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**MINISTRY OF WATER RESOURCES
BANGLADESH WATER DEVELOPMENT BOARD**

Integrated Planning
for
Sustainable Water Management
(IPSWAM)

Technical Report No. 4

**'Partnership in Practice':
Approaches for Integrated Planning for Sustainable Water Management**

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ABBREVIATIONS

ADP	Annual Development Plan
BWDB	Bangladesh Water Development Board
CO	Community Organiser
DP-III	Directorate of Planning – III
EIA	Environmental Impact Assessment
FCD	Flood Control and Drainage
FCDI	Flood, Control, Drainage Irrigation
GO	Government Organisation
GoB	Government of Bangladesh
GoN	Government of the Netherlands
GPWM	Guidelines for Participatory Water Management
IPSWAM	Integrated Planning for Sustainable Water Management
IWRM	Integrated Water Resource Management
LCS	Landless Contracting Societies
LGI	Local Government Institution
M&E	Monitoring and Evaluation
NGO	Non-Government Organisation
NWMP	National Water Management Plan
NWPo	National Water Policy
O&M	Operation and Maintenance
PRA	Participatory Rural Appraised
QC	Quality Control
SC/SW	South Centre / South West
SDE	Sub-Divisional Engineer
SE	Superintending Engineer
TA	Technical Assistance
UP	Union Parishad
WMA	Water Management Association
WMC	Water Management Committee
WMF	Water Management Federation
WMG	Water Management Group
WMO	Water Management Organisation
XEN	Executive Engineer

1 INTRODUCTION

The Integrated Planning for Sustainable Water Management (IPSWAM) Programme, has been established on 2nd November 2003 and is expected to continue until 1st November 2008. It is firmly based on the following policies and guidelines:

- National Water Policy (NWPo, 1999);
- Guidelines for Participatory Water Management (GPWM, 2000);
- National Water Management Plan (NWMP).

In particular, the National Water Policy is ‘bringing order and discipline in the exploration, management and use of water resources in Bangladesh.’ As part of this process, ‘BWDB Act 2000’ was conceived and enacted.

In this policy context the IPSWAM programme has been conceived, since the new policies, guidelines and plans have ensured that the importance of operation and maintenance, stakeholder participation and multi-disciplinary planning have been widely accepted. Through programmes such as IPSWAM, the BWDB is currently undertaking a ‘globalisation’ of Participatory Water Management.

However, *making these principles operational* has proved to be complex and often difficult, and it is this that the programme has been designed to tackle.

The IPSWAM programme is drawing systematically on the experiences of past projects and its major task is to be a *pathfinder project to strengthen institutional capacity* in terms of local water management organisations (WMOs) as well as relevant local government institutions and national bodies such as the Bangladesh Water Development Board.

In that context the programme is encouraging and developing a *decentralised approach* which is *fully integrated in the BWDB*, making full use of zonal offices for *multi-disciplinary, participatory planning for long-term operation and maintenance, in a regional and cross-sector context*.

Planning is being strengthened in BWDB, starting with the establishment of an IPSWAM Planning Team in the Directorate of Planning (III) and the establishment of zonal planning teams in the South Western and Southern Zones of the BWDB. Starting from an institutional analysis, approaches to local level institutional development have been worked out, and multi-disciplinary participatory planning has been established. Specific plans for the training of planning staff and for the dissemination of these approaches within BWDB are also being implemented.

The IPSWAM programme is putting its principles into practice through the planning and implementation of nine sub-projects, which includes the processes of local institutional development, including BWDB staff training and WMO capacity building, as well as multi-disciplinary participatory planning. Plans for the rehabilitation, operation and monitoring of water management infrastructure in the sub-projects have been finalised and are being implemented and an approach to the successful transfer and sharing of water management responsibilities has been developed.

A key programme activity is to make the basic principles as stipulated in the National Water Policy (NWPo) and the Guidelines for Participatory Water Management (GPWM) operational. This means developing and adopting a planning methodology, which as stated in the programme Inception Report “ensures people’s participation in all stages of the project – selection, planning, implementation, operation, maintenance and evaluation”.

In the development of the methodology described in this report the programme has based itself on the extensive experiences of projects that have been executed in the past, are being executed at the moment and the lessons that could be drawn from them. In particular, the BWDB ‘Manual for Implementing the GPWM’, prepared under the direction of the Chief Water Management¹, has been of great value.

The development of the methodology has been an exercise, based on the learning by doing principles, which entails that changes have been made as a consequence of experiences obtained from the field. This dynamic way of working provides flexibility for the approach and allows it to make adjustments based on the environmental conditions faced in the field. It also means that the methodology in itself is not final but still evolving and developing, so that it is adapted when applied in other areas with different conditions. The intention therefore is to use the methodology in a flexible manner. This being the case, it should be stated that the basic principles on which the methodology is found, namely integrated water management planning with the participation of community members in all stages of the project, is sound and should not be changed.

After the initial data collection and analysis by the project staff, the community members are considered to be the main partners in the planning process, while the project and BWDB field staff act as facilitators and advisers. Both community members and staff of the project and BWDB field offices are involved in the implementation of activities. This implies that the content and speed of the process has to be adjusted to the capacity of the local population. Project and BWDB field staff continuously evaluate and adjust their own role and activities in the process, based on the experiences obtained in the various polders.

The planning process as presented in this document is gender specific. The interests of women related to water management are the same as those of men, but their tasks and responsibilities differ from those of men. This means that attention is paid to the different role men and women play in the management of their water resources. It also implies that both men and women participate in the planning process. However due to the social environment separate programmes and activities could be followed by men and women to come to the final result.

1.1. Principles of Participatory Planning

The integrated participatory water resource planning approach is based on a number of principles which are believed to contribute to sustainable development. These principles are:

- **Participation:** All the interest groups are involved in planning for sustainable water resource management.
- **Social Organization:** Improvement of the resources can only take place if people work together, solve their differences and organize themselves for the management of their resources. Central to the concept of social organization is social unity; people organize round a common interest.

¹ With logistic support from the Char Development and Settlement Project II.

- ***Agreed distribution of rights, concessions and obligations:*** All interest groups should negotiate with each other and agree on who will do what, where, and when and how work and possible benefits will be distributed. Only then can social unity be established and activities receive the necessary support.
- ***Integrated approach:*** Water management activities in one area affect the use and opportunities for use of neighbouring areas. Therefore all water management related activities have to be analysed and planned in an integrated manner.
- ***Gender Specific:*** The actual role and problems of men and women with regard to water management are taken into consideration, by involving both men and women in the planning process.

1.2. Planning Teams and Planning Unit

The integrated planning methodology involves staff of the BWDB and of the programme at different levels and from various disciplines. The project staff includes both members of the zonal planning teams and members of the central planning cell. It further involves the community members (people of all different occupations living in the polder, i.e. farmers, fishermen, boatmen, landless persons and both men and women) and the representatives of Local Government Institutions.

The zonal planning teams, formed in the BWDB Southern and South Western Zones at Khulna and Barisal respectively, operate under the administrative control of the Zonal Chief Engineer. Each team is coordinated by an Executive Engineer and further consists of a Deputy Chief Extension Officer, a Sub Divisional Engineer, one or more Extension Overseers and support staff. Technical assistance to each team is provided through two socio-economists, two trainers and community organisers.

Several members of the central planning cell provide expertise in various disciplines; these include: an Executive Engineer, Sub-Divisional Engineers, a Chief Agronomist, an Economist, an Institutional Specialist, a Planning Advisor, a Gender Specialist, a Sociologist, Hydrologists, a Quality Control Engineer and an Environmentalist.

Apart from the planning cell, the IPSWAM team of field investigators plays an important role in the data collection at village level.

The unit of planning is a polder and the management plans are prepared as an outcome of the planning process related to the whole hydrological system within a polder.

The unit of social organisation is a village and at this level a Water Management Group (WMG) is formed. Occasionally, one WMG is formed for two or more very small adjacent villages (with close social relations) whereas on the other hand sometimes two WMGs are created in very large villages. Also in the latter case the division of a village is based on social and physical characteristics. Several WMGs in a polder form a Water Management Association (WMA). Further details can be found as part of the description of the procedures under Step 3 of the approach.

1.3. Phases in the Process

In the preparation and implementation of plans for sustainable water management, six steps can be distinguished. Below a short overview will be given of these steps; they are described in more detail in the subsequent chapters.

Step 1: Identification/selection of sub-projects

In this phase of the approach new sub-projects or polders are identified and selected on the basis of specific criteria.

Step 2: Participatory, multi-disciplinary data collection/analysis and option development

This stage concentrates on the collection of basic data regarding the socio-economic conditions in the project area, the agricultural and environmental situation, and the condition of the water management infrastructure.

The data collection takes place through a multidisciplinary PRA in order to crystallise the water management issues within the system. The activities to identify the various problems in terms of water management issues and conflicts encompass field observations and updating of the polder map which includes all hydrological structures as part of an engineering survey, informal interviews focussing on key issues in water management with men and women representing different stakeholders and additional data collection through key informants.

During data processing, information is exchanged and cross checked among the planning team members and included in summary tables describing individual villages as well as the overall situation in the polder. Finally the data are presented and discussed with the villagers and strategic options for improving the water management are worked out.

Step 3: Water Management Organisation (WMO) formation and development

The first activity in this phase consists of analysing the social relationships in the village between the various stakeholders. Once an agreement on the constitution of WMOs is reached and their objectives, responsibilities and activities are spelled out, a Water Management Group (WMG) is formed at village level and one or more Water Management Associations (WMAs) at polder level.

The WMA consists of one male and one female representative elected by each WMG. Both the WMG and WMA form their own executive committee. Draft by-laws are proposed to the WMOs and redefined by the WMO in consultation with the planning teams and BWDB staff.

Since well organised WMOs are a pre-condition for sustainable water management, training and the development of their organisational capacity is given continuous attention.

Step 4: Plan formulation and finalisation

The options for the improvement of the water management which are framed on the basis of the problem analysis are reviewed with the WMA and WMGs and thereafter solutions are formulated. This ultimately culminates in:

- an Infrastructure Rehabilitation Plan;
- a Sustainable Environmental Management Plan;
- an agreement on long-term Operation and Maintenance.

Step 5: Infrastructure improvement and rehabilitation

Once these plans are finalised, detailed designs are made, approved and implemented by the relevant BWDB field division. The WMOs are involved in monitoring the implementation.

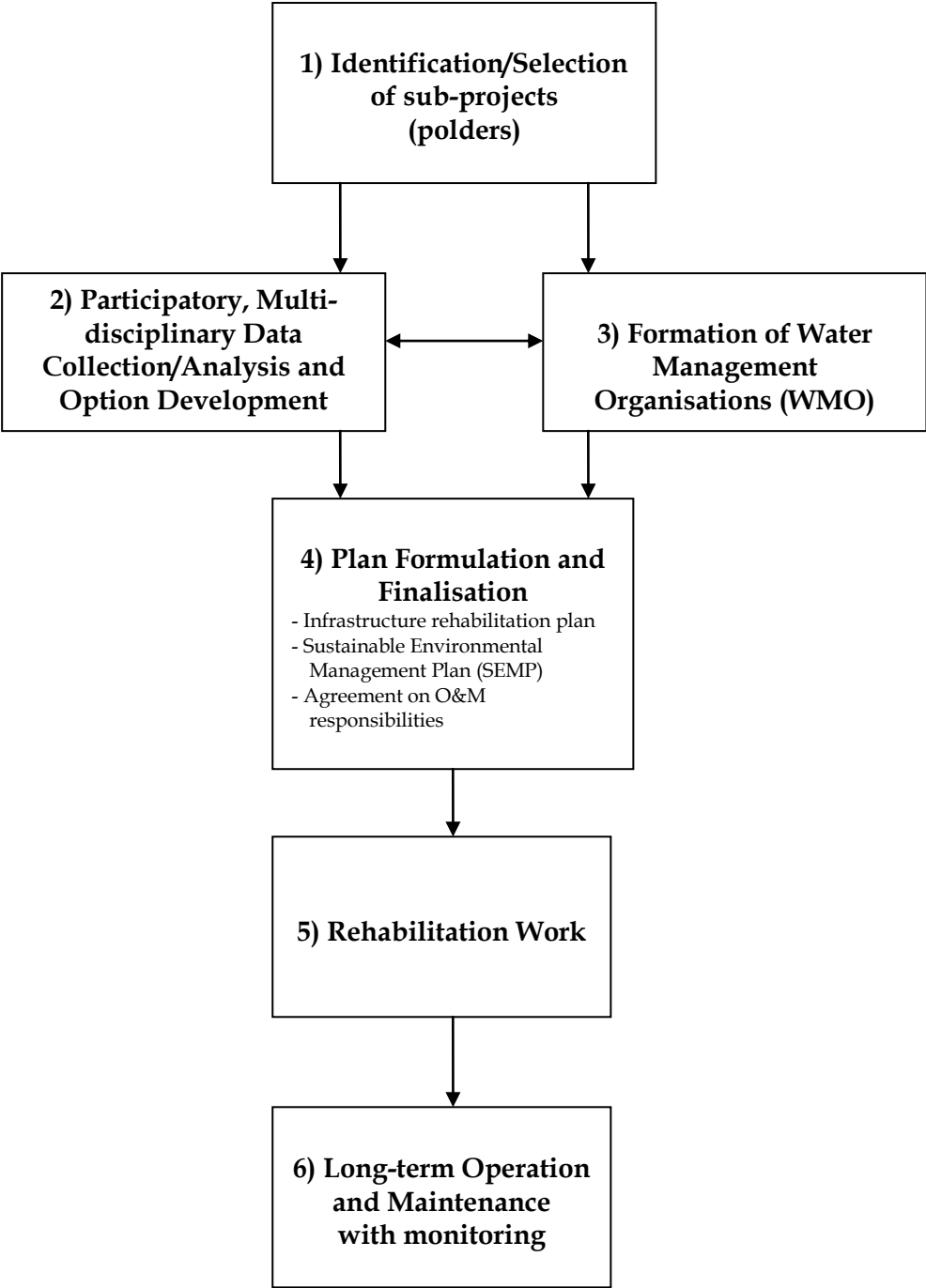
Step 6: Participatory Operation and Maintenance with monitoring

During and after implementation, the WMOs receive training in the technical management of the hydrological system and organisational issues such as decision making, conflict management and monitoring activities. Responsibility for the operation of the water management infrastructure and for its routine maintenance is transferred to the WMO, in line with the agreement. Periodically, the WMO and BWDB check if the plans and related O&M activities are still applicable or need adjustment. For this purpose a participatory monitoring system is established and implemented by the WMO and BWDB staff.

Process Summary Table

1. Identification/Selection	New sub-projects/polders are identified and selected using specific criteria.
2. Participatory, Multidisciplinary Data Collection/Analysis and Option Development (DCAOD)	Problem Identification: <ul style="list-style-type: none">• Primary stakeholders identify the problems they face, analyse causes and effects and identify possible solutions.• Secondary stakeholders join with primary stakeholders to discuss and priorities problems related to natural resources management and the environment. This leads to identification of the: <ul style="list-style-type: none">• Key water management issues in each village• Patterns of leadership;• Social conflicts in the area that hinders implementation• Likely levels of support that the project can expect.• Relevant quantitative data collection and processing for analysis of options for solutions.
3. Formation of Water Management Organisations (WMOs)	<ul style="list-style-type: none">• Guidelines for Participatory Water Management are followed.• GoB policy on WMO registration is also followed.
4. Plan Formulation and Finalisation	Analysis of Solutions: <ul style="list-style-type: none">• Primary stakeholder groups approach identified solutions to assess the:<ul style="list-style-type: none">- Socio-Economic and Gender Issues- Technical Aspects- Economic Aspects- Environmental Aspects- Sustainable Impact of each option• Primary and secondary stakeholder jointly review the options and agree upon solutions, which include:<ul style="list-style-type: none">• An infrastructure rehabilitation plan.• A Sustainable Environmental Management Plan (SEMP).• Agreement on long-term O&M responsibilities.
5. Rehabilitation Work	<ul style="list-style-type: none">• BWDB draws on a high standard technical design in consultation with primary stakeholder groups;• BWDB implements physical work in consultation with WMOs
6. Long-Term Operation and Maintenance with Monitoring	<ul style="list-style-type: none">• Gradually handed over to the WMO.• O&M plan, with monitoring, developed and implemented by WMO in consultation with the BWDB.

Figure 1: Process Diagram (numbers refer to the phases in the process).



Note: Certain steps and the activities carried out as part of them are implemented in parallel and interact with each other. This particularly relates to steps 2 and 3.

1.4. Duration of the Planning Process

This brief overview of the steps of the planning process shows that careful work is required to properly introduce participatory, integrated, water resources management. It is however important to realise that these activities are spread over a larger time frame, the pace of which is mainly set by the villagers. They need sufficient time to familiarise themselves with the improved management practices and attain sufficient organisational strength to take over operation and maintenance responsibilities. This process cannot be forced and it has to be observed carefully when the villagers are ready to proceed with the next step. An indication of the time needed, based on the experiences obtained so far is given below.

Step 1: This takes about two months, including an initial visit to the project area.

Step 2: Once a decision is made to include a sub-project, it will take between four and six months to collect all basic data for a sub-project with a size of 5,000 hectares, analyse it and prepare management options.

Step 3: Simultaneously, the activities for the formation of WMOs are carried out during this period.

Step 4: This involves the formulation and finalisation of the infrastructure improvement and rehabilitation plan, the Sustainable Environmental Management Plan and the agreement on Operation and Maintenance responsibilities, and takes about two months.

Step 5: Rehabilitation work is carried out during two winter seasons and so takes about two years.

Step 6: During step six, the WMOs are prepared to take over responsibilities for the long-term operation and maintenance of the water management infrastructure, which is a continuing process.

1.5. Report Structure

The following Chapters present a detailed overview of the activities involved in the six steps of Integrated Planning for Sustainable Water Management. The sequence of the different activities does not need to be followed exactly, provided all the activities are carried out in order to draft the infrastructure rehabilitation plan, the SEMP and the Operation and Maintenance agreement.

The activities require a combination of different methodologies and tools from planning techniques and participatory rapid/rural appraisal techniques to methods for participatory monitoring.

2. IDENTIFICATION/SELECTION OF SUB-PROJECTS (*Step 1*)

2.1. Introduction

As outlined in the Inception Report, IPSWAM is developing and implementing integrated planning for sustainable water management in nine polders, using the approach described in Chapter 1. Three polders namely 22, 43/2A and 43/2E had already been selected as part of the project preparation, and information on important physical water management problems and institutional shortcomings had already been identified. The Project Document states that the three sub-projects were selected for the reason that they fulfilled the preconditions for the successful application of the IPSWAM approach, these being a substantial level of stakeholder organisation and a clear need for rehabilitation and additional investment in infrastructure to strengthen water management.

Subsequently an additional six sub-projects had to be identified in the IPSWAM program area, which includes the South Central and South West BWDB Zones.

2.2. Objective

The objective of this step is: to identify and select new sub-projects, on the basis of specific criteria, in which water resources infrastructure rehabilitation and management will take place using the integrated participatory planning approach.

2.3. Selection Criteria

Based on the criteria in the project documents and those suggested by other projects, the following criteria were adopted by IPSWAM for the selection of sub-projects:

- The proposed sub-project area should be more than about 5,000 ha, but not larger than about 10,000 ha.
- The area should have relatively simple and well defined problems with particular reference to environment, fisheries and river morphology.
- The sub-project should be easily accessible.
- There should be no major conflicts in the communities and between occupational groups.
- The area should preferably fall within one upazila and areas falling under the jurisdiction of more than two upazilas should be avoided as much as possible.
- The concerned Local Government Institution should have a positive attitude with regard to the proposed sub-project.
- Basic organisations dealing with water management should already be present in the area. If not, the stakeholders should show interest in establishing WMOs and in taking over responsibilities for Operation and Maintenance (O&M).
- The incidence of landless share croppers, low income and marginal farmers in the sub-project should be relatively high in comparison with other areas.
- There should be a committed attitude on the part of BWDB staff, NGOs and other local organisations in favour of developing the proposed sub-project.
- There should be a good prospect for the sub-project to have significant positive impacts.

- The return on investment and benefits for the activities should be well distributed among the different stakeholders residing in the area.
- There should be scope for better utilisation of the available water resources, involving relatively minor rehabilitation of the infrastructure.
- The lay out of the scheme should be in agreement with the development priorities formulated in the NWMP.

2.4. Activities Carried out

The following activities were carried out to come to a final selection of sub-projects:

- ***Collect basic information on existing projects and prepare a long list***

The long list is an inventory of sub-projects in the project area and is prepared by the central planning team on the basis of information available in Dhaka.

- ***Assess the projects based on the criteria and prepare a short list.***

For the identified sub-projects additional information is collected in consultation with the BWDB Divisional officers. At this stage the major considerations for reducing the number of possible sub-projects are: the accessibility; the potential for improvement of the available water resources, based on the existing problems and state of the infrastructure, the economic structure (poverty status) in the polder and the opinion and attitude of the local BWDB staff towards inclusion of the sub-project.

Also two practical criteria were considered:

- the possibility of forming a cluster of adjacent sub-projects in which the participatory integrated water management approach is introduced and implemented;
- the distance of the sub-project from the IPSWAM zonal offices at Khulna and Patuakhali.

- ***Make reconnaissance visit to the different areas that have been short-listed.***

A multi-disciplinary group consisting of members of the central and zonal planning teams and the BWDB Divisional office (SO, SDE and XEN) make a field visit to the short listed areas to appraise them. Part of this visit includes an assessment of the interest of the stakeholders in establishing WMOs and a consultation with Local Government Institutions (LGIs) and Government Department offices in the area to solicit their active involvement in the process. Based on this, consensus is reached on the final sub-projects to be selected.

- ***Make final selection and obtain approval***

The final outcome of the selection process is presented in a document which is forwarded by the PD to the Chief Planning BWDB for approval.

3. PARTICIPATORY, MULTI-DISCIPLINARY DATA COLLECTION/ANALYSIS AND OPTION DEVELOPMENT (*Step 2*)

3.1. Introduction

Systematic data collection is essential to provide insight into the socio-economic, hydrological and environmental situation from the point of view of the community and the LGIs as well as that of the BWDB.

The data collection and analysis methodology is based on Rapid Rural Appraisal (RRA) techniques. The data collection and analysis is fairly quick and focuses mainly on the information that is needed to develop the infrastructure rehabilitation plan and the SEMP. This focussed data collection is possible as long as it is realised that it is not necessary to know everything about the villages and the polder to understand the way in which people use their water resources, the problems they face in relation to them, and the ideas they have for their future development.

The focus therefore is on key subjects which are most relevant for integrated planning for sustainable water management, and its relation to the environment. Taking this into account, it is necessary to check continuously if the information is really required, how much detail is needed and if the data collected are sufficient to base the options and decisions on.

The following tools are used for data collection:

- Collection of existing information
- Observations in the field (through transect walks)
- Informal interviews with people
- Key informants
- Group meetings and consultation meetings
- Mapping
- Multi disciplinary PRA

The data collection is flexible. The tools provide the possibility of changing the approach and ideas as new information becomes available during field work. These changes reflect the increased understanding of the water resource use and the problems related to it, during the collection process.

As the data collection is rapid and focussed, care has to be taken that the data are still reliable and representative. Therefore the following rules are applied for data collection:

- Collect data from the different stakeholder groups; both the male and female members.
- Use different data collection tools.
- Cross-check information from different sources.
- Make observations in the whole village and in the entire polder.
- Collect sufficient information on each key-subject or issue.
- Realise the situation may be different in other seasons.
- Ask about changes from the past and reasons for these.

3.2. Objectives

The objectives of this step are:

- To obtain information on the socio-economic structure; the soil and agricultural situation; the environmental and fisheries status; and the condition of the water management infrastructure.
- To identify the problems faced by the community in the area of water management, analyse their possible causes on the basis of the information gathered and formulate options for improvement and development.

3.3. Activities Carried out

The following activities are carried out during this stage of the planning process and are detailed in the sections below:

- Obtain and collect basic information before going to the field.
- Introduce the IPSWAM programme and its objectives to local leaders, Union Parishad members and other local officials.
- Collect data in the villages in order to assess the social-economic structure; the soil and agricultural situation; and the environmental and fisheries status.
- Carry out an engineering survey.
- Analyse and process the data.
- Develop options for improvement.

3.3.1. Preparations for Data Collection

Prior to the collection of data in the field, maps of the sub-project area are collected. The major sources of maps are WARPO which holds maps of the whole coastal area of Bangladesh, the BWDB for the contour maps, and LGED, from where Union and Upazila maps can be obtained. The maps are digitised and form the first part of a simple GIS to which additional collected information is added.

Furthermore, secondary data are collected from various sources, such as the Bangladesh Bureau of Statistics, the Department of Agricultural Extension, the Union Parishad Office and, if applicable, from other projects or NGOs working in the area. Proper study of already available information allows the field investigators and planning team members to reflect upon data already collected and available and focuses their attention on major issues. In line with this a programme for the data collection exercise is drafted, since a well organised programme saves time and resources.

3.3.2. Introductory Meeting

Before the field work starts a meeting is held with representatives of the LGIs, local leaders and relevant departmental offices in order to introduce them to the concept of participatory water resources management and the process used to achieve this. During the meeting the field investigators, planning team members and BWDB officers are introduced to the participants and their active participation in the process is requested.

3.3.3. Data Collection

At the start of the data collection programme in a village it is important to make the objectives and field activities clear to the community members, so that they know what to expect and

will be cooperative. For this purpose leaflets are circulated and several consultation meetings are organised. It is also important during these initial community meetings to learn from community members about their experiences in and opinions about previous projects.

In order to obtain the required information the field teams make a number of transect walks to familiarise themselves with the water management situation and to identify key informants. Furthermore, a series of *bari* level consultations and focus group discussions at *para* level are organised. Standard formats are used to present the collected information at *bari* and village level. As mentioned earlier, the information relates to both male and female community members. In order to achieve this, in many cases the female investigators meet with the female household members, whereas the male investigators have meetings with the male members in the *bari*. The data relate to the following:

- social economic position of the various groups in the village (this includes parameters such as population number, land ownership, livelihood/occupation, daily wage rates, wellbeing categories, crisis periods, migration, health and sanitation, power supply, membership of different organisations and social conflicts);
- environmental characteristics (siltation, drainage congestion, water quality, health hazards, biodiversity and fisheries);
- soil and agriculture (soil characteristics, land use patterns, cropping area, crop damage and crop yields) and livestock (species and numbers).

At the end of the data collection exercise a village meeting is organised with the local people to validate the information collected from various sources.

3.3.4. Engineering Survey

Simultaneously with this data collection, officers of the BWDB divisional office, with support of members from the IPSWAM planning teams carry out an engineering survey to review the condition of the water management infrastructure (embankments, channels and khals, inlets, outlets and sluices). At the same time, the inventory of hydrological structures is cross-checked with the available map of the polder and missing information is added. This provides complementary technical information which is used to develop options for rehabilitation and improvement in the polder.

3.3.5. Data Analysis

After collection of all the information it is important to process and analyse the data. Only then the information from different team members can be combined, cross-checked, visualised and discussed among the team members and with the villagers. This exchange of data is important as the data is collected in a rapid way and with a limited number of respondents. Each team member might therefore not have a full overview of the situation in the whole polder and on all the key issues.

The information collected is compiled and entered in a database in such a way that essential characters can be used as baseline information for monitoring and impact assessment (see Step 6). It is further used to describe and analyse the social economic situation; the agricultural position, including land use; the ecological and environmental status and the condition of the water management infrastructure in the whole sub-project.

Ultimately the data analysis process provides a good insight in the way in which people living in the polder use their water and natural resources, the problems they face with them and the ideas they have for the solution of their problems and future development. IPSWAM Technical Report No. 5: Integrated Water Management Planning Study of Polder 43/2D gives an example of the presentation of the study results for a polder.

3.3.6. Formulation of Options

Based on the data analysis the multidisciplinary planning teams, in consultation with the BWDB divisional staff, develop strategic options that contribute to an improvement or a resolution of the problems identified in the polder by the various stakeholders. An example of these is also given in Technical Report No. 5.

4. FORMATION OF WATER MANAGEMENT ORGANISATIONS (*Step 3*)

4.1. Introduction

As explained in Chapter 1, this phase can be closely linked with Step 2, as it starts with the introduction of the project and the creation of awareness in the working area on participatory water management. The importance of this step is the mobilisation and social organisation of the stakeholder groups at community level, which allows them to establish and strengthen the necessary organisational and institutional structures for participatory water management, namely the WMGs and WMAs. Furthermore the relationship, role and contribution of the BWDB, LGIs, Departmental Offices and NGOs towards these WMOs is explored.²

The GPWM distinguishes three tiers of WMO for sub-projects of 5,000 hectares or more:

- Water Management Group (WMG) at the lowest level for each smallest hydrological unit or social unit (*para* or village).
- Water Management Association (WMA) at the mid level for each sub-project or sub-system.
- Water Management Federation (WMF) at the apex level of the project/scheme.

For a WMO to be successful it is required that:

- The WMO represents different stakeholders and interests (in line with the GPWM).
- It has sufficient managerial and administrative skills.
- It maintains an open communication with the community.
- It gains self confidence.
- It gains the confidence and trust of the community.
- It enables all of its members to effectively participate in decision making.

This phase makes a start with building up these success factors, which are further developed when the WMO assists in and monitors the implementation of infrastructure improvement/rehabilitation and takes over its water management responsibilities. When this is successful and benefits return to the community, confidence and trust grows and thus the WMO's authority and effectiveness also increase.

4.2. Objectives

The objectives of this step are:

- To ensure that local community members (men and women) of all occupations and income levels actively and effectively participate in all stages of establishing sustainable water resource management, from problem identification to implementation, operation, maintenance and monitoring.
- To form and develop Water Management Organisations at village and polder level through social organisation, that will acquire the skills necessary for participatory planning and implementation of effective water management.

² As suggested in the Institutional Analysis study (see Technical Report no. 2) the relationship of the other Departments with the BWDB may be laid down in a Memorandum of Understanding agreed upon at a higher organisational level between these institutions.

4.3. Activities Carried Out

In order to form WMOs, several activities are carried out, which are listed below and will be further elaborated in the following sections.

- Analyse the social relationships and assess the representation of special groups such as landless people, destitute women and fishermen.
- Raise awareness and disseminate information regarding the sustainable water management programme.
- Facilitate meetings in anticipation of the WMG formation.
- Facilitate meetings to form WMGs, elect WMG Executive Committees and formulate its bylaws.
- Facilitate meetings to form WMAs, elect WMA Executive Committees and formulate its bylaws.
- Impart initial training to the WMOs.

4.3.1. Analysis of Social Relationships

The concept of participatory planning evokes a diversity of interests, some of which could be compatible and others which would be conflicting. The different stakeholders and their interests have to be identified. In the GPWM local stakeholders are defined as ‘inhabitants of an area who are directly or indirectly affected by water management’. ‘Beneficiaries’ are those inhabitants of the area who are favourably influenced by a water management project. Project Affected Persons (PAPs) are those who are adversely affected. The stakeholders can broadly be categorized as “natural resource users and managers”. This definition includes the cascade of managers from the BWDB to the WMOs and the land/water users including all men and women living in the area. This means that all women and men in the families of landowner farmers, landless farmers, fishermen, boatmen, aquaculturists, and even destitute landless are included, because all of their livelihoods are indirectly connected to water management.

While the data are collected as part of Step 2, a comprehensive recognition of and insight into the local stakeholders’ potential for participation in sustainable water management is established by the planning team members. Among other methods, this is obtained through:

- An assessment of the social groupings existing in the village.
- An assessment of the wealth and poverty distribution.
- An assessment of the different relationships among social and economic groups in the village.
- The identification of existing village organisations already involved in water management.
- An assessment of existing conflicts related to water management.

4.3.2. Awareness Raising

The task and challenge of the planning team is to bring the various interest groups together by advocating the possible benefits they can gain if they start working jointly for the same purpose. This is done through a continuing process of interaction and exchange of information between the field investigators/planning team members and the community. The Extension Overseers and Community Organisers play a pivotal role in this process, which is enhanced through the use of extension materials.

4.3.3. WMG Formation

At present the unit of organisation for a WMG is in general a village. Occasionally, however the villages are too small; in which case the two or more adjacent villages are identified as a WMG, or too big; in which case the village is split along social and geographical lines to form two or more WMGs. The demarcation and boundaries of the WMG are agreed in consultation with the local people.

The procedure for the formation of a WMG consists of four steps:

- ***Informing the villagers***

The planning team members inform the villagers about the importance of becoming a member of the WMG and ask them to nominate representatives for its Executive Committee.

- ***Organise meetings with special groups***

Separate meetings are held with representatives of special groups in the community such as landless people, destitute women and fishermen to inform them about the WMG and the importance of their representation in the Executive Committee. Additional and separate meetings are held with women to ensure their membership and representation in the WMG.

- ***Formation of the WMG***

A WMG formation meeting is held in which individual community members register their membership in the WMG. A proper date, time and place is fixed in discussion with the local people so that a maximum number of women and men of different religions can participate without any problem. In the meeting it is established that all the participants, men and women can become general members of the organisation.

During the meeting the role and functions of the Executive Committee are explained and the procedures for its election described and agreed upon. Thereafter the Executive Committee or Management Board of the WMG is elected. The constitution of this committee is in line with the GPWM and the Proposed Constitution of Water Management Organisations, prepared by the special Committee of the BWDB. It consists of 12 members representing the various groups in the village. At least 30% of the members of the Executive Committee are female. The Executive Committee consists of the following positions: A chairperson /president; a deputy chairperson /vice president; a secretary; an additional secretary; an accountant /treasurer; a representative of the landless; a representative of the fishermen; a representative of the destitute women and 4 general members.

- ***Organise a constitutional meeting with the WMG.***

A constitutional meeting is held for the formulation of the rules and regulations or bylaws of the organisation. The following aspects are included in the bylaws of the WMG:

- Name of the WMG.
- Meeting times, place and procedures.
- Purpose and goals of the organisation.

- Eligibility and conditions of membership (including membership fees).
- Ways to take decisions, enforce and communicate them.
- Method of fund collection.
- Means of accountability.
- Formation of the Executive Committee; its duties and responsibilities and retrenchment procedure.
- Ways to resolve conflicts.
- Procedures of keeping accounts and documents.
- Relationship with government departments, LGIs, NGOs.
- Any other issue the WMG wants to include.

4.3.4. WMA Formation

A Water Management Association is formed at the polder level through representatives from all the various WMGs (one man and one woman from each WMG). This organisation is established in order to involve all interest groups in the planning, implementation, O&M and monitoring in all activities for the whole hydrological scheme at polder level. The procedure for the establishment of a WMA consists of the following steps:

- ***Organise meetings with special groups***

Separate meetings are held with representatives of special groups in the community such as landless people, destitute women and fishermen to ensure their representation in the WMA and in its Executive Committee.

- ***Organise a constitutional meeting with the WMA***

During the WMG formation meeting (see above) each group elects two representatives (one man and one woman) to become members of the WMA. These elected representatives of all the WMGs in the polder plus a representative of each of the landless people, the destitute women and of the fishermen form the general body of the WMA. A meeting is held with the general body of the WMA in which its functions and responsibilities are explained. Furthermore the election procedures of the Executive Committee are explained and agreed upon. The Executive committee of the WMA has the same constitution as is the case for the WMG and elections are held.

- ***Develop bylaws for the WMA***

As in the case for the WMG, also the WMA formulates its own rules and regulations.

Ultimately, the by-laws that are formulated at WMG and WMA level are used to achieve the registration of the WMO, which provides them with the required long-term legal status to work and to implement activities in cooperation with the BWDB.

4.3.5. Initial Training for Organisational Strengthening

Soon after the establishment of the WMOs training activities are started. An organisational management course is conducted for the Executive Committee members of all WMGs with the objective to develop and strengthen their organisational management capacity. Topics covered during the training are:

- gender awareness;
- effective communication;
- conflict management;
- problem solving and decision making;
- leadership development;
- conducting effective meetings;
- savings and income generating activities;
- record keeping,
- team building and planning.

A separate training course is provided for the female members of the WMG for the development of their leadership capabilities.

- Training and capacity building is not a one off intervention but a continuing process and is therefore built into the following planning and implementation phases of the programme as well, through formal and informal training, group discussions, workshops, exposure visits and learning by doing.

5. PLAN FORMULATION AND FINALISATION (*Step 4*)

5.1. Introduction

The formulation of the integrated water resources management plan, based on the information and problem identification which took place in step 2, is the joint responsibility of the WMA, the planning teams and BWDB Divisional staff. It is important that the plan meets the required social, environmental, economic and technical standards, making plan formulation a truly multi-disciplinary exercise. The overall plan, apart from the outcome of the planning study in the polder consists of:

- an infrastructure rehabilitation plan
- a Sustainable Environmental Management Plan (SEMP)
- an agreement for long-term Operation and Maintenance.

For examples, see Technical Report No.5.

5.2. Objectives

Based on the above, the objectives of this step are:

- To prepare and finalise a participatory plan for infrastructure development and rehabilitation for a sub-project, which is agreed upon by the BWDB and WMOs.
- To prepare and finalise a Sustainable Environmental Management Plan.
- To reach agreement in principal between the WMOs and BWDB on long-term Operation and Maintenance arrangements.

5.3. Activities Carried Out

The finalisation of plans is an interactive process consisting of a series of meetings involving the WMA, the planning teams and BWDB Divisional staff decide on infrastructure improvement and environmental management activities, based on the analysis of data collected in step 2, its own expertise and judgement and the WMAs local knowledge and experience. The following activities are carried out as part of the finalisation process:

- Review of problems and solutions/options with the WMA and validation of the data analysis to reach agreement on the infrastructure rehabilitation and improvement plan.
- Meeting with the WMA to formulation a SEM.P.
- Meeting to finalise the O&M agreement between the WMO and BWDB.

These are carried out as part of an integrated process.

5.3.1. Development of Options and Finalisation of the Infrastructure Plan

Based on the problem analysis with the WMA, different options to resolve the problems are discussed with the community members. An analysis of the feasibility of each option is made with the WMA in terms of social acceptability, environmental impact and cost effectiveness. The system approach to infrastructure planning is used as much as possible, which means that it is verified whether changes in one infrastructure element yield the desired effects in solving the identified problems for the whole water management system.

As mentioned earlier, the infrastructure plan makes use of the socio-economic data, the environmental analysis (including an impact assessment and related mitigation measures), the water engineering and water management problem analysis and the assessment of rehabilitation improvement and needs.

The infrastructure plan consists of the following topics:

- List of proposed work items validated by WMOs.
- Prioritization and shortlisting.
- Design and costing.

5.3.2. Formulation of the SEMP

In the formulation of the SEMP use is made of the land use map and the outcome of the environmental analysis. Existing environmental problems and possible negative environmental impacts (resource impacts, pollution impacts, or human interest impacts) created by new schemes are identified in a meeting with the WMA and mitigating measures are suggested. The planning team and BWDB divisional staff cross-check whether possible solutions through infrastructure development have already been considered as part of the infrastructure improvement plan and if not verify whether inclusion is feasible. Ultimately the key environmental issues and possible measures to address them (not relating to infrastructure improvement) are described in the SEMP. An overview of possible issues which may be tackled through the SEMP:

- Surface and ground water (availability, quality and quantity);
- Flooding, water logging and drainage;
- Crop species (traditional and introduced HYV varieties), cropping patterns and farming systems;
- Fertiliser and pesticides use;
- Existing habitats (wetlands, forest areas, grazing areas and their variety of species);
- Fisheries (habitat, lifecycle, migration, prawn introduction, etc.);
- Land use and soil quality;
- Salinity;
- Erosion and siltation;
- Public health (water borne diseases);
- Navigation.

The plan further includes a timeframe for the implementation of identified environmental measures, identifies persons or organisations such as LGIs, other government departments (i.e. agricultural extension, environment, fisheries, forestry) and non government agencies who should be contacted for necessary cooperation and action.

5.3.3. Finalisation of the O&M Agreement

Prior to drawing up the draft operation and maintenance agreement, meetings are held with the WMOs in which O&M issues are discussed and explained, possible roles and responsibilities are described and options for resource mobilisation for O&M are considered.

In order to transfer some of the long-term O&M responsibilities to the WMOs, a contract agreement between the BWDB and the WMA is discussed; an example of such an agreement is included in Technical Report No. 5.

- Responsibility for operation of the water management infrastructure (embankments, sluices, channels etc.) will be assigned to the WMA.
- The WMA will take the responsibility for the regular, routine maintenance of this infrastructure, for which it may use labour or cash contributions of its members and or establish contacts with LGIs for fund allocation.
- The BWDB will lease the infrastructure on a no payment basis to the WMA so that any income which can be generated (from rent, fishing leases, tree plantation etc.) can be used by the WMA for its maintenance. IPSWAM may assist the WMA in investments to improve the income of the infrastructure (e.g. through tree plantation) and these activities will be reflected in the SEMP.
- The BWDB will remain responsible for major periodic maintenance and emergency works (e.g. replacement and repair of major hydraulic structures, breach repair or retirement of embankments) as well as issues related to the drainage channels outside the sub-project.
- The BWDB and WMA will jointly assess the annual maintenance requirements and the work carried out will be jointly monitored, on the basis of an agreed procedure. Also the functioning and operation of sluice gates and regulators will be jointly inspected and corrective action agreed.
- The BWDB will be responsible for the provision of technical assistance and training to the WMA, as and when required, in the areas of water management and operation and maintenance of the structures.

6. REHABILITATION WORK (*Step 5*)

6.1. Introduction

Once the infrastructure improvement and rehabilitation plan is formulated and approved it is implemented. All the earthwork is carried out through Landless Contracting Societies (LCSs)³, so that employment and income generating activities are provided to the poor sections of the community, and the quality of the work is assured.

6.2. Objectives

The objectives of this step are:

- To prepare detailed technical designs and costing for the rehabilitation of infrastructure as agreed in the plan.
- To implement the physical works included in the rehabilitation plan and in accordance with the technical design.

6.3. Activities Carried Out

The activities carried out in order to implement the rehabilitation work are:

- Preparation and approval of technical designs and cost estimates and tendering of the contracted works.
- Formation and training of LCSs so that they are prepared to carry out their part of the implementation work.
- Selection and training of a monitoring committee from the WMA.
- Implementation of the proposed infrastructure improvements.
- Monitoring of the quality of work.

6.3.1. Technical Design, Cost Estimate and Tendering

On the basis of the agreed rehabilitation plan the technical designs for infrastructure rehabilitation and improvement are prepared by the officers of the Design Office Circle 2 and Circle 5. The detailed cost estimates are made based on the Standard Schedule of Rates and necessary documents for contracting are prepared by the staff of the Divisional Offices.

The technical design and related cost estimates are, depending on the finances involved in the scheme, approved by the Executive Engineer (XEN), the Superintending Engineer (SE) or the Chief Engineer (CE) of the Zonal Offices. In IPSWAM the cost estimates are also vetted by the Project Director and Team Leader.

³ According to the GPWM this should be *at least* 25% of the total; ideally it will be 100%.

After approval and vetting the structural works are tendered by the Divisional Offices, and earthworks are assigned to appropriate LCSs.

6.3.2. LCS Formation and Training

Once the rehabilitation works have been identified and approved the XEN and zonal team decide which part of the work could be implemented through LCSs. Thereafter the zonal team forms the LCSs who, before they start their activities, receive training.

6.3.3. Monitoring Committee Establishment

The WMA selects from among its members a monitoring committee who will observe the quality of work and report the progress of the implementation to the WMAs, the WMGs and to the zonal team and Divisional Office (XEN). Once selected, a short course is given to the committee to inform them about the importance of quality control; the methodology used to monitor quality and progress; criteria for them to observe; formats to fill in and the reporting mechanism and feedback in case of problems.

6.3.4. Implementation of the Proposed Infrastructure Improvements

The infrastructure improvements are implemented in accordance with the plan by contractors (structures) and LCSs (earthwork).

6.3.5. Monitoring the Quality of Work

During the construction process the monitoring committee of the WMA records its observations regarding progress and quality of the work on a bi-weekly basis in specified formats. Monitoring formats have been prepared in Bangla for the different rehabilitation activities relating to: the construction of an inlet, the construction of an outlet, repair of a sluice, construction of a retired embankment, embankment resectioning/repair, re-excavation of *khals* and re-excavation of ponds. Support is supplied by a Technical Community Organiser who follows the construction activities and also completes monitoring formats on a bi-weekly basis.

Overall monitoring is carried out systematically by the zonal team with support from the central planning cell.

7. LONG-TERM OPERATION AND MAINTENANCE WITH MONITORING (*Step 6*)

7.1. Introduction

Once the rehabilitation activities are concluded, part of the long term Operation and Maintenance responsibilities are, in line with the agreement, (see Step 4) transferred to the WMO. At the same time, the SEMP is implemented by the WMO with support from the BWDB Division Office.

The implementation of the O&M consists of two activities:

- **Operation:** i.e. the manipulation of water management infrastructures to manage and maintain the appropriate water levels in the project area.
- **Maintenance:** i.e. the actions undertaken to prevent the deterioration of the water management infrastructure and keep the physical components in such a condition so that they can serve the purpose.

In line with the above, the objectives of operation are:

- To control the water levels and flow of water in the canal system of the scheme.
- To ensure that through effective water management, the water availability matches with the requirements of the stakeholders for agricultural, fisheries or domestic purposes.

The objectives of maintenance are:

- To retain the hydraulic infrastructures in line with the technical objectives of the scheme.
- To preserve the infrastructure, protect the investments made and prevent high rehabilitation costs.

During this phase the O&M responsibilities are in line with the agreement between the BWDB and the WMOs. With the shift in water management responsibilities as described in the previous steps, the need for direct involvement of BWDB staff and WMOs in the monitoring process is obvious.

The participatory planning approach thus implies the involvement of all stakeholders not only in the identification of problems, the prioritisation and planning of the activities to be implemented in order to resolve these problems and in the execution of activities, but also in the monitoring and evaluation of the activities, and finally in the decision-making process for re-planning or making adjustments to the intervention.

In fact the monitoring does not start in this phase of the planning process. During the basic data collection in Step 2 baseline information used for the integrated water management planning study was already collected. At that stage it was also mentioned that only relevant information should be collected. That is also the case for monitoring. In order to identify the information that needs to be collected the purpose of monitoring should be defined.

The monitoring carried out should fulfil the following purposes:

- For WMOs it has to supply information for the planning and assessment of the water management, including infrastructure operation and maintenance. It further has to provide information needed for the planning and assessment of the environmental management activities. Finally it has to provide information required for a self assessment of its organisational and management performance.
- For the XEN, who is managing the Division, it has to supply information on water management, periodic maintenance requirements and WMO performance.
- For the BWDB O&M Directorate it has to supply information on periodic maintenance requirements to be financed and undertaken by the BWDB.
- For the Third Planning Directorate (DPIII) it has to supply information on all the above issues, plus and assessment of economic benefits and poverty reduction impacts resulting from participatory water management.
- Apart from yielding information, the idea of participatory monitoring should be to stimulate debate in order to improve the programme. Monitoring should therefore not be considered to be a control system, but more a learning and knowledge-building system.

A small number of relevant indicators that provide the right information have been identified for the monitoring system, which is described in more detail below.

7.2. Objectives

The objectives of this step are:

- To ensure the implementation of the agreed long-term Operation and Maintenance arrangements between the BWDB and WMO, including the transfer of responsibilities.
- To carry out monitoring in an effective and participatory way, that will enable the various parties involved in the water resource management to monitor their activities and assess the progress and impact made through them.

7.3. Activities Carried out

The following activities are carried out as part of this phase:

- Training in maintenance, operation and monitoring.
- Regular routine maintenance of the infrastructure.
- Regular operation of the infrastructure.
- Regular participatory monitoring.

7.3.1. Training and Continued Organisational Strengthening of WMOs

Training courses are coordinated and organised by the planning teams to enable the WMOs to plan and implement regular maintenance, operation and monitoring as well as to: strengthen the internal management capacity (leadership, conflict management, accountability, savings and income generation, etc.), increase the membership to the organisation (avoiding “free riders” in the community) and enhance external organisational linkages (contacts and linkages with other government and non government organisations).

7.3.2. Regular Routine Maintenance of the Infrastructure.

This process requires five steps, which are carried out by WMGs, WMAs and the BWDB Division Office jointly⁴ as follows:

- Obtaining possession of the infrastructure. (*WMA/Div/IPSWAM*)
- Pre-inspection and assessment of maintenance needs. (*WMA/WMG/Div*)
- Planning of the maintenance. (*WMA/WMGs working in blocks*)
 - Define blocks (areas drained by a single structure with one or more WMGs).
 - Plan annual maintenance.
 - Allocate responsibilities.
- Implementation
 - Carrying out the work, mainly through voluntary labour. (*WMGs in blocks*)
 - Monitoring (*WMA/Div*)
- Post-inspection
 - Assess progress (*WMA/Div*)
 - Award prize to best performing WMG/block.

7.3.3. Regular Routine Operation of the Infrastructure.

Trial Operation

Once all infrastructure improvements have been carried out, participatory operation starts. During the first year the system is jointly operated and reviewed; shortcomings in the system are discussed and corrected. This is an on-the-job training period for the WMOs, during which they gain experience and confidence in the O&M responsibilities and activities.

Operating Committees

At village level selected members of the WMG are responsible for the operation of water infrastructures that affects the water levels of the land belonging to the village. At hydrological system level (blocks) a sub-committee of the WMA is formed under the WMA to manage the operations in this unit. The WMA maintains overall responsibility for the water management in the polder. The selected members who form committees are trained in gate

⁴ The first step also requires support from the IPSWAM teams.

and sluice operation and management, so that they are in a position to realise their operation targets through the day to day operation of the structures.

Regular operation requires six steps, which are carried out by WMGs, WMAs and the BWDB Division Office jointly⁵ as follows:

- Obtaining possession of the infrastructure (if not done already for maintenance). (WMA/Div/IPSWAM)
- Planning of the operation. (WMA/WMGs working in blocks)
 - Confirm blocks (WMA).
 - Define seasonal water requirements. (WMGs in blocks)
 - Test the system. (WMGs in blocks)
 - Define operation system.(WMGs in blocks)
- Modification/Calibration
 - Install gauges, small bunds, pipes as required. (WMA/Div)
- Training of Operation Committees.⁶ (IPSWAM)
- Arrange Operator (WMGs in blocks)
- Monitor results and arrange prize to best performing WMG/block (WMA/Div/?)

7.3.4. Regular Participatory Monitoring.

The monitoring system needs to be *simple*, relying on data collection and analysis of a *small number of key indicators*. It also needs to be *quick*, and appropriate. It should be *people oriented*, using, whenever appropriate, *perception and self assessment techniques*.

Taking this into account, the following summary table has been drawn up, including five essential types of monitoring:

Type of Monitoring	Purpose	Users	Indicators	Method
1. Infrastructure Situation	Plan/assess routine/periodic maintenance	WMAs/XEN (DPIII/O&MD)	Condition of sluices, dykes, khals	Field observation by WMA/SDE jointly
2. Institutional Situation	Assess functioning and relationships of WMAs	WMAs/XEN (DPIII/O&MD)	WMA activities, attendance, savings	Record/analysis by WMA/DCEO
3. Economic Situation	Assess benefits of Water Management	DPIII (WMAs/XEN)	Cropping pattern/Yields	Assessment by WMA/DCEO
4. Social Situation	Assess poverty reduction impact	DPIII (WMAs/XEN)	Poverty status population	Assessment by WMA/DCEO
5. Environmental Situation	Plan/assess SEMP activities	WMAs (XEN/DPIII)	Environmental situation	Assessment by WMA/DCEO

It should be borne in mind that a *limited number* of key indicators have been identified to keep the system as *simple* as possible and so give it a reasonable chance of long-term success.

⁵ The first and third steps also require support from the IPSWAM teams.

⁶ Composition may be the same as the maintenance committees.

Infrastructure and Water Management Monitoring:

It is envisaged that the WMA and staff of the XEN (probably the SDE), will carry out a systematic visual inspection of the polder water management infrastructure annually (see above) and that this will form the basis for:

- An annual routine maintenance plan to be executed by the WMA and WMGs.
- Occasional plans for periodic maintenance to be prepared by the XEN in consultation with the WMA and forwarded to the O&MD for financing.

An assessment of the systematic visual inspection of the infrastructure form the ***first part*** of the semi-annual monitoring report, together with a joint assessment of the performance of the infrastructure and the resulting quality of water management.

Institutional Monitoring:

It is envisaged that the WMA, in the presence of the XEN or SDE, will carry out a self-assessment of its institutional performance during the previous half-year, including:

- Organisational performance: e.g. elections held on time, proper meetings held, minutes recorded and circulated on time.
- Water management performance, through the operation of infrastructure: e.g. successful delivery of water when required and drainage of excess water.
- Environmental management (SEMP) performance: e.g. progress made in improving fisheries and domestic water supply etc.
- Relationship performance: e.g. successful cooperation with LGIs and BWDB Division.

In addition an analysis will be made, together with the DCEO, of WMA and WMG membership, meetings and attendance; savings, credit activities; maintenance related income and expenditure, including administrative costs.

The joint record of the WMA self-assessment forms the ***second part*** of the semi-annual monitoring report.

Economic Monitoring:

An assessment by the WMA and zonal Deputy Chief Extension Officer (DCEO) of the BWDB of cropping intensity and yields, together with the WMAs perceptions on economic changes during the past year, will form the ***third part*** of the semi-annual monitoring report.

Social Monitoring:

In the Integrated Water Management Planning Study carried out for each polder, each household in the polder has been asked (using a systematic methodology) to classify itself data as either: *poor, moderately solvent* or *well-off*.

It is important to obtain an assessment of changes in these figures over time in order to estimate the poverty reduction generated by participatory water management.

An estimate of this self-assessment of poverty status by the WMA will form the *fourth part* of the annual monitoring report.

Environmental Monitoring

As part of long-term water management planning, in addition to taking part in the preparation of an infrastructure rehabilitation plan, the WMA has also been involved in identifying important environmental issues and preparing a Sustainable Environmental Management Plan (SEMP). This involves taking initiatives to tackle serious environmental issues such as domestic water supply and fisheries development, which are not covered in the infrastructure rehabilitation plan.

It is therefore necessary to monitor annually the basic situation of environmental health in the polder to assess progress made and to plan further environmental measures. It is envisaged that this will be done through a joint assessment of the WMA in the presence of the XEN.

The results of this joint assessment of environmental health conditions form the *fifth part* of the semi-annual monitoring report.

Integration and Presentation

A simple integrated system for collecting this information systematically from the WMOs has been developed and field tested. This involves careful structured discussion between WMGs, WMA and BWDB staff on each of the five categories and the resulting scoring of key indicators. Finally an overall indicator is agreed for each category.

It has been possible to present this monitoring data graphically through a simple Geographical Information System (GIS), and an example of this for Polder 22, Khulna, is given in Annex I.

7.3.5. Plan Adjustment

As a result of the participatory monitoring process the operation and maintenance and environmental plans are reviewed. Adjustments or changes are suggested by the various actors involved, discussed and, after agreement has been reached between all parties, implemented.