

Call - 501
FAP-13

Government of the People's Republic of Bangladesh

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

BANGLADESH FLOOD ACTION PLAN

FAP 13 OPERATION AND MAINTENANCE STUDY

BN-401
A-501(1)

(4)



METHODOLOGY REPORT

DRAFT

March 1991



Hunting Technical Services Limited

in association with

Flood Hazard Research Centre
Sanyu Consultants Inc.
Technoconsult International Limited

2

Government of the People's Republic of Bangladesh

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

BANGLADESH FLOOD ACTION PLAN

FAP 13 OPERATION AND MAINTENANCE STUDY

METHODOLOGY REPORT

DRAFT

March 1991

Hunting Technical Services Limited

in association with

**Flood Hazard Research Centre
Sanyu Consultants Inc.
Technoconsult International Limited**

SUMMARY

The Operation and Maintenance Study (Flood Action Plan component 13) aims to carry out a review of operation and maintenance (O&M) practice, constraints, and alternative approaches in Flood Control and Drainage and Flood Control Drainage and Irrigation (FCD/I) projects. The study will combine review phases with detailed case studies of completed projects.

The FAP 13 team comprises members of the FAP 12 team and works in close collaboration with that study (FCD/I Agricultural Study). A separate report covering the proposed methodology being adopted by FAP 12 is being submitted at the same time. There is a substantial overlap in the work of the two studies and much of the methodology of FAP 12 is directly relevant to FAP 13. Therefore, this report concentrates on areas of methodology which are specific only to FAP 13.

The reviews planned under FAP 13 (Chapter 2) will assess the existing organisational and institutional framework for O&M in FCD/I projects in Bangladesh. Since most O&M is the responsibility of the Bangladesh Water Development Board this will be a starting point for the review, but it will extend to aspects of the legal framework in which FCD/I management and O&M is carried out and to relevant experience in other earth work programmes and in other organisations in Bangladesh.

An important aspect of the review phase is that relevant experience in FCD/I system O&M in other countries will also be reviewed. This will largely be limited to a literature review, and will concentrate on alternative organisational arrangements, and particularly on mechanisms for greater local involvement and participation in project planning, management and operation. It is hoped that this will indicate means of improving the performance in O&M, and any problems to be avoided in introducing new approaches.

The greater part of the FAP 13 study will be based on case studies on 17 completed FCD/I projects spread throughout Bangladesh and covering a range of project types and associated management issues (Chapter 3). These case studies will be undertaken jointly with FAP 12. The assessments of engineering, social and institutional issues and problems in O&M will both provide an important contribution to the post-evaluations of FAP 12 and present more detailed evidence on the constraints and problems involved in O&M for FAP 13.

FAP 13 is directed in the Terms of Reference to pay special attention to means of increasing local participation in O&M. This may be achieved by local resource mobilisation and by distributing potential benefits (from O&M and direct additional use of project infrastructure) towards the rural poor. The international reviews and additional assessments of ongoing experiments in alternative approaches to O&M in Bangladesh will be the basis of this focus of the study. Assessment of some aspects of O&M at the Divisional level will help to place project or system specific experience into context.

In addition to collaboration with other FAP components, there are a number of other projects and studies currently underway concerning O&M of FCD/I projects in Bangladesh. The team will liaise closely with these projects to avoid wasteful duplication of effort and to incorporate any relevant experience and findings into this study.

CONTENTS

Chapter/Section	Page
Summary	
Contents	i
Abbreviations	ii
1 INTRODUCTION	1-1
1.1 General	1-1
1.2 Objectives	1-1
1.3 O&M implications for other stages in project life	1-2
2 REVIEW OF O&M PRACTICE AND INSTITUTIONAL CONTEXT	2-1
2.1 Reviews envisaged	2-1
2.2 Review of BWDB organisation and O&M procedures	2-1
2.3 Review of other institutions and legislation relevant to Bangladesh O&M	2-4
2.4 Review of relevant international O&M practice	2-5
3 CASE STUDIES	3-1
3.1 Need for a case study approach	3-1
3.2 Joint case studies with FAP 12	3-1
3.3 Additional case studies	3-3
4 DIVISION MAINTENANCE STUDY	4-1
5 APPROACH TO STUDY OUTPUTS	5-1
ANNEXES	
A O&M checklists	A-1
B Examples of Bangladesh legislation relevant to O&M	B-1

ABBREVIATIONS

BWDB	Bangladesh Water Development Board
CIDA	Canadian International Development Agency
EIP	Early Implementation Project
ESCAP	Economic and Social Committee for Asia and the Pacific
FAO	United Nations Food and Agriculture Organisation
FAP	Flood Action Plan
FCD	Flood Control and Drainage
FCDI	Flood Control, Drainage and Irrigation
FCD/I	FCD and/or FCDI
HTS	Hunting Technical Services Ltd
IIMI	International Irrigation Management Institute
LGEB	Local Government Engineering Bureau
NGO	Non-Governmental Organisation
ODA	UK Overseas Development Administration
O&M	Operation and Maintenance
PIE	Project Impact Evaluation
RRA	Rapid Rural Appraisal
SSSFCDI	Second Small Scale Flood Control, Drainage and Irrigation Project

1 INTRODUCTION

1.1 GENERAL

Hunting Technical Services Limited (HTS) has been engaged by the United Kingdom Overseas Development Administration (ODA) to provide consultancy services to the Government of Bangladesh for Component 13 of the Flood Action Plan, the Operation and Maintenance Study. Support for this FAP component is also provided by the Japanese International Cooperation Agency, which has contracted Sanyu Consultants Inc. to provide consultancy support.

The FAP 13 team includes engineering and institutions specialists from Middlesex Polytechnic Flood Hazard Research Centre and from Technoconsult International Limited of Bangladesh. Although the study for FAP 13 is a separate component of the Flood Action Plan it is closely linked with FAP 12. In particular the two studies share a common core of fieldwork and all the team working on FAP 13 are involved in at least part of the work under FAP 12.

Separate reports for FAP 12 and 13 will be produced, with the exception that a joint inception report for the two studies was produced dealing with common aspects of logistics and staffing. This report is an additional one to those required in the Terms of Reference to FAP 13 (reproduced in the joint inception report), but in timing takes the place of the separate inception report required by the FAP 13 Terms of Reference.

Many aspects of methodology are common between FAP 13 and FAP 12. Details of common methodology with FAP 12, particularly the selection of projects for study under both FAP 12 and FAP 13 (which forms the core of the case study work for FAP 13) are covered in the methodology report for FAP 12. Hence this report covers aspects of methodology particular to FAP 13 for discussion at a meeting scheduled for March 10, following which a final version of this report will be submitted reflecting comments made at the meeting.

1.2 OBJECTIVES

Based on the Terms of Reference there are three main aims of the study:

- to identify the main constraints on effective operation and maintenance (O&M) of FCD and FCDI projects in Bangladesh;
- to develop guidelines for ways of overcoming these constraints, both for existing projects and for new ones under FAP;
- and to recommend ways of maximising participation of beneficiaries and of mobilising local resources for O&M.

A further aim is to prepare, on the basis of this year's study, a work programme for years 2-5 which will continue to review progress in O&M of FCD/I projects and will take up specific topics for study.

The methods involved are essentially reviews and case studies. The reviews will cover the institutional context and experience in Operation and Maintenance (O&M) in

Bangladesh and other countries, both in Flood Control and Drainage (FCD) projects and in other relevant projects (particularly irrigation systems). This will be supported by additional information collected from the other studies of O&M and from projects developing alternative O&M approaches in Bangladesh.

The difference between this study and others underway in Bangladesh is that FAP 13 concentrates on FCD projects and will be based on detailed case studies of O&M history in completed projects, which will reveal the interrelationships between the impacts of the projects and O&M. Most case studies will be jointly undertaken with FAP 12, although one or two may be undertaken specifically for FAP 13. Recommendations will be based on: the joint case studies with FAP 12; on an examination of alternative 'experimental' O&M approaches in Bangladesh; and on alternatives suggested from review of water management systems and O&M in other countries. Better operation and management will be considered in terms of information requirements and management, and the balance between system wide decisions and management and local operation. Aspects of maintenance to be investigated include the balances between preventative maintenance, repair, replacement, deferred maintenance, and emergency works (repairs and maintenance), and between direct resourcing from local sources and central funding with cost recovery.

1.3 O&M IMPLICATIONS FOR OTHER STAGES IN PROJECT LIFE

Operation and maintenance issues are relevant to the design and implementation stages of FCD/I projects, not just to the post-project phase. Although primarily concerned with the operating phase of projects, the study aims to make recommendations for the interaction of engineering practice and social and institutional implications at other stages in project life, since inappropriate choices in the earlier stages of a project are likely to create problems later for O&M. The case study approach, which includes detailed assessment of engineering design and of projects' impacts, will reveal the links between these aspects of project performance and O&M 'problems'.

At the **design** stage attention needs to be paid to O&M implications and the needs of those likely to be affected, for good or bad, by a project. Recent innovations in beneficiary participation suggest that the detailed experience of farmers in a proposed project area, particularly of flood and drainage processes in the area, is likely to be valuable to project planning and design. Obtaining the views and representation of potential beneficiaries and of people who may be disbenefited on the choice of flood mitigation measures, and more detailed project or programme design, may avoid inappropriate planning and design and ensure greater local cooperation with the external agencies implementing a project.

Similarly the planning and design teams should take a wider view of the surface water system in a proposed project area than is possible for local people. Public consultation to explain the alternative schemes and the problems they would try to mitigate could help in achieving local acceptance of a project. Where a project will have potential adverse impacts on other areas these areas need to be included in the consultation and planning process. An early explanation of intended changes and identification of measures to help people affected in this way appears to be needed if "public cuts" and damaging impacts on poor people are to be avoided. These impacts form part of the FAP 12 study, but institutional and consultative means of coping with or avoiding them would be investigated in FAP 13.

During **implementation** of a selected project design, some social and economic aims may be better achieved by construction methods and institutional arrangements which

favour less advantaged groups. At the same time problems and delays in implementation can both erode an otherwise favourable subsequent economic performance, and create problems resulting in higher O&M costs. There is some overlap here conceptually with the FAP 15 Land Acquisition Study, since the issues of ownership, interests in and responsibility for public goods are vital to their continued maintenance.

These points stress the institutional/social aspects, but in parallel with this the **engineering** review will consider the technical implications of these issues, and organisational implications for BWDB and project management. For example, alternative plans and associated designs which would reduce conflicts or help to minimise disbenefits would need to be considered for technical feasibility and costs. Alternative contracting and management models may imply changes to or conflicts between BWDB and local government responsibilities. Additionally, the economic evaluation under FAP 12 and the detailed study of past O&M records and histories may indicate a need for revised allocation of resources, which would be reviewed under FAP 13. Detailed costing recommendations are not within the scope of the study.



2 REVIEW OF O&M PRACTICE AND INSTITUTIONAL CONTEXT

2.1 REVIEWS ENVISAGED

The organisational structure and procedures and practices of BWDB are clearly of greatest relevance to O&M of FCD/I projects in Bangladesh since this is the main implementing and O&M agency. Additionally it is important to understand the legislative context, since this limits the opportunities to develop alternative means of managing and maintaining FCD/I projects and of resourcing these vital activities. Other institutions and organisations are also relevant since they could be used to modify the existing model of O&M in FCD/I and/or be involved in carrying out O&M.

O&M appears to be in an early stage of somewhat unplanned evolution in Bangladesh. Hence the organisational arrangements for FCD/I management in other countries, and particularly the role, responsibilities and involvement of beneficiaries in project O&M, are directly relevant to identifying alternative O&M models. A literature review of relevant non-Bangladesh experience will be undertaken to identify alternative approaches to O&M which may be appropriate to Bangladesh.

O&M is a major concern of both the Government of Bangladesh and donors, and a number of experiments are already underway to develop different institutional approaches to O&M. Those of particular interest to this study include:

- Local Project Committees to coordinate operation and minimise conflicts involving farmers cultivating land of different levels, for example;
- beneficiary committees to operate sluices and regulators;
- and involving the rural poor in project maintenance, such as engaging labour contract societies of women in maintaining embankments and canal sections.

Experience with such approaches in Bangladesh and other countries will be assessed, including the implications of these approaches for existing institutional arrangements, and any problems revealed in their operation.

2.2 REVIEW OF BWDB ORGANISATION AND O&M PROCEDURES

2.2.1 Organisation level review

The Bangladesh Water Development Board is the key agency in water management in Bangladesh, being responsible for implementation and O&M of FCD/I projects, with the exception of some very small schemes taken up by local government (Upazilas). Hence review of the institutional context for O&M will concentrate initially on BWDB.

BWDB has a composite structure involving both functional division, horizontal (regional) divisions within implementation and O&M, and at the officer level, a strong hierarchical system. The implications of its organisational structure for O&M will be considered. In particular the apparent lack of links between O&M Divisions and Implementation Divisions, the implications for operating problems, and the apparent lack of feedback from system operation and management to future design will be considered (and evidence collected in the case studies).

Bangladesh O&M regulations, procedures, engineering criteria, practice, problems, and future requirements will also be reviewed. This will be based on a review of the systems adopted by BWDB, including review of the practice of a selection of O&M Divisions. The findings may be compared with equivalent systems in other agencies also involved in implementing and operating similar projects involving earth moving or water management, for example LGEB (Section 2.3).

2.2.2 Review of detailed O&M provisions

Apart from the administrative system for O&M, the main way in which O&M is formalised in BWDB is through O&M Manuals, usually for particular projects. Hence some of these O&M Manuals will be reviewed - not only for case study projects but also for some BWDB Divisions, and possibly other projects, to assess from engineering and organisational viewpoints their operational plans, budget provisions, O&M procedures and guidelines, and in particular instructions for maintenance and operation of project components - structures and earthworks. The link with the case studies will clearly be important since this will provide a means of comparing the intended procedures and practices given in Manuals, often prepared by consultants, with actual problems in O&M. This may point to design and technical problems, problems in data management and real time operational practice, resource problems, problems of conflicting objectives in drainage and water level management, and/or needs for further training of O&M staff.

There is a danger in taking only a project based approach of missing relevant problems and issues in the programming of maintenance work and in the chain of command in operation. Similarly standard cost schedules and record keeping are at a Divisional level rather than project specific. Hence it will also be appropriate to compile some more aggregate data on O&M in Bangladesh, depending on availability on a national basis or from selected BWDB Divisions, to include typical unit costs and frequencies of routine work, and frequency and costs of problems like major repairs and breaches relative to the infrastructure inventory.

2.2.3 Liaison with other studies/projects

In addition to liaison with other components of FAP relevant to the O&M study, there are a number of non-FAP projects under BWDB which also address issues in O&M. A number of projects with O&M components or involving participation of beneficiaries, and studies relating to O&M, are ongoing or recently completed in Bangladesh and are directly relevant to this study. The O&M models involved in these projects and the experiences in experiments and innovations involving local people in O&M will be assessed.

Brief details of relevant studies and projects are given below.

BWDB related projects include:

a) Systems Rehabilitation Programme

Rehabilitation of selected existing FCD/I projects, but with an emphasis on revised O&M systems including cost recovery from beneficiaries. Funded by European Community and Netherlands.

b) Operation and Maintenance Cost Cell

Currently a one year study concentrating on management systems for improved O&M planning and prioritisation of maintenance work and systematic costings, and improving monitoring and performance of O&M. Assumes central funding for O&M. Funded by CIDA.

c) Second Small Scale Flood Control Drainage and Irrigation Projects

Project is mainly concerned with constructing structures for existing small FCD/I projects and in implementing some new projects. Innovations are based on formation of project committees of local people to assist in planning and design and to facilitate operation and minor maintenance - particularly to minimise disputes in drainage management. Relatively few projects are in the O&M stage so far. Funded by CIDA.

d) Early Implementation Projects

A review of O&M in existing EIPs in 1990 highlighted problems in O&M and put forward an O&M component to be taken up under EIP. This would aim to improve maintenance by involving local landless women in routine maintenance, would provide additional funding for maintenance, and would aim to hand operation over to local committees. The importance of accountability within improved O&M systems was noted. Funded by Netherlands and Sweden.

e) Delta Development Project

Involves rehabilitation of two polders and participatory management and maintenance of these. Routine maintenance is funded by the project but carried out by landless women organised and assisted by a local NGO. Funded by Netherlands.

f) Land Reclamation Project

Involves local people and NGOs (Nijera Kori) in operation of a pilot polder, with further polder development planned. Funded by Netherlands.

Other relevant projects/organisations include:

g) Local Government Engineering Bureau/Rural Employment Sector Programme/Intensive Rural Works Programme

Reviews of O&M in Upazila initiated small scale FCD projects in 1986 showed that some local committees were working, and also resulted in a general O&M manual for these schemes. At the planning stage of these schemes local O&M committees are to be formed among affected groups.

h) Rural Maintenance Programme

A widespread programme for maintenance of earth roads by groups of women with extensive experience in organising basic maintenance aimed to employ the poor.

The FAP 13 study differs from and complements these other projects in two ways. Firstly it is based on detailed case studies of completed FCD/I projects (which are not a

special focus for O&M development) where the problems in O&M will be apparent along with the impacts of such problems. Secondly, FAP 13 will involve reviews of O&M experience, particularly in FCD/I projects, in other countries. This international review should help to identify appropriate O&M approaches for Bangladesh. However, it will be important for the FAP 13 team to liaise with these other O&M related projects so that wasteful duplication of effort is avoided. Preliminary discussions have already been held with all of the projects linked with BWDB listed above.

2.3 REVIEW OF OTHER INSTITUTIONS AND OF LEGISLATION RELEVANT TO BANGLADESH O&M

The legislative frameworks in which BWDB, local government, and NGOs operate are all relevant to O&M, since this may limit the flexibility of different organisations in developing alternative practices to involve local people more directly in O&M, and in directing the use of project infrastructure and work to poorer groups. Preliminary examples of summaries of relevant legislation are given in Annex B.

There is a legal framework for:

- land acquisition for building embankments;
- and collection of water charges or rates in irrigation projects.

But the framework for beneficiary involvement and organisation is not clear, and there appears to be no clear legal framework for their involvement in the operation and maintenance of FCD systems such as sluices, and other structures, and embankments. This may require fresh thinking for new legislation if the formal institutions are to be strengthened to support alternative means of mobilising resources, along with the greater local involvement and accountability implicit in such approaches.

Some organisations and projects active in other sectors of rural infrastructure (see Section 2.2.3) have relevant experience which could be used as models for future O&M in larger FCD projects. Examples are the handing of routine maintenance on earthworks over to landless women, and men, which appears in several programmes, and the preparation of simple operation and routine maintenance manuals.

The experience of NGOs in helping local people to organise successfully to take direct responsibility for aspects of O&M, or to act as labour contracting organisations (where the returns from O&M work are distributed to those in need), is also of direct relevance.

The review will pay particular attention to:

- the replicability of alternative approaches in other parts of Bangladesh, in different types of FCD/I project, and on a larger scale;
- potential management problems in larger systems;
- institutional and legal implications of such alternatives;
- resourcing of such alternatives, whether direct inputs from local people, funds from beneficiaries, funds from central government, or external funds are used;

- and whether organisation of O&M should be internalised within existing bodies (BWDB, or Upazilas, for example), or be in collaboration with other bodies such as NGOs.

2.4 REVIEW OF RELEVANT INTERNATIONAL O&M PRACTICES

2.4.1 Aim of international review

A brief review of relevant international O&M practices in FCD and irrigation systems, particularly of management systems and administrative frameworks, will be undertaken to place in context the current Bangladesh O&M systems in water management.

The review also aims to detect the methodologies or models of management in O&M used in other countries and to assess their applicability to Bangladesh. Hence comparison with practices and organisation of water management in Bangladesh, and indications of the alternative arrangements which could be tried in Bangladesh will be the output. However, within the limited time available this study will largely be limited to a literature review.

2.4.2 Selection of countries

There are three lines of country selection and/or acquisition of information for review:

a) Countries in the region

Clearly the national institutional arrangements of other countries in Asia facing similar environmental and water management problems are of interest to Bangladesh. In terms of flood control, irrigation management and/or overall water management all of the following countries would appear to be relevant for comparison with Bangladesh: China, India, Japan, Malaysia, Myanmar (Burma), Philippines, Sri Lanka, and Thailand. In some cases experience with farmer participation, mostly in irrigation management, will be reviewed since the models adopted may be of relevance to possible approaches for FCD management in Bangladesh.

For some of these countries some information is already available in Bangladesh, but additionally FAP 13 will be able to take advantage of the availability in Bangladesh of people, including the consultants, with direct experience of water management in these countries.

b) International organisations in the region

Useful information including previous reviews and reports on experiments in alternative water management systems, such as farmer managed systems, should be available through: IIMI in Colombo (plus Dhaka office), and ESCAP and the FAO regional office in Bangkok.

c) Countries outside the region

The organisational and administrative setups in other countries, particularly for planning, management responsibilities, and accountability within water management, are of some relevance to Bangladesh. Examples would be the different institutional frameworks in England and Wales compared with the Netherlands, with the latter being particularly interesting given similarities with the physical environment in Bangladesh. Some information has already been obtained in a brief review of water authority organisation in the Netherlands by a Dutch water lawyer working at Middlesex Polytechnic Flood Hazard Research Centre,

which highlights the differences in physical planning, decentralisation in water management, and accountability compared with water management in Bangladesh.

2.4.3 Major review items

It is expected that basic information of the following types will be collected and reviewed:

- Country description: natural conditions, socio-economic conditions, development policy, agricultural pattern, etc.;
- Institutional arrangement for FCD management: vertical and horizontal divisions, legislation, regulations, procedures and practices;
- Organisational setup: organisational charts of relevant agencies, water users/management associations, farmers groups etc.;
- O&M cost implications: government subsidy system, project cost amortisation, water levies, O&M cost levels, cost recovery in general.

Major focal points of the reviews will be:

- public/beneficiary participation mechanisms, their success and problems;
- the extent of representation and accountability in the water management and O&M system;
- and the O&M management systems, particularly monitoring systems including institutional arrangements, data base management, and prioritisation of work.

3 CASE STUDIES

3.1 NEED FOR A CASE STUDY APPROACH

Problems with the operation and maintenance of completed FCD/I projects have been widely noted in previous post-evaluations (based on those reviewed for FAP 12, see FAP 12 methodology report), and in review missions for completed projects, proposals for new projects, and in the post-1988 flood studies and in FAP reports. However, in few cases has this been based on a detailed study of existing projects, comparing their intended performance and O&M requirements and resourcing with their actual O&M provision and associated performance and impacts.

A key difference of FAP 13 from other studies and projects concerned with O&M is the case study approach of examining the past O&M histories of completed projects. This will produce a quantification of these costs, associated problems, and their implications, which will form a basis for recommending changes in practices where necessary. The case studies also offer an opportunity to assess the extent of local participation in O&M, both in the main case studies with FAP 12 and in review of other projects involving O&M experiments.

Hence one of the strengths of this study is that case studies of O&M which can be linked to full impact evaluation studies will be undertaken. This complements the other projects aimed at strengthening O&M of FCD/I projects in Bangladesh (Section 2.2.3) since these are largely concerned with rehabilitating or improving O&M in particular projects, without necessarily any feedback into the planning of new FCD/I projects.

3.2 JOINT CASE STUDIES WITH FAP 12

FAP 13 will undertake detailed studies of O&M practice, including any involvement or lack of involvement of local people in project management, operation, and maintenance, in the projects selected for study under FAP 12. The 12 RRA and five PIE project areas will be those selected and studied jointly with FAP 12, and covering the range of FCD/I project types in Bangladesh. The FAP 12 Methodology report gives full details of the selection process and projects selected for these evaluations.

Projects selected include FCDI projects, main river embankments, both inland and semi-saline zone polders, submersible embankments, and embankments protecting from flash floods; and both large and small projects. Hence a range of management issues and O&M complexities is expected in the case studies. Operation and water level management is expected to be more complex and show greater problems of conflicting interests among beneficiaries in FCDI and polder projects. Submersible embankments and main river embankments are likely to have greater maintenance requirements, and will be dependent on rapid repair of annual damage to facilities if benefits are to be achieved in following years.

Two evaluation methods will be adopted in FAP 12, and will form the basis of the FAP 13 fieldwork. Rapid Rural Appraisals (RRAs) will involve small multi-disciplinary teams of specialists assessing impacts in qualitative and less quantitative terms based on one month studies including reviews of existing data, discussions with groups and key informants, and field inspection. Project Impact Evaluations (PIEs) will involve interview based sample surveys on a probability sampling basis inside the projects, in adjacent areas which may be affected, and in control areas. This will quantify more reliably the impacts of the projects and is likely to reveal any disbenefits and conflicts of interest in both design and operation of projects. The

detailed methodologies for both of these evaluation techniques are given in the FAP 12 methodology report.

Although in general the RRA evaluations will be less detailed than the PIEs, this is less true of the engineering and O&M assessments (technical and social) which will be closely linked, than of the agricultural and socio-economic assessments. The RRAs of completed projects in FAP 12 are intended to provide detailed case study information on a number of O&M issues and the RRA teams will include members of the FAP 13 team. This will identify the actual practice and problems and constraints for O&M in existing projects.

By its nature the assessment of technical O&M requirements and performance relies on discussions with officials and BWDB staff and on field inspection, rather than group discussions or interviews. Hence for the equivalent O&M assessments in the five PIE projects essentially the same methods will be followed as for the RRAs. Although slightly more time may be available, the PIE projects are larger so more time will be needed to cover them to the same level of detail as for the RRA evaluations (which are generally for smaller projects).

The result will be 17 case studies. For each of these (for FAP 13) a more detailed engineering history of the project and inventory of project features (planned and actual) will be reported on than for FAP 12. Additionally the sections of the evaluations for FAP 13 will assess from an engineering viewpoint the constraints on O&M due to problems in obtaining public participation in the projects, and from the social and institutional viewpoint the problems placed on participation by existing institutional structures and engineering procedures. Assessment of the alternative costs and benefits which would occur with preventative maintenance, compared with those actually incurred, would help in identifying appropriate O&M programmes which may achieve prolonged project operating lives and lower overall costs and disbenefits.

An implication of having 17 main O&M case studies is a delay in the availability of the additional five PIE O&M case studies, since they cannot be completed until after the RRAs. This has been allowed for in the reporting schedule given in the joint inception report.

The case studies will be the main means of reviewing and diagnosing problems in public participation and in targeting project infrastructure and project implementation towards benefiting poor people and minimising disbenefits, to be assessed through discussions with groups and key informants.

For as many as possible of the projects the opportunity will be taken to make return visits during the monsoon season to assess and verify actual operating conditions and problems during the flood season, rather than relying just on inspection in the pre-monsoon season and interview data.

Detailed checklists for the engineering and O&M case study evaluations have already been drafted and are reproduced in Annex A. The O&M topics covered include:

- facility inventory for case study projects;
- review of O&M staff and resource requirements and actual levels;
- annual O&M history, including expenditures, work done, and damages to facilities;

- assessment of any conflicting interests and impacts through operation;
- assessment of current state of maintenance and repair of embankments, channels and structures;
- assessment of the use of project infrastructure/land for productive purposes, and distribution of any such use;
- and opinions on alternative management strategies, and on experience in liaison, consultation, and joint planning between different agencies and with local people.

3.3 ADDITIONAL CASE STUDIES

Additional case studies of other projects targeted at assessing recent initiatives in beneficiary participation in implementation and O&M will be undertaken. The RRA (and PIE) projects selected cover a range of project types locations and sizes, but do not include the full range of project O&M experience, such as recent experiments in project participation and O&M, because these projects are either not yet completed or have been completed too recently to qualify for evaluation.

Because the recent experiments in participant O&M tend to be relatively well documented it will not be necessary to carry out detailed case studies in the same way as the main case studies. However, the methods and experiences of some of the projects listed in Section 2.2.3 will be reviewed. This will include field visits to one or two such projects selected purposively, based on the recommendations of the organisations involved in these initiatives, in order to assess the problems involved in O&M in these projects.

A brief visit has already been made to one of the SSSFCDI sub-projects where local sluice and project committees are active and where landless groups make some use of minor earthworks. This indicated some success, but problems in maintaining and operating structures still exist even in a small project close to the local headquarters of BWDB O&M staff. For example, alternative materials or designs may be needed if materials currently used in water control structures are likely in practice to be ineffective or made use of elsewhere.

Key issues to be assessed in these studies are:

- the extent of local participation in both operation and maintenance;
- the effectiveness of O&M compared with other case study projects;
- the resource implications of the experiments: are demands for external resources reduced, or is it dependent on additional funds for O&M;
- the institutional and organisational approaches used in the experiments;
- the extent to which a sense of ownership of and responsibility for projects is created among potential beneficiaries;
- and the replicability of these methods for larger projects possibly involving complex water level regulation.

4 DIVISIONAL MAINTENANCE STUDY

Within one or more of the O&M Divisions in which FAP 12/13 case study projects are located it is intended to place project O&M requirements and practice in context by assessing the Divisional O&M system. Aspects to be considered will include:

- facilities and systems the Division is responsible for, putting into context the importance of the case study project;
- overall staffing and resource levels;
- annual maintenance requirements;
- annual repairs and emergency work in response to flood damage and 'public cuts', also identifying the areas affected;
- O&M costing and current contracting arrangements;
- O&M monitoring system and any training programmes for O&M staff;
- policies towards use of system facilities: embankments, berms, and borrow pits, and the extent of use by poor people;
- and the extent of collaboration, coordination and division of responsibilities in system management between BWDB and other local agencies.

Because O&M is mainly organised in BWDB on a Divisional basis rather than a FCD/I system basis it is important to see how any proposed changes would need to be incorporated into the existing administrative system, or where changes to the latter might be advisable.

5 APPROACH TO STUDY OUTPUTS

A brief review of FAP (and other project) design and implementation intentions will be needed, through liaison with, for example, other components of FAP, so that appropriate approaches to future O&M can be devised. In particular FAP 13 is requested to find ways of ensuring implementation of its recommendations. This may involve comments on:

- Training in O&M for different levels of BWDB, for other O&M organisations such as Upazilas, and down to participant groups, who would need technical assistance if they are to build a capability to operate and maintain completed FCD projects;
- Mechanisms for beneficiaries to contribute in cost-sharing for O&M where direct participation is not feasible, which should also address the distribution of positive and negative impacts of FCD projects;
- Improved record keeping of past work and future needs, and proper inventories of infrastructure, will be a basic element in a better O&M system;
- Dividing responsibilities for O&M and overcoming the perceived failure of the public sector in resource mobilisation for a public good's maintenance. Means of building a sense of 'belonging' or ownership of completed projects and their infrastructure are needed. This might involve "privatising" FCD but care would be needed to avoid adverse distributional impacts and to redress any negative impacts of FCD (ie redistributing benefits to losers).

To achieve such changes some delicate and complex institutional changes could be needed, involving both BWDB and other branches of the governmental system, and beneficiaries through their own group formation.

Any recommendations would clearly need to be reviewed in the light of FAP pilot project experience **and** in the light of the other projects, listed in Section 2.2.3, which are either making recommendations or putting into practice changes in FCD/I O&M in Bangladesh. This would be achieved through the annual reviews in years 2-5.



ANNEX A

CHECKLIST-1

**SUMMARY of FCD/I PROJECT
ENGINEERING AND O&M FIELD SURVEY**

(To be filled up immediately after the survey as per Checklist 2 and 3 and own judgement)

DESCRIPTION

1. Name of the Project : _____

2. Location :

a) District _____

b) Upazilla _____

c) Water Board Circle _____

d) FAP Region _____

3. Type of Scheme : _____

4. Gross Area: _____

5. Net Benefitted Area : _____

(Attach Index map showing all the important infrastructures of the project)

6. Over all plan;

(State purpose of the scheme and major components of works)

7. Feasibility study : date of starting _____

: date of completion _____

10. Agencies involved :BWDB/BADC/FFWP/EIP/CIDA/CARE etc._____

1st Phase 2nd Phase 3rd Phase
etc.

Details of phases :

13. Year wise expenditure :

Total

Allocation Tk/Wheat

O&M

14. Problem Identification (Pre/Post Project Conditions :

	<u>Pre-Project</u>	<u>Post Project</u>
Drainage congestion by siltation of drainage channels		
Damage of land		
a) sand deposition		
b) erosion		
Early flood		
High flood in nearby rivers		
Highest flood level		
Flash flood		
Slow fall in flood water		
Wave action		
Rapid drainage		
Drainage impeded by existing structure/embankment		
Breach in embankments		
a) Normal(for weak section)		
b) Public cut		
c) Over topping		

Failure of structure

Damage of structures

Inadequate O + M

Salinity

Drought

15. Present condition of major components of the project :

i) Embankment :

Length_____ Km; Top Width_____ m

Top Elevation_____ m; Height_____ m; F.B_____ (m)

Slope : C/S 1:_____; R/S 1:_____

Condition :

Good

Need repair

a) Embankment (E/W)

km
Km
Km
Km

km
Km
Km
Km

Top

Side slope C/S

R/S.

b) Turfing : C/S

R/S

Km
km

km
km

c) Condition of Berms Present yr. Last yr. Designed

Berms width

ii) Structure : Regulators/Sluice

No.

Condition

Good

Need repair

Civil Construction

Gate

Aprons: U/S

D/S

Wing walls:

U/S

D/S

(iii) Other Structures

(No)

(P.S., Weir etc.)

(iv) Describe the present condition of works and reasons for their deterioration or failure if applicable

Embankment	
Structures	
Others	

16. Hydrology :

a) Flood Condition (Area flooded) : 0% 25% 50% 75% 100%
(From Area-Elev.curve and SL. 16b)

i) Current year :

ii) Last year :

iii) Year before last :

iv) Before the Project :

b) Highest water level :

i) Pre-project :

ii) Post-project :

c) Gauge Readings
(inside/outside Project) :

annual maximum records (append
example hydrographs) location
of gauges

17. Describe the impact of the scheme outside the project area

i) Positive

ii) Negative

CHECKLIST - 2

FCD/I PROJECT SURVEY

DISCUSSION WITH BWDB AND OTHER GOVT. OFFICIALS IN THE PROJECT AREA

A. Name of the Project _____

BWDB ENGINEERS(e.g, SE,XEN, SDE, S.O)1. History of the project including all earlier schemes in the area
(eg. RWP-1/, FFW-2/, etc.)

2. Perception of the success of the project and any problem
requiring remedial action.

3. Name of other organisations/individual who should be contacted
in the course of Survey

-1/ RWP - Rural Works Programme

-2/ FFW - Food For Works.

4. Agency involved in Cosntruction : BWDB/FFWP/EIP/CIDA/CARE/

5. Year wise expenditure :

i) Capital Cost	19	19	19	19	Total
Embankment					
Drainage Channel					
Irrigation Canal					
Structures					
Vehicle & Equipment					
Project Buildings and Roads					
Land Acquisition					
ii) O & M Cost	19	19	19	19	Total
Demand Tk/Wheat					
Allocation Tk/Wheat					
Actual Expd. Tk/Wheat					
a) Staff					
b) Material					
c) Labour					

iii) Beneficiaries
Participation for
O & M (Describe)

6. Identify Project conditions :

	<u>Pre-project</u>	<u>Post Project</u>
Drainage congestion by siltation of drainage channels		
Early Flood		
High flood in nearby rivers		
Flash flood		
Slow fall in flood water		
Rapid drainage		
Drainage impeded by existing structure/embankments		
Breach in embankments		
Failure of structure		
Inadequate of O & M		
Open water Fisheries		
Salinity		
Drought		

7. Hydrology :

List for each year maximum water levels at relevant gauging station with dates, also area of project undated

Highest water level	Proportion of area affected				
	0%	25%	50%	75%	100%
i) Pre-Project					
ii) Post-Project					

8. Is the adjacent river /khal changing course Yes/No

If yes state the following

Description	19	19	19	19	19	19
Discharge m3/sec						
Bank erosion Width (m/km)						
a) Project side						
b) Other side						

Present distance of the toe of embankment from the river side :

_____ m/km

B. BADC (District and Upazilla Officials)

I) Involvement in the project : any special input

II) Perception of the success of the project and any problems for remedy

C. UNO's

1. Involvement of the Upazilla in the project

2. List of all RWP/FFW/-project undertaken in the area from before project to present

Project	Year of construction	Type of work done	Amount spent Tk./Wheat (mds)

3. Future programme if any

4. Perception of the success of the project and any problems for remedy

RWP - Rural Works Programme

FFW - Food For Works.

CHECKLIST - 3

FCD/I PROJECT SURVEY - FIELD WORKS

NAME OF PROJECT _____

DIRECT OBSERVATION OF THE TEAM

1. Embankment

Total Length

km

Top width, Design

m

Side slope design C/S,

1 : _____

R/S

1 : _____

Date of Survey

a) Over all Project Conditions

Condition	Good	Need Minor Repair	Need Major Repair
Embankment Top	<input type="text"/> km	<input type="text"/> km	<input type="text"/> km
Side Slope C/S	<input type="text"/> km	<input type="text"/> km	<input type="text"/> km
Turfing	<input type="text"/> km	<input type="text"/> km	<input type="text"/> km

Soil of Embankment : Clay/Silt/Sand

b) Condition in details. (indicate reasons)

Reach	Embankment top Level	Topwidth	Side Slopes		Turfing	Misc. (Berm)	State of repair	Other uses (Cultivation, housing etc.)
			C/S	R/S				

Patrols/Guard

Maintenance by

- i) Local Committee Headed by
- ii) Other Agencies, BWDB/
- iii) None

Coy

2. STRUCTURES

Regulators/Sluices (No)	<input type="text"/>
Other structures (No)	<input type="text"/>
Date of Survey	<input type="text"/>

a) Over all project condition

Condition	Good	Needs Repair
Civil Construction	<input type="text"/>	<input type="text"/>
Gate	<input type="text"/>	<input type="text"/>
Aprons:U/S	<input type="text"/>	<input type="text"/>
D/S	<input type="text"/>	<input type="text"/>
Wing walls:		
U/S	<input type="text"/>	<input type="text"/>
D/S	<input type="text"/>	<input type="text"/>

3. Drainage Channels

	Design		Actual (est.)
Total Length	<input type="text"/>	km	<input type="text"/> km
Bed width	<input type="text"/>	m	<input type="text"/> m
Side slope	1 : <input type="text"/>		1 : <input type="text"/>

4. Irrigation Canals

	Design		Actual (est.)
Length	<input type="text"/>	km	<input type="text"/> km
Bed width	<input type="text"/>	m	<input type="text"/> m
Date of Survey	<input type="text"/>		<input type="text"/>

a) Over all Project Conditions

Condition	Good	Need improvement
Channel/ canal bed	<input type="text"/> km	<input type="text"/> km
Side slope	<input type="text"/> km	<input type="text"/> km
Others_____	<input type="text"/> km	<input type="text"/> km

b) Conditions in details (indicate reasons)

Reach	Bed	Side slope	Misc.

B. QUESTIONNAIRE TO THE LOCAL PEOPLE
(AT LOCATIONS AS SELECTED BY THE TEAM)

Name of Mouza/Village _____

a) Identification of Problems

	<u>Pre-Project</u>	<u>Post-Project</u>
Drainage congestion by siltation of drainage channel	<input type="text"/>	<input type="text"/>
Damage of land -	<input type="text"/>	<input type="text"/>
a) Sand Deposition	<input type="text"/>	<input type="text"/>
b) Erossion	<input type="text"/>	<input type="text"/>
Early flood	<input type="text"/>	<input type="text"/>
High flood in nearby rivers	<input type="text"/>	<input type="text"/>
Flash flood	<input type="text"/>	<input type="text"/>
Slow fall in flood water	<input type="text"/>	<input type="text"/>
Rapid drainage	<input type="text"/>	<input type="text"/>
Drainage impeded by existing structure/embankment	<input type="text"/>	<input type="text"/>
Breach in embankments	<input type="text"/>	<input type="text"/>
Failure of Structure	<input type="text"/>	<input type="text"/>
Inadequate of O & M	<input type="text"/>	<input type="text"/>
Open water Fisheries	<input type="text"/>	<input type="text"/>
Salinity	<input type="text"/>	<input type="text"/>
Drought	<input type="text"/>	<input type="text"/>



82

A-22

b) Hydrology :

Previous year

When flood water starts to rise ? :

When flood water submerges the
river bank ? :When flood water starts to
recede ? :When the flood water goes down
completely ? :c) Impact of the Scheme on the following productive
activities:

	Positive	No Change	Negative	Not Applicable	Unknown
Crop production	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Fish production	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Shrimp production	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Land transport	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Water transport	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Project of property	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Health	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Describe any 'Negative' impacts or give response if 'Unknown'

d) Describe the impact of the scheme outside the project area

i). Positive

ii) Negative

CHECKLIST - 4

O&M

BWDB Officials/Upazillas/Beneficiaries as appropriate

- 1. Are there any standard procedures spelled out for O&M in the approved project document or O&M Manual?

If yes, are they been fully followed?

If not, why not?

- 2. Who controls the present O&M system?

- 3. Do you think that the present system of controlling O&M is effective?

Yes

No

If not, what are the reasons behind this?, how might it be more effective?

- a).....
- b).....
- c).....

- 4. What are the source of fund for O&M?

- a)
- b)
- c)

5. Are there any O&M committees?

Yes

No

If yes, who are the members of the committee?
how did they become members?

a)

b)

c)

d)

6. If O&M committee exists, how active is it?

7. What are the requirements for routine operation and management?

Are they all available on time?

Who is specially responsible for operation and maintenance?

8. What is the extent of cooperation from the local administration especially at District and Upazila level in terms of providing fund, supervision, etc.

9. What is the actual extent of participation from the beneficiaries local people in operation and maintenance?

10. What coordination and other problems exist regarding the O&M of this FCD/I project?
(as experienced by the administration/beneficiaries)

11. What are the major benefits of the project?

12. What are the obstacles in the operation and maintenance of it?

a).....

b).....

c).....

13. What services or changes are needed to achieve greater benefits out of the project?

14. Do you think, increased local participation in the operation, management and maintenance of the project will increase its effectiveness?

Yes

No

How might it?

examples

i) through cooperative society

ii) through any other organisation

iii) any other (specify).....

15. Which one of the following management system do you prefer for O&M?

- a) Complete control by upazila
- b) Shared management by Upazila and beneficiaries
- c) Full responsibility by the beneficiaries but with support by upazila
- d) BWDB only
- e) BWDB + Upazila
- f) BWDB + beneficiaries

16. Any other comments about O&M :

ANNEX B

EXAMPLES OF BANGLADESH LEGISLATION RELEVANT TO O&M

Bangladesh Irrigation Water Rates Rules 1984

[Bangladesh Irrigation Water Ordinance, 1983 (XXXI of 1983)]

Main points are:

1. The water rate may be imposed on the owners, on occupiers of land situated within any area on account of water being supplied or regulated therein for irrigation. The authority (authority means the Board, or as the case may be, the corporation) shall submit to the government a report containing the full description of the area together with an index map on such scale as may be required and the water rate per acre sought to be imposed.
2. The Assessing Authority shall, subject to such instructions as may be given by the Government by notification in the official Gazette, make a preliminary assessment of the water rate including the rate of bulk supply payable by the owner or occupiers of all lands included in the notified area for each crop season as per schedule of such rate notified in such manner as the government may direct.
3. After the preliminary assessment of water rate has been made, the assessing authority shall inform all persons by public notice affixed in conspicuous places and also give publicity of the fact of preliminary assessment by beat of drums in all hats and bazar in the area concerned.
4. Copies of the preliminary assessment list shall remain open for public inspection free of charge in such office or place as the assessing authority may notify in this behalf within the local limits of the area for which assessment has been made for such period as may be fixed by the assessing authority.
5. After the final assessment of the water rate payable by an assessee has been made, the assessee authority shall send a duly authenticated copy of it to the Deputy Commissioner.
6. There shall be allowed a rebate of water rate @ 20% of rate payable if the payment is made within a period of 30 days from the date of rate becomes due, provided that the rebate shall be reduced to 10% if the payment is made within a period of 45 days.

7. In the case of any default on the part of the assessee in making payment of water rate, the defaulter shall be liable to an interest @ 15% of the water rate for payment after the due date including the grace period specified.
8. In case of any default for making payment of water rate of a particular crop season before the next same crop season commences, the assessing authority may, without any previous notice, stop the supply of regulation of water in the land of the defaulter and for that reason, no loss or compensation can be claimed for the damage, if any, of any crop that may remain standing in such field at the time of such stoppage.
9. A water rate shall be collected by such officer and employee of the Board authorised for the purpose or by such person or group of person as the Board, after obtaining previous approval of the government, considers it expedient for such collection.

Some Relevant Legislation for Public Lands in FCD/I Projects

1. Acquisition of any property: The acquisition and requisition of immovable property ordinance 1982.
2. Requisition of Property: The acquisition and requisition of immovable property ordinance 1982.
3. Emergency acquisition of property for flood control - Emergency acquisition of property Act 1989 (No.9).

Abstract from : The Acquisition and Requisition of Immovable Property Ordinance 1982.

Section 3

Publication of Preliminary notice of acquisition of property:

Whenever it appears to the Deputy Commissioner that any property in any locality is needed or is likely to be needed for any public purpose or in the public interest, he shall cause a notice to be published at convenient places on or near the property in the prescribed form and manner stating that the property is proposed to be acquired.

Provided that no property used by the public for the purpose



B-3

of religious worship, graveyard and cremation ground shall be acquired.

Section 10

Payment of compensation (1) on making an award under section 7, the Deputy Commissioner shall, before taking possession of the property, tender payment of the compensation awarded by him to the persons entitled thereto according to the award and shall pay it to them unless prevented by some one or more of the contingencies mentioned in sub section (2).

(2) If the persons entitled to compensation do not consent to received it or if there be no person competent to receive the compensation or if there be any dispute as to the title to receive the compensation or as to the apportionment of it, the Deputy Commissioner shall keep the account of the compensation in a deposit account in the Public Account of the Republic which shall be deemed payment for the purpose of taking over possession of the property without any prejudice to the claim of the parties to be determined by the Arbitrator.

Provided that any person admitted to be interested may receive such payment under protest as to the sufficiency of the amount.

Provided further that no person who has received the amount otherwise than under protest shall be entitled to make any application under section 28.

Provided further that nothing herein contained shall affect the liability of any person who may receive the whole or any part of any compensation awarded under this part to pay the same to the person lawfully entitled thereto.

Section 18

Requisition of Property: (1) When any property is required temporarily for a public purpose or in the public interest, the Deputy Commissioner may, with the prior approval of the Government, by order in writing requisition it.

Provided that no such approval shall be necessary in the case of emergency requirement of any property.

Provided further that save in the case of emergency requirement for the purpose of maintenance of transport or communication system, no property which is bonafide used by the owner thereof as the residence of himself or his family or which is used either for religious worship by the public or as an educational institution or orphanage or as a hospital, public library, graveyard or cremation ground shall be

requisitioned.

(2) Where an order made under sub section(1) has been served, the Deputy Commissioner may take possession of the requisitioned property - (a) in the case of emergency requirement for the purpose of maintenance of transport or communication system, at any time after the date of service of the order, (b) in any other case, after the expiry of thirty days from the date of service of the order and may use the property for the purpose for which it has been requisitioned.

(3) Except with the prior approval of the Government, no property shall be kept under requisition for a period exceeding two years from the date of taking over possession of such property.