
   Existing canals, local names. condition - length, siltation, history of re-excavation, present requirements, interconnections

Ground Water

1. For Irrigation. STW & DTW. Numbers & capacity
   Variation in capacity year to year or in same season
2. For household uses & drinking. STW & numbers, adequacy
3. Ground water quality, Iron, Suitability for drinking, irrigation

AGRICULTURE

Crops

1. Major crops grown in the area.(Kh-1/Kh-2/Rabi/Annual/Perennial
   F0, F1, F2, F3+ land
2. Cropping patterns practised in the area (single, double, triple)
3. Approx. % of area under HYV crops and local varieties & yields/acre or pakhi. (Aus (L), Aus (HYV), T. Aman (L), T. Aman (HYV), Boro (L),
   Boro (HYV), B. Aman, TDW Aman, Aus+Aman, Jute, Wheat, Mustard, Potatoes, Pulse
4. Sale price per mound at farm gate (different seasons)
5. Sowing and harvesting period of major crops
6. Irrigation methods adopted in the area and area covered by each
7. No. of LLP/DTW/STW/Indigenous methods and area
8. Which crops are mostly irrigated
9. Cost of irrigation per acre/pakhi (cash and kind)
10. Crop Damaged by Flood (Location/Name of crops/extent/timing/source)

11. Area ploughed by a pair of bullock.
12. Use of power tiller, draft animals (shortage or excess)
13. Availability of extension services

Livestock

14. How many HYV cattle available and artificial insemination
15. Trend in number of Cows (Dry), Bulls, Buffaloes, Bullocks, Calf Goats, Sheep
16. Availability/shortage of livestock feeds and percentage of total feed (straw, rice fran, pulse residence grasses, water hyacinth etc.)
17. Medicare provided
18. Available grazing facilities
19. Provision for growing HYV fodder
20. Average yield of milk per milch cow per day
21. Facility provided by diary farm (Milk Vita)
22. Cattle disease in epidemic form and measure taken
23. Suggestion for livestock development (farmer's view)

Poultry

24. Type of poultry
25. Live on scavenging/provided additional foods
26. Varieties available
27. Poultry disease or epidemic
28. Medicare provided
29. Price of marketable size of hen/cock/duck
30. No. of commercial poultry farm
31. Notes from physical observation: Topography, Vegetation, Drainage congestion, Present Crops etc.

FISHERIES

1. Water bodies (rivers, canals, beels, ponds and lakes, floodplain, their numbers and area (acres/pakhi), type (perennial, seasonal), period, species, catch (maund)
2. Number and status area, lease and rate of lease) of Jalmahal in the area (Govt. Khas).
3. Location, number of Fishermen household (their average family size).
4. History, religion, Socio-economic conditions of fishermen community.
5. Fishermen cooperative society.
6. Information on ponds (derelict, open, cultured, intensive culture, damage en source of flooding, use of fertilizer, expenditure, return)
7. Sources of fish fry (hatchery) and its price per 1000.
8. Fishing (period and types of gear used) methods.
9. Institutional facilities, Loan facility from Bank for fishermen.
10. Fish predation, Fish diseases (period; damage caused).
11. Social problems of fishermen.
12. Fish population increasing or decreasing, Brood fish availability.
13. Fish migration (period/spawning time) from river to floodplain.
14. Your views to improve fishery in the area.

ENVIRONMENT

1. Significant natural vegetation (Forest)
2. Afforestation programme (private sector/Govt.).

3. Flora and fauna
4. Significant land animals in the area, Birds, amphibian, reptiles population in the area.
5. Water quality (pure/impure), Water-born disease.
6. Human activities (waste water), Agriculture (pesticides/insecticides), Urbanisation, Industry (weaving/dyeing/brick-field).
7. Soil condition.
8. Public health (sanitation, latrines), Diseases (time & source).
9. Sources of water and air pollution.
10. Your comments to improve present environmental condition.
11. Own observations

NON-FARM ACTIVITIES

Activities

1. Major non-farm activities (occupation/%)

Social and Institutional Aspects

2. Employment (Labour use pattern: Family vs. hired, local/outsider, male/female)
3. Wage rate by types of labour and season (Farm Labour /Fisherman's Assistant/Unskilled Workers/Rural Industry Labour (by types of industry/ activity)/busy-lean period, migration)
4. Literacy rate/enrolment (No. of school/educational institutions in the area (% of boys & girls).
5. Different Govt./NGO/autonomous bodies/water management societies/activities (male/female) (incl. contact person)
6. Union Council Office, Post Office, F.P. Clinic, Health Clinic/Centres etc.

General

1. Transport and communication facilities (seasonal use of transport)
2. Markets, hats & bazaars in the area with marketing days (attendance)
3. Problem in respect of Education, Health, Communication Marketing etc.
4. Development needs: Roads, School, Medical facilities, Drinking Water facilities, Extension Services etc.

WOMEN

1. Employment (labour use pattern and activities of women)
2. Wage rate and earnings of women
3. Literacy rate and enrolment/attendance rates of boys and girls (no. of schools/educational institutions in the area and % of boys and girls
4. Society: different Govt./NGO/Autonomous bodies/societies/activities and women's opinion about NGO activities
5. Public facilities: Union council office, Post office, F.P. clinic, Health clinic/centres etc (incl women's opinion on services provided)
6. Development needs: schools, medical facilities, drinking water
7. Water related issues
8. Impact of floods per class (health, communication, type of flooding etc.)
9. Identification of specific problem spots
10. Possible solutions
11. List of influential village leaders

- who can help within the community (literate or illiterate)
- person with outside connections

WOMEN-ENVIRONMENT

1. Total area covering forest/homestead forest (kitchen garden, land vegetation)
2. Sources of fuel and percentage use (extent of scarcity)
3. Sources of drinking water (number of handpump/wells, % use)
4. Public health (sanitation), diseases (time and source)
5. Rat problems in the area, wild animals
6. Human activities, urbanisation, industry (weaving/dying/brick fields)
7. Building of new human habitation
8. Rat problems

3.7 Evaluation

After conducting the MDSC-survey the following conclusions can be drawn about this type of needs assessment;

1 The method is very useful to get the view of different interest groups about the existing water management situation, its problems and the solutions as they see them.

2 The method is useful because it introduces the professionals from the different disciplines to the knowledge of the people and of each other.

3 The time needed for the MDSC survey depends to a large extent on how heterogeneous the area and its population are. The Sirajganj CPP MDSC-survey is expected to take about a quarter less time because the area is more homogeneous than Tangail CPP.

4 The time schedule should not be as tight as it was in Tangail CPP (2 days field work, one day report writing, so two cycles per week). Such a tight schedule does not leave enough room for discussion and immediate follow-up. One cycle per week combined with other activities would be best.

5 The format of the report writing was found to be problematic. Reports were too bulky and took too much time to compile, edit, summarize etc. Putting the data in table form was tried but this tended to push the output in the direction of quantifiable data. That way the purpose of the survey, qualitative information, tended to be lost. In Sirajganj a more concise form of reporting will be used.

6 It is very important to conduct the whole survey using the same (trained) people. The departure of the assistant Team Leader left a gap that could not be filled in time. While the other team members and the new member (who got only on-the-job training) did everything to make up for the loss, they succeeded only partly. This is reflected in the quality of the latter part of the MDSC survey (Eastern halve of Tangail CPP) and in the amount of follow-up visits that had to be made.

7 Close supervision and immediate correction if deviations from the methodology are found, is necessary. Here again the Eastern halve suffered because the expatriate Sociologist could not back-up the team as much as in the beginning.

8 The inclusion of a female Sociologist is a must. In the first few sub-compartments the male Sociologist and the Fisheries-cum-environmentalist covered issues related to women. This was both too time consuming and did not allow a free flow of information.

The majority of detailed suggestions made by the people of Tangail CPP during the MDSC survey have been included in the planning (see Chapter 4, Sections 4.2 and 4.3 of the TANGAIL CPP INTERIM REPORT). This applies in particular to the large number of suggestions for re-excavation of existing *khals*, culverts and bridges.

4 TANGAIL CPP EASTERN PART

4.1 SUMMARY MDSC SURVEY TANGAIL CPP EASTERN PART

The eastern part of *Tangail* CPP, which includes *Tangail* and *Karatia* town, is rather well developed in the area of non-agricultural activities. Agriculturally the eastern part of *Tangail* CPP is not as developed as the western part. The most likely reason is that the eastern part has more low lying areas and suffers more from water logging.

According to the people of the rural part of this area, relieving the local drainage congestion through improved drainage, combined with re-excavation of *beels* and *pagars*, is the main way to benefit both agriculture and fisheries. Their main interest is on expanding and securing their dry season crops by getting rid of all excess water in pre- and post-monsoon.

People in general value embankments, particularly those living in the town, and at some places they have suggested building regulators. However at the same time they want as few water regulating structures as possible because these tend to hinder navigation as well as fish migration and have often cause (unintended) drainage congestion.

People have given detailed suggestions as to which channels should be re-excavated and where possible structures might be situated (see below).

People have also requested quite a number of culverts and bridges to improve the local drainage situation. This is linked to the fact that the area has quite a few recently constructed rural roads.

It is the opinion of the MDSC-team that in due course the following changes might be made to the sub-compartmental boundaries;

- sub-compartment 04 be expanded to include the area between the new road close to the river *Lohajang* and the SC-04 boundary,
- sub-compartments 01 and 02 remain as is,
- sub-compartments 03 and 04 may be combined,
- sub-compartments 05 and 06 be joined and
- sub-compartments 07 and 08 be joined.

4.2 SUB-COMPARTMENT 1

Findings

The sub-compartment No-01 is located on the Eastern part of the *Tangail* CPP. This sub-compartment is bounded by *Karatia-Natkhola* road on the South, *Suruj-Karatia* earthen road on the west and the *Pungli* embankment cum-road along the *Pungli* river on the East and the *Gharinda-Suruj* road on the North. The area of this sub-compartment is 687 Ha. Land slopes towards the South-West.

Of the cultivated area about 55% is flooded deeper than 3 feet and 55% is irrigated. The approximate cropping intensity is 190%. The single cropped area is 25%, double 60%, triple 15%. No HYV crops other than HYV Boro and Wheat are found. Yields are moderate to average. Main crop damage is through flood and waterlogging, affecting TDW Aman and some Aus seedlings. There is a shortage of draft animals. The livestock situation is poor as is that of poultry. Medicare is poor. Both the livestock and agricultural extension service are poor.

The area has no *beel* and ponds but there are about 125 *pagars*. Professional fisherman are absent, but there are about 40 households of subsistence fishermen in the area. Floodplain fishery is average. Re-excavation of *khals* would to some extent increase fisheries resources.

The condition of flora and fauna in the area is under threat of human interference. Cattle disease is a serious problem. The problem of deforestation is insignificant. Kitchen gardening is average. The situation regarding sanitation and pollution is relatively bad.

The socio-economic situation of the people is slightly above average. Distribution is average. The degree of organisation of the people is below average. Less than an average number of women are involved in cash earning activities. More than an average number of people make use of tubewell water for drinking purposes. The situation regarding sanitation is poor. The fuel situation is worse than average. The people are more or less agreed about the need for improved drainage.

People's suggestions about improvements

Most people are in favour of re-excavating the *Munchibari Khal* plus they want the mouth of the *Suruj Khal* (connecting it to the *Pungli* river) to be re-opened while maintaining road transport by placing a culvert or even better a bridge (allowing navigation) in the mouth of that *Khal*. Some influential people are against re-excavating the *Munchibari Khal* and as an alternative people suggested to re-excavate *Dapnajor Khal*.

MDSC survey team's conclusions

1 The watermanagement of sub-compartment 01 is separate of that of the other sub-compartments.

2 Re-opening the *Suruj Khal* is necessary for agriculture, fisheries and navigation. A bridge would be ideal.

4.3 SUB-COMPARTMENT 2

Findings

The sub-compartment No-02 is located on the Eastern part of *Tangail* CPP in between SC No-03 in the West and SC-01 in the East. The sub-compartment is bounded by the *Tangail-Karatia* paved road on the South, *Gharinda-Suraj* paved road on the North, *Taratia-Gharinda* earthen road on the West and *Suruj-Karatia* earthen road on the East. Total area of this sub-compartment is 1281 Ha. and about 50% of the farm land is low lying, affected by drainage congestion. Land slopes gradually towards the South.

Of the cultivated area about 55% is flooded deeper than 3 feet and 60% is irrigated. The approximate cropping intensity is 190%. The single cropped area is 20%, double 70%, triple 10%. There are hardly any HYV crops other than HYV Boro and Wheat. Yields are average. The main crop damage is through flood and waterlogging affecting deep water Aman (TDW). Occasionally early flood damages some Irri/Boro (HYV) in the area. There is a shortage of draft animals. The livestock situation is poor as is that of poultry. Medicare is poor. Both livestock and agricultural extension service are poor.

The area has relatively few *beels* (2) but 17 ponds and 175 *pagars*. Floodplain fishery is average. Culture fishery is poorly developed. There are no professional fisherman in the area but about 12 households of subsistence fishermen. Re-excavation of *khals* would much increase fisheries resources.

The flora and fauna is under threat of human interference. Cattle disease is a serious problem. Deforestation is also a problem. Kitchen gardening is below average. The situation regarding sanitation and pollution is bad.

The socio-economic condition of the people is above average. The distribution is highly skewed. The degree of organisation of the people is above average. More than the average number of women are involved in cash earning activities. Use of tubewell water for drinking is above average. The situation regarding fuel is slightly below average. The people agree about the need for improved drainage.

People's suggestions about improvements

There is strong demand for re-excavation of the *khals* in the area to relieve the drainage congestion in this area. One new link canal from *Gugudao* bridge up to *Suruj khal* needs to be excavated. There are public demands for construction of some bridges and culverts to facilitate proper flow of water to allow drainage. There is a strong demand for opening the intake of *Suruj khal* at *Pungli* river providing it with either a culvert of a bridge.

MDSC survey team's conclusions

1 The watermanagement of SC-02 is separate of that of the other sub-compartments.

2 This is one of the sub-compartments most effected by water logging both trough rainfall and overland flooding. The scope for improved agricultural production is rather high.

4.4 SUB-COMPARTMENT 3

Findings

The sub-compartment No-03 is to the East of the *Tangail* town. This area is almost triangular in shape and is bounded by the *Tangail-Gharinda* paved road on the North and South, *Paila-Garinda* earthen road on the East and *Tangail*-Karatia paved road on the South. The total area of this sub-compartment is 630 Ha. Land slope is towards the South. Average land level is medium high and low farm land affected by drainage congestion is about 40% of the total farm land, located at the central part of this area.

Of the cultivated area about 65% is flooded deeper than 3 feet and 65% is irrigated. The approximate cropping intensity is 205%. The single cropped area is 25%, double 55%, triple 20%. There is hardly any other HYV crops beside HYV Boro and Wheat. Yields are average. Main crop damage is through flood and waterlogging affecting TDW Aman seedlings. There is a shortage of draft animals while a few power tillers are occasionally available. The livestock situation is moderate to poor while the poultry situation is poor. Medicare and extension service are poor.

This area has the second best fisheries resources in Eastern part of *Tangail* CPP area. There are 2 *beels*, 17 ponds and 46 *pagars* in the area. Culture fishery is poorly developed. About 45 households of professional fishermen and 10 households of subsistence fishermen live in the area, making this one of the important areas for fisheries. Re-excavation of *khals* and drainage improvements would increase the fisheries resources in the area.

The flora and fauna is under threat of human interference. Deforestation and cattle disease is a problem. Kitchen gardening is more than average. The situation regarding pollution and sanitation is relatively bad.

The socio-economic condition of the people is average. The distribution is also average. The degree of organisation of the people is below average. An average number of women are involved in cash earning activities. Use of tubewell water for drinking is above average. The situation regarding fuel is worse than average. The people more or less agree about the need for improved drainage and communication by culverts and a bridge.

People's suggestions about improvements

Re-excavation of *khal* from *Jalfai* to *Lohajang* and new excavation of the *khals* and a few internal link canal will solve most of the drainage congestion problem. There is public demand for constructed of a few bridges and pipe culverts to relieve drainage congestion and to develop the road communication system.

MDSC survey team's conclusions

1 The watermanagement of sub-compartment 03 is linked with that of 04 and the two might be combined.

2 In this sub-compartment roads built under FFW create much waterlogging. Placing a number of culverts would improve the situation much.

4.5 SUB-COMPARTMENT 4

Findings

The sub-compartment No-4 is on the South-Eastern corner of the *Tangail* CPP. This area is almost triangular in shape and is bounded by the *Tangail-Bajitpur* paved road on the West, *Bajitpur-Jalfai* earthen road on the South-East and the *Tangail-Taratia* paved road on the North. The total area of this sub-compartment is 419 Ha. About 80% of the farm land is low lying affected by drainage congestion. Land slope is towards South.

Of the cultivated area 80% is flooded deeper than 3 feet and about 50% is irrigated. The approximate cropping intensity is 195%. The single cropped area is 20%, double 65% and triple 15%. There are hardly any HYV crops other than HYV Boro and Wheat. Yields are average. Main crop damage is through flood and waterlogging affecting B/TDW Aman and some Aus seedlings. There is a shortage of draft animals. The livestock situation is moderate to poor while the poultry situation is poor. A few power tillers are occasionally available. Medicare is poor. Both livestock and agricultural extension work is poor.

The area has no *beel* but there are six ponds, and 110 *pagars*. Culture fishery is poorly developed. Floodplain fishery is average. There are no professional fisherman in the area but there are 2 households of subsistence fisherman.

The flora and fauna is under threat of human interference. Cattle disease is a problem. Deforestation is insignificant. Kitchen gardening is more than average. The situation regarding pollution and sanitation is relatively bad.

The socio-economic condition of the people is much above average. As a semi-urban area this is the richest in the Eastern part. The distribution is highly skewed. The degree of organisation of the people is above average. A slightly higher than average number of women are involved in cash earning activities. Use of tubewell water for drinking is above average. The situation regarding fuel is worse than average. The people more or less agree about the need for improved drainage through re-excavation of a number of *Khals* and excavation of link channels.

People's suggestions about improvements

There are strong demands from the public of this area for re-excavation of the *Jalfai khal* from *Paila beel* to the *Lohajang* river and the link canal from *Nandir Betka* to *Jalfai khal* through *Mirrer Betka* to ensure drainage and for excavation of a link canal to interconnect the low pockets with the *Lohajang*. There is demand for construction of a bridge over *Mirrer Betka baor*, in the South-West part of *Mirrer Betka* near *Lohajang* river to allow proper flow of water and to relieve the adjoining area of drainage congestion.

MDSC survey team's conclusions

1 The watermanagement of sub-compartment 04 is linked with that of 03 and the two might be combined.

2 Sub-compartment 04 be expanded to include the area between the new road close to the river *Lohajang* and the SC-04 boundary,

3 The proposed excavation and re-excavation is necessary.

4.6 SUB-COMPARTMENT 5

Findings

The sub-compartment No.5 is on the North-eastern periphery of the *Tangail* CPP. The *Tangail-Jamalpur* paved road forms the western boundary and the earthen embankment along the *Pungli* river is the eastern boundary of this sub-compartment. On the North is the *Sibpur - Pasbetur* earthen road and on the South the *Tangail - Garinda* paved road extending up to the *Pungli* river beyond *Sujujbazaar*. The total area of this sub-compartment is 752 Ha. The North-eastern area along the *Pungli* river embankment is high sloping southward.

Of the cultivated area about 45%, is flooded deeper than 3 feet and 55% is irrigated. Approximate cropping intensity is 190%. The single cropped area is 20%, double 70%, triple 10%. There are no other HYV crops beside Irri/Boro and Wheat. Yields are average. Main crop damage is by flood and water congestion affecting TDW Aman, Aus and some jute seedlings. The area faces a shortage in draft animals. The livestock situation is poor as is that of poultry. Power tillers are rarely available. Medicare and extension service of both livestock and agriculture are poor.

This area has the most fisheries resources of all sub-compartments on the Eastern part, two *beels* and seven ponds. Floodplain fishery is more than average. Culture fishery is poorly developed. There are about 107 *pagars* and one lake in the area. There are 4 households of professional fishermen and 10 households of subsistence fishermen. Re-excavation of *khals* and improvements of drainage would much increase the fisheries resources in the areas.

The flora and fauna is under threat of human interference. Cattle disease is a real problem. The problem of deforestation is insignificant. Kitchen gardening is average. The situation regarding sanitation and pollution is bad.

The socio-economic condition of the people is much below average. The distribution is slightly skewed. The degree of organisation of the people is above average. An above average number of women are involved in cash earning activities. Use of tubewell water for drinking is above average. The situation regarding fuel is worse than average. The people agree about the need for improved drainage by re-excavation a number of *Khals*.

People's suggestions about improvements

There is much demand for the re-excavation of 5 *khals* in this sub-compartment. A number of bridges are also needed to improve road communication.

MDSC survey team's conclusions

1 The watermanagement of SC-05 is linked with that of SC-06 and the two might be combined. It may be noted here that the drainage congestion of SC-05 will be relieved by re-excavating channels up to the *Lohajang* river via SC-02 and SC-03.

2 Improved drainage is needed but attentions should also be given to the water needs of high lying areas.

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4.7 SUB-COMPARTMENT 6

Findings

The sub-compartment No-06 is on the northern periphery of the *Tangail* CPP and is bordered by the *Tangail-Jamalpur* paved road on the West (at present under re-construction), *Sibpur-Pasbetur* earthen road on the East and South, part of *Silimpur-Karatia* embankment along the *Gala khal* on the North. The central part is low and affected by drainage congestion. Land slope is towards East and South. The total areas is 292 Ha.

Of the cultivated area about 70% is flooded deeper than 3 feet and 70% is irrigated. The approximate cropping intensity is 205%. The single cropped area is about 15%, double 65% and triple 20%. Apart from HYV Boro and wheat and a little T.Aus there are hardly any HYV crops. Yield of HYV Boro is moderate to high and average in other crops. Main crop damage is through flood and water congestion affecting mainly deep water Aman (TDW) and Aus seedlings. Some T. Aman is also affected. There is shortage of draft animals. The livestock situation is poor as is that of poultry. Medicare and the extension services are poor.

The area has no *beel* but there are about 5 ponds. Floodplain fishery is average. Culture fishery is poorly developed. There are about 19 *pagars*. There are no professional nor subsistence fisherman in the area. Re-excavation of *khals* and drainage improvements would increase fisheries resources in the area.

Both flora and fauna is under threat of human interference. Cattle disease is a problem as is deforestation. Kitchen gardening is average. The situation regarding pollution and sanitation is relatively bad.

The socio-economic condition of the people is slightly below average. The distribution is average. The degree of organisation of the people is below average. A less than average number of women are involved in cash earning activities. Use of tubewell water for drinking is more than average. The situation regarding fuel is worse than average. The people more or less agree about the need for improved drainage and strengthening of the embankment near the erosion point in the *Pungli*. There are conflicting interest regarding the provision of a regulator/culvert to relieve SC-E1 from drainage congestion.

People's suggestions about improvements

There is a general demand for re-excavating *khals* to relieve drainage congestion.

MDSC survey team's conclusions

1 The watermanagement of SC-06 is linked with that of SC-05 and the two might be combined. Drainage depends much on re-excavating *khals* in SC-03 and SC-04.

2 The erosion problem at the *Pungli* should be solved.

3 Drainage of SC-E1 via the culvert under the *Tangail-Jamalpur* road to the North may be a alternative to drainage via SC-E6 in southern direction.

4.8 SUB-COMPARTMENT 7

Findings

The sub-compartment No-7 is on the northern periphery of the *Tangail* CPP. This area is triangular in shape and is bounded by the embankment cum road along *Gala khal* from *Sadullapur to Rasulpur* on the North, *Tangail*-Jamalpur paved road on the East and *Gala khal* branch from *Sadullapur to Enayetpur* on the West. The paved road from *Tangail* town to *Enayetpur* bazaar forms the South-western boundary. Total area of this sub-compartment is about 359 hectare. Average land level is medium high and low farmland affected by drainage congestion is about 25%, located in the central part of the basin shaped chaks.

Of the cultivated area is 60% is flooded deeper than 3 feet while almost 50% is irrigated. The approximate cropping intensity is 195%. The single cropped area is about 25%, double 55%, triple is 20%. Beside Irri/Boro and HYV wheat there are hardly any other HYV crops. Yield of Irri/Boro is comparatively high and for other crops average. Main crop damage is by flood and waterlogging which mainly affect TDW Aman and some Aus paddy. There is shortage in draft animals. The livestock situation is poor as is that of poultry. Both livestock and agricultural extension work is poor.

The area has no *beel* but 8 ponds. Floodplain fishery is average. Culture fishery is poorly developed. There are about 39 *pagars*. There are no professional fisherman in the area but about 14 subsistence fishermen households. Re-excavation of *khals* would much increase fisheries resources.

The flora and fauna is under threat of human interference. Cattle disease is a problem like deforestation. Afforestation is average. Human habitation growth is insignificant. The situation regarding pollution is insignificant but sanitation is relatively bad.

The socio-economic condition of the people is average. The distribution is slightly more skewed than average. The degree of organisation of the people is average. A more than average number of women are involved in cash earning activities. Use of tubewell water for drinking is more than average. The situation regarding fuel is worse than average. The people more or less agree that there is some scope for improved drainage as well as a need to contain the erosion at *Rasulpur*.

People's suggestions about improvements

Re-excavation of the channel through *Magurata* to *Gala khal* in the West and the borrow-pit channel in the East with channel improvements in SC-6 will relieve the drainage congestion of this area. Internal link channels will be required to connect the low pockets with the existing *khals*. Erosion at *Rasulpur* needs to be tackled.

MDSC survey team's conclusions

1 The watermanagement of SC-07 is linked with that of SC-08 and the two might be combined.

2 Investigate the need for a regulator to control the inflow via *Gala khal*.

4.9 SUB-COMPARTMENT 8

Findings

The sub-compartment No-08 is on the northern periphery of the *Tangail* CPP. This area is almost triangular is shape and is bounded by the embankment cum road beside *Gala khal* from the *Lohajang* river to *Sadullapur* on the North, the earthen road beside *Gala khal* branch from *Sadullapur to Enayetpur* on the East, and the earthen road from *Dharerbari to Enayetpur* on the West and South. The Northern part in *Pichuria and Sadullapur* is high and sloping Southward. Low farmland in *Bhatchanda* and *Enayetpur* is badly affected by drainage congestion. The paved road from *Tangail* town to the proposed *Jamuna* bridge site passes through this sub-compartment. Total area of this sub-compartment is 904 Ha.

Of the cultivated area 60% is flooded deeper than 3 feet and 54% is irrigated. The approximate cropping intensity is 177%. The single cropped area is 13%, double 77%, triple 10%. There are hardly any HYV crops beside Irri/Boro, HYV Wheat and little T.Aus. Yields are moderate to high in Irri/Boro (HYV) and average in other crops. Main crop damages is through flood and water logging affecting deep water aman (TDW). There is shortage in draft animals. The livestock situation is poor as is that of poultry. Medicare is poor as are the livestock and agricultural extension work.

The area has two *beels* and eleven ponds. Culture fishery is not very developed but there is prospect for culture fishery. Flood plain fishery is more than average. Fisheries resources would be increased in the area by re-excavating *khals*. There are about 15 professional fisherman households but subsistence fishermen are insignificant. There are about 80 *pagars*.

The flora and fauna in the area is under threat of human interference. Afforestation is average. Deforestation is a problem as is cattle disease. Kitchen gardening is average. The situation regarding sanitation and pollution is relatively bad.

The socio-economic condition of the people is much below average. The distribution is more skewed than average. The degree of organisation of the people is above average. A more than average number of women are involved in cash earning activities. Use of tubewell water for drinking is more than average. The situation regarding fuel is below average. The people more or less agree that there is a need for improved drainage through re-excavation of a number of *Khals* as well as excavation of a number of link channels. Re-excavation of some *khals* is strongly opposed by certain sections of society.

People's suggestions about improvements

There is a common demand for the re-excavation of a large number of existing *khals* as well as excavation of a number of link channels and making of culverts and link roads. But there are conflicting opinions on re-excavating some other *khals* and two regulators.

MDSC survey team's conclusions

1 The watermanagement of SC-08 is linked with that of SC-07 and the two might be combined.
2 The need for a regulator at *Saddulapur* or near *Pauli* should be further investigated.

4.10 SUB-COMPARTMENT E1

Findings

The sub-compartment No-E1 is to the North-East of the *Tangail* CPP. It is stretched on both sides of North bound *Tangail-Madhupur* road. The river *Pungli* flows on the North and East with sharp meandering curves. The Gala *khal* intake from Pungli river, flowing South through Bara- *Basalia* and *Rasulpur* villages is to the West and the Gala *khal* branch flows East to the *Pungli* river (outlet used since 1989) is the southern limit of this sub-compartment. The area is small, comprising 180 Ha., including parts of only three villages i.e., *Pauli, Salina* and *Rasulpur.* This sub-compartment suffers from severe drainage congestion problem and is also affected by erosion from North and East.

Of the cultivated area 85% is flooded deeper than 3 feet, and 40% is irrigated. Cropping intensity is about 190%. The single cropped area is about 30%, double 50%, triple 20%. There is hardly any HYV paddy other than IRRI/Boro. Yields are average. Main crop damage is through water logging. The livestock situation is poor as is that of poultry. Medicare and extension services are poor.

The area has relatively few fisheries resources, and no *beels* at all. Flood plain fisheries is above average. In spite of the reasonable number of ponds, culture fishery is only partly developed. Re-excavation of *khals* would increase fisheries resources. Twenty professional fishermen households but no subsistence fishermen live in the area.

The flora and fauna is under threat of human interference. Deforestation is average. The situation regarding sanitation is relatively well developed and regarding fuel is reasonable.

The socio-economic situation of the people is average and distribution is slightly skewed. The degree of organization of the people is below average. A below average number of women is involved in cash earning activities. Use of tube well water for drinking is above average. The people are more or less agreed about the need for improved drainage.

People's suggestions about improvements

The drainage problem may be solved by constructing a regulator at *Salina* on the southern road to the *Pungli* to effect drainage through the borrow pit channel of *Gala khal.* About 800 M. length of channel re-excavation will be required. Alternatively a regulator beside *Pauli* ensuring drainage to Pungli to the North will also solve this problem. The roads serving as embankment are required to be raised above flood level. About 1 km length of embankment is required on the East of *Salina* along Pungli river.

MDSC survey team's conclusions

1 It seems rather logical to include this external sub-compartment in the *Tangail* CPP area.

2 The erosion problem is rather complicated. Costs of river training and bank protection works may not be justifiable economically. Scope of embankment retirement is limited. This problem needs further investigation and analysis.

4.11 SUB-COMPARTMENT TANGAIL TOWN

Findings

Tangail urban area is bounded by the *Tangail-Gala* paved road on the North, *Tangail-Sontosh* paved road up to *Lohajang* river on the West, village *Kachua danga* beside *Tangail-Sontosh* road on the south and parallel earthen road of *Tangail-Mymensingh* paved road from *Mirrerbetka* to Bus-stand on the East. The total area of this sub-compartment is 260 Ha. Average land levels of *Kazipara, Beparipara, Barabasna* are high, of *Akur Takurpara, Muslim Akur Takur para* and the central part of the town are medium high and of *Adi-Tangail, Biswaser-betka* are comparatively low.

Although there is some agricultural activity in the town area this is relatively unimportant.

Tangail town has no *beels* but 47 ponds including the three "District Collectory Ponds" and 38 *pagars*. Culture fishery is average. About 50 professional fishermen households and 25 subsistence fisherman households live in the area. Timely supplying of carp fingerlings and knowledge of culture fishery would much increase fishery resources in the area.

The flora and fauna is under threat of human interference. The afforestation and deforestation is insignificant. Cattle disease is also insignificant. Kitchen gardening is poorly developed. The pollution problem is serious but sanitation is more or less developed.

The socio economic situation of the people in *Tangail* town (who make up about 40% of the population of the CPP) differs much from that of the other sub-compartments. Only a minor portion of the people depend on agriculture. Most are involved in non-agricultural income earning activities including business and services. There is a distinction between the traditional inhabitants, who are relatively few in number but better off and those who have recently come to the town. The latter are mostly victims of river erosion and are less well off. Distribution is highly skewed. The level of organisation among women is relatively low but among men relatively high. Relatively few women are involved in cash earning activities. Use of tubewells is very high while a limited number of households have excess to municipal water supply. The majority of households use saw powder as fuel. A few well to do households use gas for cooking purposes, and slightly more use electricity. There is a general consensus for the need to stop the river bank erosion, improve the embankment and the carrying capacity of the few drainage channels in the town.

People's suggestions about improvements

People demand construction of an embankment along the eastern bank of the *Lohajang* river from district court's building up to bridge (over *Lohajang* river) on *Tangail-Sontosh* road to protect the *Tangail* urban area from entrance *Lohajang* river flood water.

There are demands from the public for construction of some drains from the adjacent area of the Western part of *Tangail* urban area to the *Lohajang* river to solve the drainage congestion problem of the area.

Tangail khal is silted up and in-capable to provide proper drainage of the adjacent respective nearby areas resulting in drainage congestion. The *Tangail khal* (main drainage

of *Tangail* town) needs to be extended from *Biswaserbetka* to *Lohajang* river (near *Stadium*) and re-excavation and thorough cleaning for proper drainage of the area. In order to remove the drainage congestion problem of *Adi-Tangail*, construction of a few culverts over existing roads in the eastern and southern part of this area would be needed.

MDSC survey team's conclusions

1 The situation in *Tangail* town is more complex than in the rural sub-compartments. Due to the high population density water management works are likely to be more difficult to implement. A more detailed study will be needed to fully cover the needs of the people in urban areas, including *Karatia*.

2 All water management interventions, particularly embankments, will have to take into account the rate and direction of urbanization.

3 Environmental impact of the existing situation and all proposed interventions will have to be carefully studied.

5 TANGAIL CPP WESTERN PART

5.1 SUMMARY MDSC SURVEY TANGAIL CPP WESTERN PART

Agriculturally the western part of *Tangail* CPP is relatively better off than the eastern part. This is most likely linked to the fact that the western part has less low lying areas and suffers less from flooding and waterlogging. Urbanisation is much less in the western part than the eastern side.

According to the people of the western part of the *Tangail* CPP, relieving the local drainage congestion through improved drainage, combined with re-excavation of *beels* and *pagars*, is the main way to benefit both agriculture and fisheries. Their main interest is on expanding and securing their dry season crops by getting rid of all excess water in pre- and post-monsoon.

People in general value embankments but they want as few water regulating structures as possible because these tend to hinder navigation as well as fish migration and have often cause (unintended) drainage congestion.

In a number of places people have got together on their own initiative to either re-excavate channels or to manage water in- and out-flow by closing channels or cutting open levees/embankments.

People have given detailed suggestions as to which channels should be re-excavated and where possible structures might be situated (see below).

It is the opinion of the MDSC-team that in due course the following changes might be made to the sub-compartmental boundaries;

- sub-compartments 9, 10 and 11 can be joined,
- sub-compartments 12 and 13 can be joined,
- sub-compartments 14 and 15 remain as is.

5.2 SUB-COMPARTMENT LOHAJANG FLOOD PLAIN

Findings

The *Lohajang* Flood Plain extends through the middle of *Tangail* CPP area from *Ramdevpur* in the North-West near the off-take of the *Lohajang* river from the *Dhaleswari* river, to *Karatia* in the South-east, where the river flows out of the compartment. The flood plain, consisting of an area of 1970 Ha., is on either side of the *Lohajang* river, unprotected by any regular embankment. The major part of this area lies in between SC-08 and SC-11 in the North, and between SC-04, Sc-14 and SC-15 in the South.

The flood plain is unprotected against the flooding from the *Lohajang* river and as such the area enjoys the benefits of flooding. However, sudden rise of flood water damageS crops in the low land. In high flood years, e.g. in 1987 and 1988 there was considerable loss of property.

Of the cultivated area 35% is flooded deeper than 3 feet, and 35% is irrigated. Cropping intensity is about 210%. The single cropped area is about 20%, double 50%, triple 30%. Apart from IRRI there is some use of HYV paddy in Aus and T. Aman. Yields are average. Main crop damage is through water logging. There is a shortage of draft animals, the livestock situation is poor as is that of poultry. Medicare and extension services are poor.

The area has one *beel* and 8 ponds. Flood plain fisheries is below average. Culture fishery is poorly developed. There are 8 *pagars* in the area. Re-excavation of *khals* would marginally increase fisheries resources. There are no professional but twenty-five subsistence fishermen living in the area.

The flora and fauna is under threat of human interference. Deforestation is above average. Cattle disease is average. The situation regarding sanitation and fuel is relatively bad.

The socio-economic situation of the people is above average, and distribution is highly skewed. The degree of organization of the people is above average. An average number of women is involved in cash earning activities. Use of tube well water for drinking is average. The people are more or less agreed about the need for improved drainage. There is however some difference of opinion about whether only re-excavation of the river *Lohajang* should be done or whether embankments should also be made.

People's suggestions about improvements

A few *khals* including the *Lohajang* river need to be re-excavated for improved drainage of the area.

MDSC survey team's conclusions

1 A new road close to the river to the South-East of SC-04 now protects the area between that road and SC-04. This area is to be included in SC-04.

5.3 SUB-COMPARTMENT 9

Findings

The sub-compartment No-09 is at the North-West periphery of the *Tangail* CPP. It is a semi-circular area surrounded by embankment on the West along the *Dhaleswari* river and on the North and East along the *Lohajang* river. The earthen road from *Dalan* to *Baghil* forms the Southern boundary. The total area is 606 Ha. The northern and western parts are high. Land slope is towards South and South East. This sub-compartment consists of mainly medium high land.

The low pockets in *Beel bagil*, *Jugini* and *Krishnapur*, comprising about 30% of the farm land, are severely drainage congested.

Of the cultivated area 55% is flooded deeper than 3 feet, and 50% is irrigated. Cropping intensity is about 220%. The single cropped area is about 20%, double 40%, triple 40%. There is hardly any HYV paddy other than IRRI/Boro. Yields are average. Main crop damage is through water logging. There is a shortage of draft animals, the livestock situation is poor as is that of poultry. Medicare and extension services are poor.

The area has relatively many *beels* but few ponds. Flood plain fisheries is about average. Culture fishery is not very well developed. Re-excavation of *khals* would much increase fisheries resources. Forty two professional and five subsistence fishermen live in the area, making this one of the important areas for fisheries.

The flora and fauna is under threat of human interference. Deforestation is a problem as is cattle disease. The situation regarding sanitation, fuel, and pollution is relatively bad.

The socio-economic situation of the people is average, but distribution is skewed. The degree of organization of the people is above average. A more than average number of women is involved in cash earning activities. Use of tube well water for drinking is average. The people are more or less agreed about the need for improved drainage.

People's suggestions about improvements

Re-excavation of the channel from *Jugini* Daha to *Kalibari* khal to *Pasbeel* and re-excavation of the *Jugini khal* will solve the drainage congestion of the area.

MDSC survey team's conclusions

1 The water management of SC-09 can possibly be linked with that of SC-10 and SC-11. There are no social or other reasons to keep the three sub-compartments separate.

2 The breach at *Sibpur* needs further investigation to find out a form of long term protection, particularly as the people favour a bridge instead of a regulator.

5.4 SUB-COMPARTMENT 10

Findings

The sub-compartment No-10 is on the western periphery of the *Tangail* CPP and is bounded by the *Charabari-Jugini* earthen embankment-cum-road along the *Dhaleswari* river on the West, *Charabari to Baghil* earthen road on the East and *Dhalan* to *Baghil* earthen road on the North. The total area is 487 Ha. The western part is higher and consists of a densely inhabited area along the embankment. Land slopes towards East, comprising the most farm land of which about 40% is low and affected by drainage congestion.

The low farm land of this sub-compartment is in the Eastern part. The low farm land are flooded and congested initially by the early monsoon rainfall and later river water entry increases the water level. Due to the silted up channels drainage is hampered in the early monsoon and late monsoon periods. This area could be drained through SC-11. The main route of drainage is through the *Goramara khal*.

Of the cultivated area 60% is flooded deeper than 3 feet, and 65% is irrigated. Cropping intensity is about 200%. The single cropped area is about 25%, double 50%, triple 25%. Apart from HYV IRRI/Boro paddy there is some HYV T. Aman in the area. Yields are average. Main crop damage is through water logging. There is a shortage of draft animals, the livestock situation is poor as is that of poultry. Medicare and extension services are poor.

The area has only one *beel* and five ponds. Flood plain fisheries is below average. Culture fishery is poorly developed. There are 5 *pagars* in the area. Re-excavation of *khals* would increase fisheries resources. Five to seven professional and fifty subsistence fishermen live in the area.

The flora and fauna is under threat of human interference. Deforestation is a problem. No cattle disease is reported. Sanitation is relatively good but regarding fuel is relatively bad.

The socio-economic situation of the people is slightly below average, and distribution is highly skewed. The degree of organization of the people is above average. A lower than average number of women is involved in cash earning activities. Use of tube well water for drinking is average. People are more or less agreed about the need for improved drainage.

People's suggestions about improvements

Re-excavation of the *Goramara khal*, including a number of link channels, is needed.

MDSC survey team's conclusions

1 The water management of SC-10 and SC-11 is strongly inter linked and they may in due course be made into one sub-compartment.

2 The embankment on the West along the *Dhaleswari* river needs to be strengthened and re-sectioned at some places.

5.5 SUB-COMPARTMENT 11

Findings

The sub-compartment No-11 is bounded by the earthen road cum embankment from *Tangail* town to *Baghil* bazaar along the *Lohajang* river on the North, *Baghil* bazaar to *Charabari* earthen road along SC-10 on the West, *Charabari* to *Tangail* town paved road along SC-12 on the South and East. The total area of this sub-compartment is 1100 Ha., sloping southward, of which about 60% is low farm land affected by drainage congestion.

The severe drainage congestion is due to silted channels. Early flood starts in June and the major source is early monsoon rainfall. Thereafter river water enters from the *Lohajang* river through the existing *khals* on the South East and North.

Of the cultivated area 50% is flooded deeper than 3 feet, and 60% is irrigated. Cropping intensity is about 240%. The single cropped area is about 15%, double 30%, triple 55%. Apart from HYV IRRI/Boro paddy some HYV T.Aman is grown. Yields are average. Main crop damage is through water logging. There is a shortage of draft animals, the livestock situation is poor as is that of poultry. Medicare and extension services are moderate.

The area has the most fisheries resources of all sub-compartments on the western part of *Tangail* CPP. There are 3 *beels*, and 54 ponds. Flood plain fisheries is more than average. Culture fishery is relatively well developed, but there is still much scope for improvements. There are 9 *pagars* in the area. Re-excavation of *khals* would much increase fisheries resources. Five professional and twelve subsistence fishermen live in the area.

The flora and fauna is under threat of human interference. Deforestation is less than average. Cattle disease is the worst of the whole area. The situation regarding sanitation and fuel is relatively good.

The socio-economic situation of the people is average, and distribution is slightly skewed. The degree of organization of the people is average. An average number of women is involved in cash earning activities. Use of tube well water for drinking is below average. The people are more or less agreed about the need for improved drainage.

People's suggestions about improvements

Re-excavation of the main *khals* e.g. *Goramara khal*, *Gaizabari khal*, *Digalia khal* and *Chillabari khal*, along with a few internal link channels will relieve the drainage congestion.

MDSC survey team's conclusions

1 The water management of SC-10 and SC-11 is strongly inter linked and they might be joined into one sub-compartment in due course.

2 Investigate the need of a regulator on the North of the *Kalibari khal*

5.6 SUB-COMPARTMENT 12

Findings

The sub-compartment No-12 is on the western side of the *Tangail* CPP, beside the *Elanjani* river, a branch of *Dhaleswari* river. The earthen embankment-cum-road beside the *Elanjani* river from *Charabari* to *Baruha* bazaar is the western boundary of this sub-compartment. On the North lies the *Kagmari-Charabari* paved road, on the East is the *Kagmari-Silimpur* paved road and on the South is the *Berabusna-Baruha* bazaar paved road. The total area of this sub-compartment is 1019 Ha. The western part beside the embankment is densely habitat area and the central and Eastern part comprises the farm land of which about 40% is low lying and affecting by drainage congestion.

The main water related problem in this sub-compartment is drainage congestion caused due to silted *khals*. The two small regulators on *Barabelta khal* and *Indrobelta khal* have aggravated this problem. *Barabelta khal* commands a large catchment area and there is demand for construction of larger regulator with low sill level.

Of the cultivated area 60% is flooded deeper than 3 feet, and 50% is irrigated. Cropping intensity is about 200%. The single cropped area is about 30%, double 35%, triple 35%. There is no other HYV paddy than IRRI. Yields are average. Main crop damage is through water logging and drought. There is a shortage of draft animals, the livestock situation is poor as is that of poultry. Medicare and extension services are poor.

The area has no *beels* but 19 ponds. Flood plain fisheries is more than average. Culture fishery is poorly developed. There are 11 *pagars* in the area. Re-excavation of *khals* would much increase fisheries resources. Four professional but no subsistence fishermen are found.

The flora and fauna is under threat of human interference. Deforestation is average. Cattle disease is the lowest of the whole area. The situation regarding sanitation is good but regarding fuel relatively bad.

The socio-economic situation of the people is average, and distribution is also average. The degree of organization of the people is much below average. A higher than average number of women is involved in cash earning activities. Use of tube well water for drinking is above average. The people are more or less agreed about the need for improved drainage.

People's suggestions about improvements

Re-excavation of the *Santosh khal*, *Aloa Tarini khal*, *Bara Belta khal* and *Indro Belta khal*, including a number of internal link channels will relieve the drainage congestion.

MDSC survey team's conclusions

1 The water management of SC-12 and SC-13 are interlinked and in due course they might be joined into one sub-compartment.

2 Investigate the use of the existing sluicegate and the suggested need for a bigger one.

5.7 SUB-COMPARTMENT 13

Findings

The sub-compartment No.13 is on the South-western corner of the *Tangail* CPP beside the *Elanjani* river. This triangular area is bounded by the *Tangail - Silimpur* paved road on the East, *Silimpur-Baruhabazaar* earthen embankment-cum-road beside the *Elanjani* river on the West and *Berabusna-Baruhbazaar* paved road in the North. The total area of this sub-compartment is 426 Ha. of which a relatively small area covering about 30% is low farm land lying in central part.

The low pockets in *Baruha*, *Burburia* and *Mamudpur* are congested.

Of the cultivated area 60% is flooded deeper than 3 feet, and 40% is irrigated. Cropping intensity is about 200%. The single cropped area is about 20%, double 60%, triple 20%. There is no other HYV paddy than IRRI. Yields are average. Main crop damage is through water logging. There is a shortage of draft animals, the livestock situation is poor as is that of poultry. Medicare and extension services are poor.

The area has no *beels* but 17 ponds. Flood plain fisheries is more than average. Culture fishery is poorly developed. There are 10 *pagars* in the area. Re-excavation of *khals* would much increase fisheries resources. There are no professional and no subsistence fishermen who live in the area.

The flora and fauna is under threat of human interference. Deforestation is above average. Cattle disease is relatively low. The situation regarding sanitation and fuel is relatively good.

The socio-economic situation of the people is slightly above average, and distribution is slightly skewed. The degree of organization of the people is average. A higher than average number of women is involved in cash earning activities. Use of tube well water for drinking is average. There is some disagreement among the people about which *khal* to re-excavate.

People's suggestions about improvements

Re-excavation of the *Baruha khal* from *Elanjani* to *Kumaria beel* will solve the drainage congestion of this area. Another alternative is to re-excavate a *khal* from the area to sub-compartment 14 connected to *Kumuria-Atia beel*. A regulator should be constructed at *Baruha* on this *khal* at the outfall to the *Elanjani* river. The *khal* at *Rupsijatra* is to be closed.

MDSC survey team's conclusions

1 The water management of sub-compartments 12 and 13 is strongly inter linked. There are no social or other reasons to keep the three sub-compartments separate. It is therefore proposed to join the three.

2 The erosion problem at *Rupsijatra* needs immediate attention.

5.8 SUB-COMPARTMENT 14

Findings

The sub-compartment No-14 is on the southern periphery of the *Tangail*-CPP. This area is almost triangular in shape and is bounded by the *Tangail-Elasin* paved road on the West, *Karatia-Silimpur* earthen road on the South, *Pathrail-Kagmari* earthen embankment along the Lohajang river on the North and North-east. The total area of this sub-compartment is 1143 Ha. In the southern part about 50% of the farm land is low, while in the northern part about 30% area is low and affected by drainage congestion. The long *Atia-Kumaria beel* extends North-South from *Chinakhola* to *Atia* almost through the middle of the sub-compartment dividing it into one eastern and one western part.

This sub-compartment suffers from drainage congestion problems due to silted up *khals*. The long *Atia-Kumaria beel* commands the major surface water flow in the area. Early monsoon flood is mainly due to rainfall which cannot be drained out because of the silted channels. Late monsoon drainage is also a problem for the same reason.

Of the cultivated area 50% is flooded deeper than 3 feet, and 50% is irrigated. .Cropping intensity is about 230%. The single cropped area is about 15%, double 35%, triple 50%. There is no other HYV paddy than IRRI. Yields are average. Main crop damage is through water logging. There is a shortage of draft animals, the livestock situation is poor as is that of poultry. Medicare is moderate and extension services are poor.

The area has two *beels* and ten ponds. Flood plain fisheries is more than average. Culture fishery is poorly developed. There are no *pagars* in the area. Re-excavation of *khals* would much increase fisheries resources. There are forty-two professional and no subsistence fishermen living in the area.

The flora and fauna is under threat of human interference. Deforestation is below average. Cattle disease is average. The situation regarding sanitation and fuel is relatively good.

The socio-economic situation of the people is slightly above average, and distribution is also average. The degree of organization of the people is above average. A average number of women is involved in cash earning activities. Use of tube well water for drinking is average. The people are more or less agreed about the need for improved drainage.

People's suggestions about improvements

Re-excavation of the *Deojan khal* and *Aloa-Tarini khal* in the North and *Thanar khal* in the South will relieve the drainage congestion of this area.

MDSC survey team's conclusions

1 A bridge on the *Bandabari-Baratia* road is much needed for the socio-economic development of the area. This is to be taken up by the relevant authorities.

5.9 SUB-COMPARTMENT 15

Findings

The sub-compartment No-15 is in the South of the *Tangail* CPP and covers a triangular area. This area is bounded by *Koijuri-Khagjana* earthen road on the North and East, *Silimpur-Karatia* earthen road on the South and *Tangail*-Delduar paved road on the West. The *Koijuri-Khagjana* road also serves as an embankment beside the *Lohajang* river. The area covered by this sub-compartment is 690 Ha. The western part is mostly medium high land and the eastern part consists of mostly low lying areas. About 50% of the farm land is low lying, affected by drainage congestion.

The main problem of this sub-compartment is drainage congestion in the early monsoon and late monsoon period. Surface flood water enters from the Lohajang river through three *khals*; *Birkushia khal* in the East, *Kumulli khal* in the North and *Pathrail khal* in the West. Drainage is effected mainly through the *Birkushia kha*l and partly through *Kumulli khal.* But these *khals* are silted up and clearly incapable to properly drain out their respective catchment areas resulting in drainage congestion in about 50% of the farm land of the area.

Of the cultivated area 50% is flooded deeper than 3 feet, and 35% is irrigated. Cropping intensity is about 220%. The single cropped area is about 0%, double 80%, triple 20%. There is no other HYV paddy than IRRI. Yields are average. Main crop damage is through water logging. There is a shortage of draft animals, the livestock situation is poor as is that of poultry. Medicare and extension services are poor.

The area has no *beels* but 20 ponds. Flood plain fisheries is below average. Culture fishery is poorly developed. There are no *pagars* in the area. Re-excavation of *khals* would marginally increase fisheries resources. There are no professional nor subsistence fishermen.

The flora and fauna is under threat of human interference. Deforestation is below average. Cattle disease is average. The situation regarding sanitation and fuel is relatively good.

The socio-economic situation of the people is above average, and distribution is slightly skewed. The degree of organization of the people is much below average. A below average number of women is involved in cash earning activities. Use of tube well water for drinking is average. The people disagree about which *khal* should be re-excavated.

People's suggestions about improvements

Re-excavation of some these *khals* and a few internal link canals might solve the drainage problem. There is demand for re-excavation of the *Lohajang* river to increase discharge.

MDSC survey team's conclusions

1 Discuss with the relevant GOB departments and local government institutions the need as expressed by the people that culverts be placed in the breaches in the roads.

6 TANGAIL CPP ADJACENT PART

6.1 SUMMARY MDSC SURVEY TANGAIL CPP ADJACENT PART

Down stream area

The sub-compartment E6 and E7 are possibly going to be affected by the compartmentalization of the *Tangail* CPP area. Extra drainage water outflow from the CPP area would aggravate the already bad drainage situation, particularly in SC-E7.

As SC-E7 is part of the *Kamar-Nagoan* project, CPP should take up this matter with the management of that project, so as to ensure a minimum of negative impact. If interested, the CPP may at the same time advise the *Kamar-Nagoan* project on how the drainage situation may be improved.

The eastern boundary of SC-E7 should be shifted to the *Patrail* to *Malapara* road as the area to the East is part of the *Kamar-Nagoan* project. Drainage in E6 may be improved by re-excavation of *khals*, benefitting both the area itself and *Tangail* CPP.

Up stream area

Sub-compartment E2, E3 and E4 will certainly be negatively affected if a throttled or gated structure be built at the ToR site. For that reason shifting that inlet structure to the so called "FAP 3" (BRE) site would have to be investigated as an alternative. This would imply including these 4 sub-compartments in the *Tangail* CPP.

In either case the people of this area should participate in all plans and programmes that would include constructing a regulator in the *Gala khal* or the river *Lohajang* as this might cause deeper flooding in part of this area.

Dhaleswari and *Pungli* floodplain

The people of the *Dhaleswari* flood plain should participate in all plans and programmes that would result in changes in the *Tangail* CPP Western embankment. Particularly when it comes to improving the existing embankment and/or changing its alignment, the people in the flood plain should be involved.

The same applies to the people in the *Pungli* flood plain, though to a lesser extent as the area concerned is much smaller, population density less and the likely changes of only minor influence.

6.2 SUB-COMPARTMENT E2

Findings

The sub-compartment No-E2 is to the North of the *Tangail* CPP and is stretched on either side of northbound *Gala-Kujbari* road, on the West the *Bara Basalia-Nandabala* road, on the East lies the *Pungli river* and the *Gala khal* intake through *Bara Basalia* and *Rasulpur*, on the South is the *Gala khal* from *Lohajang* river to *Rasulpur* village and on the West is the road from *Senergagarjan* to *Bilbakhar*. About 70% of the farm land on the West of the *Gala-Kujbari* road is medium high while to the East about 80% land is low. Total area of this sub-compartment is 877 Ha. This sub-compartment consists of high and low areas and as such the problems related to water resources varies. The high river bed level of *Pungli* is a major obstacle to efficient drainage of the area.

Of the cultivated area 70% is flooded deeper than 3 feet, and 50% is irrigated. Cropping intensity is about 230%. The single cropped area is about 00%, double 70%, triple 30%. There is hardly any other HYV paddy other than IRRI/Boro. Yields are average. Main crop damage is through water logging. There is a draft animal shortage, livestock situation is poor as is that of poultry. Medicare and extension services are poor.

The area has relatively average fisheries resources, mainly ponds. Flood plain fisheries is average. Culture fishery is relatively well developed. Re-excavation of *khals* would increase fisheries resources. Thirty-five professional fishermen households and six subsistence fishermen families live in the area.

The flora and fauna is under threat of human interference. Deforestation is average. The situation regarding sanitation is poorly developed and regarding fuel is reasonable.

The socio-economic situation of the people is below average and distribution is highly skewed. The degree of organization of the people is average. A below average number of women is involved in cash earning activities. Use of tube well water for drinking is average. The people disagree about re-excavation of *khals* and the making of embankments.

People's suggestions about improvements

The inland people want re-excavation of *khals* for proper drainage but the people near the outfall of the *khal* are against any re-excavation. There is demand for excavation the *Pungli* river and *Gala khal*. The village *Bara Basalia* is along the *Pungli* river bank. Any embankment through this village will be extremely difficult as a large number of homesteads will be affected. A few years back the *Magra-Gala* small scheme project in this area was rejected due to this reason.

MDSC survey team's conclusions

1 There seems to be no justification for keeping SC-E2 separate from SC-E3 and SC-E4. Conceptually the three can be merged.

2 The people of this area should participate in all plans and programmes that would include constructing a regulator in the *Gala khal* or the river *Lohajang* as this might cause deeper flooding in part of this area.

6.3 SUB-COMPARTMENT E3

Findings

The sub-compartment No-E3 is to the North of *Tangail* CPP. It is bounded by *Bara Basalia - Nandabala* road on the North, *Gazarian - Basalia* road on the East, *Mirpur - Chitkibari* road on the West and *Lohajang* river on the South. The total area of this sub-compartment is 563 Ha. Most of this area is medium high land and only about 25% area is low around the *beels* and affected by drainage congestion.

Adverse effects of flood and drainage congestion is absent in most of the areas of this sub-compartment since the average land level is high. Some low pockets around the *beels*, comprising about 25% of the farm land, is low and affected by drainage congestion.

Of the cultivated area 35% is flooded deeper than 3 feet, and 25% is irrigated. Cropping intensity is about 230%. The single cropped area is about 0%, double 45%, triple 55%. There is hardly any other HYV paddy other than IRRI/Boro. Yields are average. Main crop damage is through water logging. There is a shortage of draft animals, the livestock situation is poor as is that of poultry. Medicare and extension services are poor.

The area has relatively few fisheries resources but no ponds. Flood plain fisheries is average. Capture fisheries is below average. Re-excavation of *khals* would increase fisheries resources. Fifteen professional fishermen households and five subsistence fishermen families live in the area.

The flora and fauna is under threat of human interference. Deforestation is below average. The situation regarding sanitation is poorly developed and regarding fuel is very bad.

The socio-economic situation of the people is below average and distribution is average. The degree of organization of the people is below average. A below average number of women is involved in cash earning activities. Use of tube well water for drinking is average. The people more or less agree about the need to improve drainage.

People's suggestions about improvements

Re-excavation of *khals* from *Gagarjan beel* to *Lohajang* and from *Gagarjan* to *Kandapara beel* through *Kutibari beel* will ease the drainage congestion problem. Re-excavation of the *beels* is also a convenient solution also enabling fish culture, surface water irrigation and providing bathing pool for people and cattle.

MDSC survey team's conclusions

1 There seems to be no justification for keeping SC-E3 separate from SC-E2 and SC-E4. The three should be merged.

2 The people of this area should participate in all plans and programmes that would include constructing a regulator in the *Gala khal* or the river *Lohajang* as this might cause deeper flooding in part of this area.

6.4 SUB-COMPARTMENT E4

Findings

The sub-compartment No-E4 is to be North-West of the *Tangail* CPP. This area is bounded by the river Dhaleswari on the West, Lohajang river on the South, *Mirpur-Bilmuril* road on the East and *Kujbari-Nandabala* road on the North. The total area of this sub-compartment is 557 Ha. Most of this area is medium high land and only about 30% of the farm land is low and partly affected by drainage congestion. Average land slope is South ward and the only *khal* from *Dhaleswari* at *Nandabala* to Lohajang always flows South during monsoon.

Average land level of this sub-compartment is high and medium high and as such there is no pronounced problem of flood or drainage congestion.

Of the cultivated area 20% is flooded deeper than 3 feet, and 30% is irrigated. Cropping intensity is about 240%. The single cropped area is about 0%, double 30%, triple 70%. Apart from IRRI/Boro there is a little use of HYV Aus and T. Aman. Yields are average. There is hardly any crop damage. There is a shortage of draft animals, the livestock situation is poor as is that of poultry. Medicare and extension services are poor.

The area has few fisheries resources i.e.., only one *beel*. Flood plain fisheries is developed. Re-excavation of *khals* would increase fisheries resources. There are no professional nor subsistence fishermen families living in the area.

The flora and fauna is under threat of human interference. Deforestation is average. The situation regarding sanitation is very bad and regarding fuel too.

The socio-economic situation of the people is below average and distribution is average. The degree of organization of the people is below average. A much less than average number of women is involved in cash earning activities. Use of tube well water for drinking is average. The people more or less agree about the need to improve drainage.

People's suggestions about improvements

Re-excavation of the *Nandabala khal* from Dhaleswari to Lohajang and of the *Chitkibari beel* will solve the minor drainage congestion of this area. Re-excavation of the *Chitkibari khal* will enable fish culture, surface irrigation and bathing of people and cattle.

MDSC survey team's conclusions

1 Merging SC-E4 with SC-E2 and SC-E3 seems logical on hydrological ground.

2 The people of this area should participate in all plans and programmes that would include constructing a regulator in the *Gala khal* or the river *Lohajang* as this might cause deeper flooding in part of this area.

6.5 SUB-COMPARTMENT E5

This sub-compartment, situated north of SC-02, SC-03 and SC-04 has not been surveyed as it was not considered so relevant at this time.

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6.6 SUB-COMPARTMENT E6

Findings

The sub-compartment No-E6 is to the South of *Tangail* CPP. It is bounded by *Tangail-Elasin* paved road on the West, *Tangail-Delduar* paved road on the East, *Karatia-Silimpur* earthen road on the North, *Elanjani* river and *Delduar-Elasin* earthen road on the South. Total area of this sub-compartment is 1653 Ha. This area is influenced by the flood flow from the pilot project compartment in the North through SC-13 and SC-14.

The area enjoys benefits of flooding, but also faces the problem of drainage congestion in the early and late monsoon.

Of the cultivated area 45% is flooded deeper than 3 feet, and 60% is irrigated. Cropping intensity is about 215%. The single cropped area is about 15%, double 55%, triple 30%. There is hardly any HYV paddy other than IRRI/Boro. Yields are slightly above average. Main crop damage is through water logging. There is a shortage of draft animals, the livestock situation is poor as is that of poultry. Medicare and extension services are poor.

The area has relatively much fisheries resources, including ponds. Flood plain fisheries is about average. In spite of the good number of ponds, culture fishery is not at all developed. Re-excavation of *khals* would increase fisheries resources. No professional nor subsistence fishermen live in the area.

The flora and fauna is under threat of human interference. Deforestation is not reported. The situation regarding sanitation and fuel is bad.

The socio-economic situation of the people is above average and distribution is slightly skewed. The degree of organization of the people is above average. An average number of women is involved in cash earning activities. Use of tube well water for drinking is above average. The people are more or less agreed about the need for improved drainage.

People's suggestions about improvements

The drainage problem might be effectively managed by a planned programme of re-excavation of channels up to *Lohajang*. If the few perennial *beels* are re-excavated, that will improve fish culture and surface water irrigation by traditional method and LLP.

MDSC survey team's conclusions

1 The eastern boundary should be shifted to the *Patrail* to *Malapara* road as the area to the East is part of the *Kamar-Nagoan* project.

2 Improved drainage of SC-14 results in more water in SC-E6 which in turn can only be drained out through SC-E7 which already faces drainage congestion. This matter be taken up with the *Kamar-nagoan* project.

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6.7 SUB-COMPARTMENT E7

Findings

The sub-compartment No-E7 is to the South-South-East of the *Tangail* CPP. This sub-compartment is bordered on the North by the *Karatia-Silimpur* earthen road, to the South by the *Delduar-Matara* earthen road/embankment, by the *Tangail-Dhaka* paved road to the East and the *Tangail-Delduar* paved road to the West. Comprising an area of 2242 Ha. this sub-compartment lies mostly in *Delduar* union of *Delduar* Thana. This area is influenced by the flood flow from the pilot project compartment in the North; directly from SC-15 and indirectly from SC-14 through SC-E6. About 50% of the total farmland is low and affected by drainage problem.

The main problem of this sub-compartment is drainage congestion, which is aggravated by the two regulators on the *Mirkumulli* and *Barapakia* channels. In addition to the direct rainfall in the area, flood flow from SC-15, SC-14 and Sc-E6 accumulate here since it is at the tail end of the drainage routes of those areas.

Of the cultivated area 55% is flooded deeper than 3 feet, and 60% is irrigated. Cropping intensity is about 180%. The single cropped area is about 40%, double 40%, triple 20%. There is hardly any HYV paddy other than IRRI/Boro. Yields are average. Main crop damage is through water logging. There is a shortage of draft animals, the livestock situation is poor as is that of poultry. Medicare and extension services are poor.

The area has relatively much fisheries resources, including ponds. Flood plain fisheries is less than average. In spite of the good number of ponds, culture fishery is not at all developed. Re-excavation of *khals* would increase fisheries resources. No professional nor subsistence fishermen live in the area.

The flora and fauna is under threat of human interference. Deforestation is average. The situation regarding sanitation is relatively well developed but regarding fuel is bad.

The socio-economic situation of the people is above average and distribution is slightly skewed. The degree of organization of the people is above average. An average number of women is involved in cash earning activities. Use of tube well water for drinking is above average. The people are more or less agreed about the need for improved drainage.

People's suggestions about improvements

Re-excavation of the existing channels, one from *Seoratail* to *Barapakia* through *Jangalia* and the other from *Nalua* to *Mirkumulli* through *Bhabki* will largely solve the drainage problem but the existing regulators will have to looked at as well. A few other internal link canals will be required.

MDSC survey team's conclusions

1 The western boundary should be shifted to the *Patrail* to *Malapara* road as the area to the East is part of the *Kamar-nagoan* project.
2 Solving the water congestion problem in this area is a prerequisite to improved drainage of sub-compartments 15, 14 and E6. This will have to be taken up with the *Kamar-nagoan* Project.

6.8 SUB-COMPARTMENT DHALESWARI FLOOD PLAIN

Findings

The *Dhaleswari* flood plain is outside the western boundary of the *Tangail* CPP. The area extends from *Kasinagar* in the North up to *Choubaria* along the Western bank of *Dhaleswari* river and from *Char Fatehpur* up to *Babupur* along the Eastern bank of *Dhaleswari* river in the South. The area comprises of both high and low land. The higher land are mostly along the river bank.

The flood plain is unprotected against flood. As such all the benefits of flood are found in these areas e.g. increase of fertility due to siltation, free navigation, free fish migration and few drainage congestion problems. Average land level is rising due to continued siltation. However, sudden rise of flood water damage crops, which is a recurrent phenomena. In high flood years, e.g. in 1987 and 1988, there was considerable loss of property. People have learned to adapt to these condition.

Of the cultivated area 30% is flooded deeper than 3 feet, and 15% is irrigated. Cropping intensity is about 220%. The single cropped area is about 5%, double 65%, triple 30%. There is hardly any HYV paddy other than IRRI/Boro. Yields are average. There is some crop damage through water logging. There is a shortage of draft animals, the livestock situation is poor as is that of poultry. Medicare is moderate and extension services are poor.

The area has few fisheries resources i.e., only a few ponds. Flood plain fisheries is below average. Re-excavation of *khals* would increase fisheries resources. There are no professional but 4-6 subsistence fishermen families living in the area.

The flora and fauna is under threat of human interference. Deforestation is average. The situation regarding sanitation is poorly developed and regarding fuel the situation is bad.

The socio-economic situation of the people is average and distribution is highly skewed. The degree of organization of the people is below average. An average number of women is involved in cash earning activities. Use of tube well water for drinking is average. The people disagree about the need to improve the embankment.

People's suggestions about improvements

There is some demand for protection against sudden flood by making embankments, with adequate provision for drainage. But a considerable number of people are also against the idea of embankment construction from their experience of the adverse effects in the nearby *Silimpur - Karatia* project i.e. the *Tangail* CPP area.

MDSC survey team's conclusions

1 The people of this area should participate in all plans and programmes that would result in changes in the *Tangail* CPP Western embankment.

2 The movement of the main river bed of the river *Dhaleswari* needs to be studied before any new embankment alignment is chosen.

6.9 SUB-COMPARTMENT PUNGLI FLOOD PLAIN

Findings

The *Pungli* Flood Plain is outside the North-Eastern boundary of SC-06, SC-05 and SC-01 and starts at *Salina* in the North-West under *Tangail Sadar Upazila* to *Natkhola* under *Basail* upazila in South-East where the river flows away from the compartment. The flood plain is on either sides of the *Pungli* river bounded by the embankment cum road constructed by BWDB on right side and the embankment-cum-road constructed by Union Council under FFW programme on left side of *Pungli* river.

Of the cultivated area only 20% is flooded deeper than 3 feet. No area is irrigated in the floodplain. Cropping intensity is about 160%. The single cropped 30%, double 50%, triple 10% and lying fallow 10%. There is hardly any HYV crops other than HYV wheat and some potato. No Irri/Boro is grown in the area. Main crop damage is through sudden onrush of flood water affecting Aus and Aman (mixed) and some Aus seedlings. The area faces a shortage of draft animals. The livestock and poultry situation is poor. Medicare is also poor. Both livestock and agricultural extension service is very poor in the floodplain.

The area has no *beels*, no ponds but about 3 *pagars* are present. Floodplain fishery is below average. Professional fisherman are absent in the area but there are about 4 subsistence fishermen households. Improved drainage might increase fisheries resources.

The flora and is under threat of human interference. Cattle disease is a serious problem. Deforestation is also a problem. Human habitation growth is insignificant. Kitchen gardening is more than average. The situation regarding sanitation and pollution is bad.

The socio-economic condition of the people is below average. The distribution is average. The degree of organisation of the people is below average. A much below average number of women are involved in cash earning activities. Use of tubewell water for drinking is more than average. The situation regarding fuel is much below average. The people are most concerned about erosion as well as sand deposits from the *Pungli* river.

People's suggestions about improvements

The public reported that erosion at *Birnali* by the *Pungli* river has been going on for about last 4-5 years and the problem is now serious. Erosion also is taking place at *Panch Bathur* and at *Salina* by the *Pungli* river. They suggest something be done to stop this erosion. Excavation of new ponds and re-excavation of the old ponds will partly solve the water scarcity problems in high areas.

MDSC survey team's conclusions

1 Erosion control is much needed.

2 The people of this area must be involved in any plans that involve strengthening of the *Pungli* embankment and/or placing of regulators as this might affect them through slightly higher water levels.