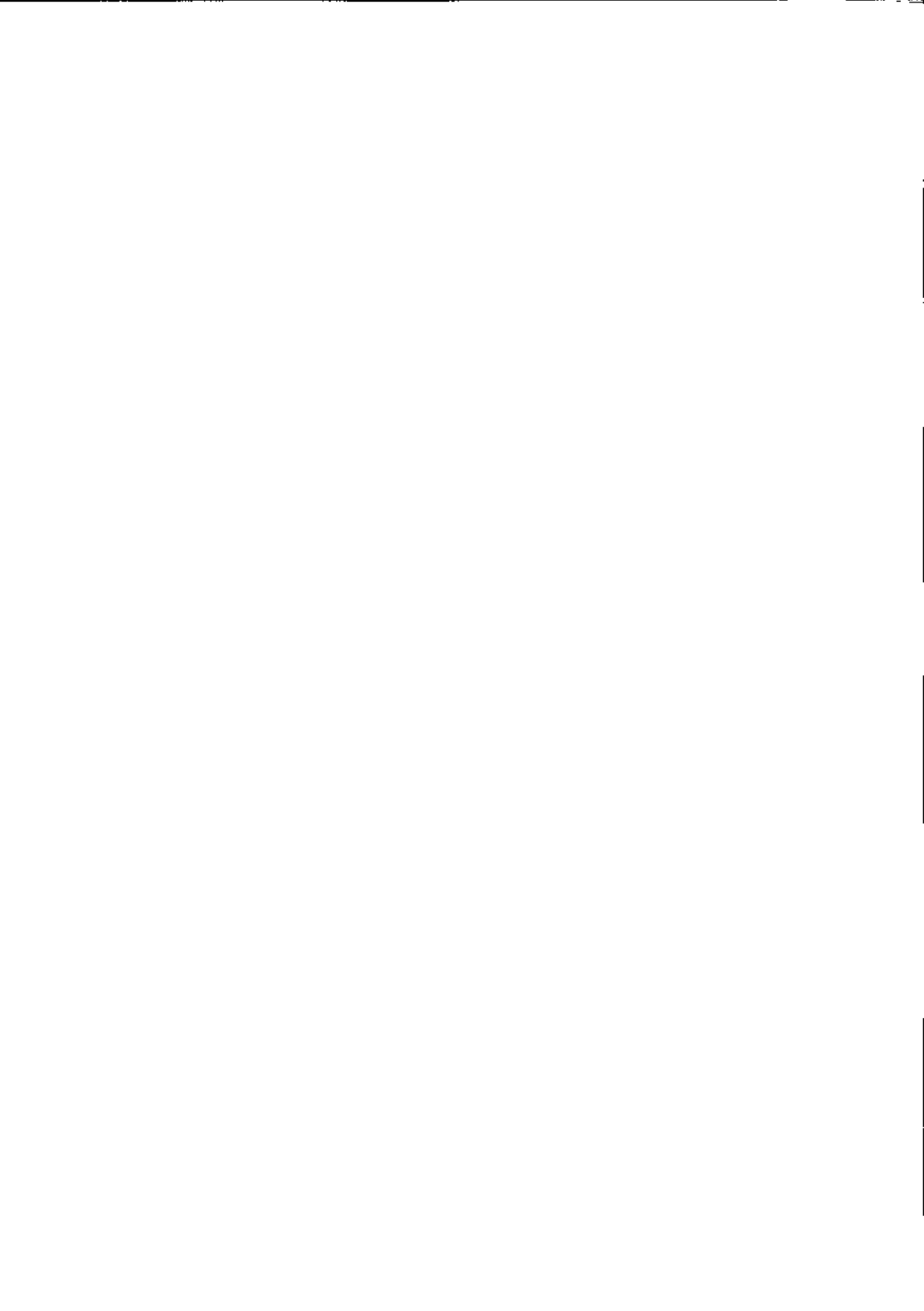


FLOOD ACTION PLAN, BANGLADESH





FLOOD ACTION PLAN, BANGLADESH

A study of the debate on flood
control in Bangladesh

Preface

The floods of 1987 and 1988 in Bangladesh led to the initiation of the Flood Action Plan (FAP). The FAP is coordinated by the Flood Plan Coordination Organization and is supported by seventeen donors including the Netherlands. The first phase, from 1990 to 1995, consists of studies and pilot projects.

In Bangladesh, flood control is both crucial and complex. It is not surprising that plans in this sector cause much debate and that the FAP is subject to extensive criticism.

The purpose of this study is to get a 'second opinion' concerning the debate and to determine whether in response to the critique the Netherlands position on the FAP should be reconsidered.

This report is based on literature studies and interviews conducted mostly in Bangladesh. Every effort was made to hear proponents, opponents and independent experts.

The study was coordinated by Rob Visser (Operations Review Unit). Arend van Riessen (Nedworc) was involved in the studies and reporting. Throughout the study period intensive consultation took place with mission leader Enno Hommes (TU Twente). A large number of experts collaborated in the file studies, the field mission and the consultations. I would like to thank them for their contributions. This report comprises an abridged version of the original published in Dutch, and was translated by John Kraay.

The Operations Review Unit (IOV), an independent unit within the Ministry of Foreign Affairs charged with evaluating Netherlands development cooperation policy and implementation, bears responsibility for this study.

Director IOV

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Abbreviations

ADAB	– Association of Development Agencies in Bangladesh
ADB	– Asian Development Bank
BARC	– Bangladesh Agricultural Research Council
BDP	– Bhuapur Development Project
BRE	– Brahmaputra Right Embankment
BWDB	– Bangladesh Water Development Board
CCCE	– Caisse Centrale de Coopération Economique
CDL	– Bangladesh NGO
CERDI	– Centre Etudes et Recherches de Développement International
CPP	– Country Policy Plan – Compartmentalization Pilot Project (FAP-20)
CT	– Consultants Team
DANIDA	– Danish International Development Agency
DDP	– Delta Development Project
DGIS	– Directoraat-Generaal Internationale Samenwerking
DTW	– Deep Tubewells
EDF	– European Development Fund
EEC	– European Economic Community
EIA	– Environmental Impact Assessment
EIP	– Early Implementation Project
EIRR	– Economic Internal Rate of Return
EIU	– Economist Intelligence Unit
EP WAPDA	– East Pakistan Water and Power Development Authority
FAP	– Flood Action Plan
FCD	– Flood Control and Drainage
FCD/I	– Flood Control, Drainage and Irrigation
FPCO	– Flood Plan Coordination Organization
GNP	– Gross National Product
GOB	– Government of Bangladesh
HYV	– High-Yielding Variety
IBRD	– International Bank for Reconstruction and Development
IECO	– International Engineering Company
IIED	– International Institute of Environment and Development
IOV	– Inspectie Ontwikkelingssamenwerking te Velde
JICA	– Japan International Cooperation Agency
KfW	– Kreditanstalt für Wiederaufbau
KIT	– Koninklijk Instituut voor de Tropen (Royal Tropical Institute)
LGED	– Local Government Engineering Department

LLP	– Low Lift Pumps
LRP	– Land Reclamation Project
MDSC	– Multidisciplinair Subcompartmental Survey
MIWDFC	– Ministry of Irrigation, Water Development and Flood Control
NGO	– Non-Governmental Organization
ODA	– Overseas Development Administration
POE	– Panel of Experts
PT	– Project Team
RC	– Review Committee
SIDA	– Swedish International Development Agency
SRP	– Systems Rehabilitation Project
STW	– Shallow Tubewells
TAPP	– Technical Assistance Project Proforma
TC	– Technical Committee
TEGON	– Themagroep Onderontwikkeling (Themegroup Underdevelopment)
TOR	– Terms of Reference
UK	– United Kingdom
UNDP	– United Nations Development Programma
UNESCO	– United Nations Educational, Scientific, and Cultural Organization
USA	– United States of America
USAID	– United States Agency for International Development
WARPO	– Water Resources Planning Organization

Summary, conclusions and recommendations

1. Introduction

In 1987 and 1988 Bangladesh was ravaged by widespread flooding which inflicted serious damage to agriculture and the infrastructure. In 1989 the World Bank and the Bangladeshi government agreed to coordinate various existing proposals in the area of flood control. This led to the Flood Action Plan (FAP), comprising twenty-six studies and pilot projects to be supported by seventeen donors. The objective of the Flood Action Plan was to identify, plan, design and test those high-priority flood-control projects which were feasible in technical, economic, environmental and social terms. The central concept of the FAP is 'controlled flooding'. A substantial part of the engineering would involve the building of embankments and subdividing the areas protected by these structures into compartments. The first phase, projected to run from 1990 to 1995, would mainly consist of studies on the basis of which construction could be begun after 1995. Total expenditure for this investigative phase amounts to US\$ 150 million.

The Netherlands has a long-standing involvement with the Bangladeshi water sector and participates in the FAP as well. The Netherlands co-finances two components: FAP-25, development of a flood management model (Dfl 0.22 million, approx. US\$ 115,000), and FAP-20 (Dfl 8.15 million, approx. US\$ 4.25 million). FAP-20 is a pilot project in which 'compartmentalization' is tested at field level. Compartmentalization entails the spreading of flood water over the floodplains by establishing interlinked compartments, with the objective of providing, through water management, a more secure environment for agriculture, fisheries and integrated development. In addition, the project looks into the economic results of compartmentalization and the effects on the environment and on fisheries. A key element of FAP-20 is to involve beneficiaries in the decision-making process.

The FAP is managed by a special unit within the Ministry of Irrigation, Water Development and Flood Control, called the Flood Plan Coordination Organization

(FPCO), in close consultation with the Bangladesh Water Development Board (BWDB) and other agencies. An important role is given to the Panel of Experts (POE), made up of Bangladeshi and foreign experts. The POE advises the FPCO.

The FAP may be called unique because of the unprecedented, close cooperation between the Government of Bangladesh and donors aimed at a coordinated and integrated approach of flood-control systems covering all of Bangladesh. This sort of approach is highly important in view of the multidisciplinary nature of water management. Interventions in the water economy affect agriculture, environment and fisheries and will have economic and social consequences for a large part of the population.

The FAP is not the first proposal to control flooding by rivers. As early as the 1950s plans were being made to this end, and throughout the ensuing years some twelve per cent of the Bangladesh development budget was invested in the water sector. The various studies indicate that many aspects of the current FAP discussions are well-worn topics. For decades now the issue has been the choice between either large-scale water works providing the greatest possible security against flooding or improvement of traditional responses to flooding. The immediate occasion for the present report is the steadily growing and sometimes fierce criticism of the FAP.

Discussions about the FAP are not always easy to follow, since the parties involved may not be talking or writing about the same FAP. One reason is that ideas about the FAP are rapidly changing; other reasons will be mentioned in section 5. Unless otherwise noted, this text uses the term FAP to refer to the complex of studies, pilot projects, etc. which, as specified in the original FAP documents, will lead to construction of embankments and compartmentalization to allow controlled flooding. Although less extensive than earlier French plans for complete protection against flooding, these FAP objectives still imply extensive water works.

2. Purpose and arrangement of the present report

The purpose of this study conducted by the Operations Review Unit (IOV) is to determine whether criticism of the FAP should affect the Netherlands point of view regarding the Flood Action Plan. Two questions need to be answered:

1. Which points of criticism are well founded, and hence pertinent to that point of view?
2. In view of this critique, is the Netherlands contribution to the FAP in accord with its development cooperation policy, more specifically with the policy for

bilateral cooperation with Bangladesh as laid down in the Netherlands development cooperation Country Policy Plan (1989)?

To obtain insight into the discussions regarding the FAP a literature study was begun in October 1992. This inquiry also provided materials for the subsequent field mission and the concluding report. Meanwhile, experts and involved parties were interviewed to fill gaps in the information. Against this background a number of technical and socio-economic memoranda were written in December 1992, to which fourteen experts responded, including proponents as well as opponents of the FAP.

A mission composed of a sociologist, a civil engineer, an ecologist, an agricultural economist and an IOV staff member visited Bangladesh during the last week of January and the first week of February 1993. A number of persons were interviewed who were either in favour of the FAP or opposed to it. Observation remained limited to visiting the site of FAP-20.

A reference group provided counselling for the inquiry.

It should be emphasized that this study is not an evaluation of the FAP. The point of departure is the critique of the FAP as voiced by various parties. The objective of the study may be described as: to seek a *second opinion* regarding crucial issues in the FAP debate, and to determine which conclusions should be drawn from this for the Netherlands position on the FAP.

3. Criticism of the FAP

The major criticism of the FAP and the proposed interventions may be summarized as follows:

- a) Flood control projects will induce increasing inequality among the population and will marginalize small farmers, fishermen and landless people.
- b) Positive effects on agricultural production are still uncertain.
- c) The FAP has a negative impact on fishery, which is the primary source of protein for the Bangladeshi poor.
- d) The FAP will affect the environment negatively.
- e) Implementation of the required water works demands a higher standard of planning, design, construction and maintenance than currently practiced in Bangladesh.
- f) Neither the BWDB nor the FPCO are able to implement water management in Bangladesh in an interdisciplinary way. Still, at the present time the BWDB is

the only organization which could shoulder an activity as comprehensive as the FAP.

- g) Maintenance of the projected structures is expensive, and Bangladesh is not able to cover the costs.
- h) A number of critics question the legitimacy of the decision-making process; they point out that the population, for whom the FAP plans have far-reaching consequences, is very poorly informed.
- i) In the light of the enormous investment and the resulting high costs of maintenance critics wonder whether it might not be more advantageous to invest the money in other projects.

Much of this FAP criticism originated in Bangladesh. NGOs in particular voice their concern about the consequences which the FAP will have for their target groups. In addition, criticism of the FAP among donors and organizations abroad is growing. Those who advocate the FAP point to the unavoidable need to intervene in Bangladesh's hydrodynamic system in order to increase agricultural production. Advocates are found especially in the BWDB and among a number of donors.

At this time, halfway through 1993, critics and defenders of the FAP are in diametrically opposite camps. There is currently no dialogue in which arguments are being exchanged and points of view being reconsidered.

In the next section the various technical arguments will be reviewed briefly. From the outset it is important to note that the FAP is subject to shifts. The FAP studies were designed as preparatory for extensive implementation after 1995. A growing number of parties have concluded that by 1995 the studies will have yielded insufficient results to justify implementation. Some hold that the studies will not lead directly to preparation for implementation, but to preparation for policy development (and it is only after this that—less extensive—implementation can begin). Criticism is directed especially against large-scale implementation.

4. Discussion and findings

4.1. Flood control

For hundreds of years the people of Bangladesh managed to cope with seasonal floods. They built embankments and prepared places of refuge. In fact, seasonal inundation is beneficial to agriculture and fishing. The low embankments regulate the water level and problems arise only when flooding is extreme.

Complete enclosure of an area with embankments does not automatically result in

improved water management. The positive effects of flooding are lost and negative effects occur because of poor drainage, deterioration of the environment and decline of fisheries. Furthermore, when a high embankment is breached flooding is proportionally more severe and the damage greater. Moreover, a high embankment provides a (false) sense of security, so that the population is likely to take fewer precautions.

In recent decades many embankments were built, so that sixty per cent of the embankments as proposed by the original FAP are already in place. Most of them are in poor condition however, due not only to inadequate maintenance but also to faulty design and construction. Some embankments collapse or farmers breach them when faced with too many negative side effects. This is why the FAP now speaks of 'controlled flooding' and more emphasis than before 1990 is placed on participation, and on operation and management. Complete flood protection is currently envisaged for cities and industrial areas only.

Nevertheless, all types of embankment continue to present considerable technical problems. Matters such as undercutting of the banks through erosion, higher peak flows because of canalization and the possibility of rising riverbeds are problems which cannot be solved until more is known of changes in the course of the rivers. It is certain that learning how to stabilize these great rivers will take at least another ten years of study.

Experience with implementation practices in Bangladesh does not justify optimism regarding the quality of construction, operation and maintenance.

In brief, the technical feasibility of the entire FAP concept is not demonstrated and projects involving large-scale embankments must be considered out of reach at this time. Projects requiring less maintenance and management and projects based on reliable assumptions could be carried out. This would imply a shift to maintenance of existing projects, protection of urban areas, and improvement of drainage. These types of relatively non-controversial activities could be undertaken at present. More studies and pilot projects are needed before implementation of large-scale water works can be started.

4.2. Agriculture

Agriculture in Bangladesh is typically small scale, and features unequal property relations and cultivation systems which require little investment. Over seventy per cent of the peasant households farms less than 1 ha of land. On average eleven persons depend on the yield of 1 ha of arable land. Agriculture amounts to forty per cent of GNP in Bangladesh.

The annual floods assure replenishment of the groundwater reservoir from which irrigation draws during the dry season. In addition, the flooding enhances soil fertility, for instance via nitrogen fixation due to blue-green algae. Crop damage because of flooding occurs under extreme conditions only.

Economic justification of the FAP is based on the assumption that agricultural performance during the wet season will increase as a result of 1) reduced crop damage, 2) increased yield due to introduction of new rice varieties to replace the local ones (which are adapted to inundation), and 3) intensification of wet-season farming because of reduced risk.

Experts in the Ministry of Agriculture and in institutes for agricultural research give priority to improvement of irrigation during the dry season, privatizing of input distribution and credit, adjustments in macro-economic policy and greater attention to fisheries as major contributions to increased agricultural production. This shows that their involvement in the FAP is limited.

Flood-caused crop damage is seldom experienced as the greatest problem, and history teaches that flood control alone does not prompt agricultural intensification. Meanwhile, FAP experts recognize that development of irrigation has considerable potential, although they do point out that these opportunities for expansion will be exhausted towards the end of this decade, so that eventually flood control will have to be considered anyway.

In any case, it is not yet clear what the net effects of the FAP will be on soil fertility, dry-season groundwater level, the spread of plagues and pests, the loss of arable land and animal husbandry. This underscores the importance of further study and indicates the need to postpone large-scale technical structures. Moreover, the agricultural objectives of the FAP must be based on both the genuine needs of the farmers and the government policy for agriculture.

4.3. *Environment*

The ecosystem of Bangladesh is dominated by the monsoon climate, large and small rivers, tidal influence, dry and wet cultivation practices and a high population density. Flooding is part and parcel of the system and constitutes the basis for a great diversity of plant and animal life.

Implementation of the FAP will cause drastic changes. This is recognized, and hence all project proposals must include an environmental impact analysis (EIA). A separate study of the environment, FAP-16, was added as well. But this is not

enough, because of the lack of proper data and expertise to implement an EIA. Further, the question is how the EIA results will be used: will they be integrated in a new basis for planning or will they come into play only after technological considerations have defined the scenario? Institutional capacity in the area of environment is limited and environmental concerns are insufficiently integrated in the FAP.

Major environmental effects attending the FAP are siltation, blocking of aquatic migration routes, and water pollution due to drainage problems. In general the effect on biodiversity, public security and public health will be negative. Especially the poor will suffer from these effects.

The fact that environmental aspects of national scope are taken up into the FAP is a step forward. Still, more study and institutional embedding of its results are needed in order to decide on an adequate approach. Moreover, the weight to be given to environmental considerations in decision making has to be indicated. Until these conditions are met it seems important to suspend all controversial interventions.

4.4. Fisheries

The fish habitats cover ten per cent of the country during the dry season and fifty per cent during the monsoon. The inundated land makes for rich feeding grounds and is very important for fry, eggs and larvae. Fish is essential to the diet of the poorest segments of the population. No less than seventy-three per cent of the rural households are engaged in some kind of open-water fishing.

A cause for concern is that the catch has been declining over the past decades, in part because of embankment projects. These cause lowering of the water level, so that the fish cannot migrate and the water pollutes and stagnates. Population pressure leads to overfishing. This trend is expected to continue, so that the diet of women and children especially will deteriorate.

Because the catch is dwindling, tracts of water are being leased by influential large landowners, on account of which open-water fishing is losing its free-access character.

Implementation of FAP water works will reinforce these trends. Compensating measures such as stimulation of fish farms, planting fry and building fish-friendly structures do not seem very promising.

It is the merit of the FAP that the importance of fishery is taken into serious consideration at last. Timely integration did not take place however. At the national level there is no indication of the weight accorded to effects on fisheries.

Additional research and postponement of ambitious water works is needed until the significance of fishery aspects can be determined.

4.5. *Economic aspects*

UNDP/GOB estimated that the 1988 flood caused US\$ 1,100 million of damage to capital goods; the Bangladesh Institute for Development Studies assessed crop loss at US\$ 800 million. The first preliminary studies indicate that the cost-effectiveness of the proposed water works on the macro level is doubtful. The assumed indirect effects, too, are not easy to predict and remain highly uncertain. Earlier experiences with flood control projects in Bangladesh show that they are seldom productive. Economically viable projects have in common that they were executed quickly, were modest in scope and simple in design. Pilot project FAP-20 also indicates that the economic returns of the investments are almost nil.

The budget for the maintenance of FAP water works should be based on five per cent of the initial investment. If the investment were US\$ 5,000 million this would amount to US\$ 250 million annually—which is many times more than current Bangladeshi expenditure for operation and maintenance.

With respect to agriculture it was noted that crop damage due to flooding is limited. A potential increase of agricultural returns must come from the cultivation of rice, and is therefore influenced by the price of rice which is unstable since the national rice market is nearly saturated. The consequences of this development for irrigation, horticulture and export are not considered by the FAP.

The above indicates that the anticipated economic returns of the FAP depend on uncertain benefits. Further study is needed because so much is still unknown.

At the present time there is no adequate macro-economic analysis and no forum for macro-economic discussion. It is only on the project level that economic effects can be assessed to some degree.

4.6. *Social aspects*

Rural Bangladeshi live in poverty, a situation in which property is inequitably distributed, and semi-feudal dependency relationships. Of the 113 million inhabitants fifty per cent lives below subsistence level in terms of the minimally necessary intake of daily calories. The average size of the farms is decreasing (1.4 ha in 1977, 0.92 ha in 1984, currently 0.8 ha), the number of the landless is growing and more people are settling in insecure, unprotected areas.

Cyclones claim far more casualties than even the extreme floods of 1987 and 1988. Cyclone protection would therefore seem a more sensible investment. Furthermore, many questions need to be answered before it can be determined whether the poorer groups will profit from agricultural improvements once the FAP is carried out and whether there will be a trickle-down effect of the benefits.

In the FAP some consideration is given to fishermen and farmers who lose their plots because of embankment, but there is little attention to the position of landless people and women. It is doubtful whether the negative consequences of the FAP for each of these groups can be mitigated. There are indications that the situation of the inhabitants of unprotected areas is played down, in spite of the fact that one of the options is that the embankments will be placed far back from the rivers. In that case this group would have to be resettled, which seems unrealistic.

Popular participation in the FAP is limited, although gradually greater attention is being paid to the needs voiced by the people. The next step requires a shift in the point of view adhered to by the BWDB, the FPCO and some consultants. For this reason again, it seems virtually impossible to gain the necessary knowledge before 1995 and to do justice to the interests of the people affected, the poorest in particular.

4.7. Institutional aspects

The FAP has ensured the necessary coordination of donors in the water sector. Perhaps donor influence leads to greater distance from the population. Then, too, donors do not always agree and may emphasize different points. On the whole, however, donor coordination is a good thing.

The FAP is managed by the Flood Plan Coordination Organization (FPCO), which consists of twelve staff members, mostly civil engineers associated with the BWDB. The FPCO is supported by a Panel of Experts (POE) composed of foreign and Bangladeshi experts. Per August 1992 the POE was expanded to ensure better representation of other disciplines.

Certain doubts are expressed regarding the technical and multidisciplinary capacity of the BWDB, the FPCO and the POE. To begin with, the institutional arrangement: the POE still has insufficient influence to introduce fundamental changes; the BWDB, which is responsible for planning, implementation and management, is a top-down organization. The BWDB accountability is considered inadequate. Finally, the FPCO and the BWDB are short on learning capacity.

Until now the NGOs involved in many development projects in Bangladesh have been kept out of the FAP, even though recently they have shown a great deal of (critical) interest. Ultimately the FPCO means to involve these NGOs more concretely. FAP-20 looks into opportunities to have popular representatives and authorities at the local level participate in the FAP.

In the Ministry of Irrigation, Water Development and Flood Control an organization has been created alongside of the BWDB and the FPCO to develop a 'Master Plan for National Water Resources'. This Water Resources Planning Organization (WARPO) has so far not been involved in the FAP. In talks about desirable changes the WARPO comes into the picture. Accordingly, FAP-26 (the study on institutional aspects) recommended that the WARPO be assigned a coordinating role. The FPCO, however, has not acted on this recommendation.

The lack of institutional clarity is lamentable because the general feeling is that this is highly relevant to the FAP. A general policy and institutional framework should therefore be designed which can serve as basis in the event that FAP projects are implemented. Responsibility for planning, policy, coordination, evaluation and monitoring could be given to a separate agency. In that case the BWDB could be made responsible for the execution.

4.8. *FAP-20*

The field mission paid special attention to FAP-20, in part because it represents the major Netherlands contribution to the FAP. FAP-20 also plays an important role in the conceptual development of the FAP as a whole.

The objective of FAP-20 is the design of a workable, development-oriented system of water management. FAP-20 is a pilot project opting for an approach in which protected areas are divided into smaller water-management units. The idea is that these so-called compartments should be technically, socio-economically, environmentally and institutionally manageable wholes.

In the context of FAP-20 studies are carried out on basic needs, farming systems, topography, hydrology, fisheries, environmental and institutional aspects. A participatory approach constitutes a major aspect of FAP-20.

The FPCO, however, evidently interprets 'participation' differently from how FAP-20 envisages it. While the FPCO considered it sufficient to consult farmers only, the project wanted to consult the population as a whole. This difference in interpretation rests on a difference in perspective which plays a key role in the debate regarding the entire FAP: as the FPCO and the advocates of the FAP see it, flood control is the central point, while the environment, fisheries and social factors are

additional issues to be taken into account. For the team of FAP-20 the Netherlands development cooperation and many critics 'taking into account' is not enough: environment, fisheries and target-group interests are starting points at least on a par with civil engineering conditions.

The institutional study of FAP-20 showed that governmental departments function primarily vertically; horizontal links between the BWDB and other departments are weak. Many NGOs are active in the area, but there is little coordination among them.

The studies completed to date are generally of good quality, but (still) insufficient in scope. FAP-20 has yielded experience with the EIA. It turned out that there were gaps in the knowledge concerning, for example, groundwater effects and biodiversity in the area. In the area of civil engineering the studies can be improved through application of risk and vulnerability analyses. In addition, more attention should be paid to matters of operation and maintenance. More research into various socio-economic aspects is needed as well; for instance, along with farming and fisheries opportunities for horticulture and employment should be included in the studies.

The complexity of the socio-economic relations in rural Bangladesh has caused the FAP-20 enquiry to expand and it proves harder to draw conclusions than anticipated. The objectives as specified for 1995 will not be reached; it will hardly be possible to experiment with newly formed compartments.

Evaluation of the project's progress also yields positive conclusions: the project has improved the poverty-alleviation orientation of FAP policy – one of the key objectives of Dutch cooperation policy. To be sure, the degree to which FAP-20 is oriented to target groups is insufficient at this moment in time, but it is realistic (and in line with the Country Policy Plan for Bangladesh) to look upon FAP-20 as a process. Compared with the original principles of the FAP (1989) the views did change and FAP-20 has been instrumental in this. FAP-20 makes it possible to provide a substantial contribution to future development of FAP concepts, be it that the target-group orientation needs enhancement. Moreover, agreement must be reached among all parties involved in FAP-20 concerning the project's objectives. Furthermore, if continuation of FAP-20 is contemplated, consideration should be given to a number of important conditions which relate to the development of the FAP as a whole. These conditions are discussed below.

5. Conclusions

5.1. The critique

The criticism levelled at the FAP contains many valid points:

- In crucial areas many questions remain unanswered. These questions relate to feasibility in civil-engineering terms, to maintenance capacity, economic returns, effects on the environment and on fisheries, and benefits for the population.
- Although the first steps from sectoral flood control to an integrated approach have been taken, the FAP still seems to be based on a narrow civil engineering perspective.
- An adequate institutional solution is essential, but has not yet come forward.

5.2. Characteristics of the debate

There is much confusion about the precise nature of the FAP. In part, the criticism voiced is aimed at the original FAP concept of designs for large-scale engineering interventions, planned and executed in terms of a dominantly technical turn of thought. Advocates of the FAP, however, emphasize the multidisciplinary character of the studies.

Both images of the FAP are wrong. The FAP today no longer is a large-scale plan for technical works. There is structured attention to the environment, fisheries, and other aspects which until recently played but a modest role in the planning and implementation of flood-control projects.

On the other hand, defenders of the FAP exaggerate when they picture the FAP as a well-balanced, multidisciplinary approach to flood control in Bangladesh. The FAP continues to be dominated significantly by technical ways of thinking, in which other disciplines (still) play a subordinate role. The institutional framework of the FAP continues to render it difficult to accommodate influences from beyond the world of civil engineering.

The FAP controversy has become highly polarized. At present it can hardly be said that there is a process of genuine discussion, in which each takes note of the other's point of view and is prepared to mark the merit of an argument.

5.3. Less controversial activities

Because of the polarization there is the danger of overlooking that the FAP also features components about which many agree. Roughly, two types of intervention

can be distinguished: flood control in the rural areas, and protection of urban areas and crucial infrastructure. The most heated discussion relates to rural flood control. It is here that measures will affect income distribution negatively, and it is here that negative effects on the environment will be most palpable. In contrast, the need of protection of rural areas and important infrastructure is relatively non-controversial. This is true also of construction works for drainage and cyclone protection.

5.4. An assessment of the FAP up to 1995

An evaluation in terms of the Netherlands policy for bilateral cooperation with Bangladesh, as laid down in the Country Policy Plan Bangladesh 1989, turns on the question whether objectives pertinent to combatting poverty have been successfully accentuated in the Bangladeshi policy regarding the FAP.

There has been progress compared to the years prior to 1990, even though certain criticisms of the FAP are well taken and improvements up to now are fragile. The FAP produces guidelines in the areas of environment and participation, undertakes innovative studies on fisheries for example, and yields an accelerated output of technical studies in the water sector. Some doubt remains whether these guidelines and studies are adequate. Never before did coordination take place between donors on this level. Again, on this scale it is the first time that economic, social, environmental and security aspects have been brought together in a multidisciplinary way with civil engineering in one comprehensive programme. In view of the Netherlands cooperation policy these developments are of great importance. Gradually, the FAP focus shifts from flood control to water management.

There is no reason to terminate the Netherlands contributions to the FAP studies at this time. Whether improvements in FAP policy will be such that Dutch participation after 1995 is justified will depend on how the FAP develops in the near future.

5.5. A perspective

Future Netherlands involvement in the FAP will have to depend on the degree to which policy objectives as formulated in the Country Policy Plans can be realized in the framework of the FAP after 1995. At the present time the future contours of the FAP are still unclear. Three scenarios are conceivable. They may be summarized as follows:

1. The FAP moves into implementation of large-scale river-canalization projects (embankments) and the construction of compartments.
2. Implementation is restricted to smaller and less controversial projects (urban protection, cyclone protection, maintenance) and studies in support of improved coordinated policy are continued.
3. The role of the FAP in the total effort towards better flood control in Bangladesh diminishes. Flood-control projects will be carried on without the FAP, as has been the case so far. The FAP loses its prominent role in the policy debate on water management in Bangladesh.

If future developments yield the first scenario, post-1995 Dutch involvement cannot be justified. Although ideas on water management are improving, the lack of expertise (correctly pointed out by critics) in civil engineering, environment, fisheries, economics and sociology makes it impossible to take a decision in 1995 in favour of a well-balanced, large-scale scenario of implementation.

If the third scenario prevails, certain FAP studies will still be useful for water-management projects supported by the Netherlands in other contexts. Whether this is actually the case is a matter which is beyond the purview of this IOV evaluation study.

The attractiveness of the FAP is its potential development towards a comprehensive, integrated policy framework for water management in Bangladesh. This is why the second scenario is the most attractive for continued Netherlands participation in the FAP. This scenario could provide room for phased implementation of flood-control projects which are relatively non-controversial both in socio-economic and technical terms. The crux of the second scenario, however, is that the FAP develop into a policy framework aimed at an interdisciplinary approach to planning and implementation of water-management projects. Critical elements of that policy framework are:

- a clear and explicit orientation to poverty alleviation;
- an increasingly integrated approach;
- an adequate institutional framework of the FAP. Important here are popular participation, flexibility, interdisciplinary build-up, growing openness, improved information and a much improved learning capacity.

In order to promote the second scenario, the Netherlands can undertake specific initiatives which would point the FAP in the more desirable direction. At present the controversy around the FAP is escalating, and the risk exists that polarization will reach a stalemate and induce the BWDB and the FPCO to retreat to familiar

monodisciplinarily oriented practice. Through its long-standing involvement with the Bangladesh water sector the Netherlands has gained considerable credibility among all parties and should be able to act as a catalyst.

6. Recommendations

The FAP is subject to changing insights. Criticism and the results of progress reports on FAP studies cause the traditional technical orientation to shift to a more multidisciplinary perspective on water management. This process of change has begun only recently and is far from completion. It has not yet led to changes in the formal FAP objectives, nor are the changes embraced by all parties in the FAP. Still, on the whole there is growing recognition of the importance of environmental and fishery aspects and of the social dimension of water management.

The conclusion must be that the Netherlands participation in the FAP has contributed to the policy objectives as stipulated in the Country Policy Plans 1989–1992. FAP-20 has contributed to the growing poverty-alleviation orientation in the FAP. Continued improvement on this point in FAP-20, however, is hampered by the lack of clarity in the terms of reference (TOR) for this project. This TOR makes it possible to interpret popular participation as a rather perfunctory form of consultation but also allows for an interpretation of genuine popular participation regarding alternative models of implementation.

Recommendation 1:

To improve the poverty-alleviation orientation of FAP-20 clarifications in the terms of reference need to be negotiated.

Since FAP-20 is a pilot project and as such important to future development of the FAP as a whole, adjustments in the TOR should be proposed which will render possible a more integrated approach to water management.

On many points criticism of the FAP is well taken. The construction of large-scale civil engineering works implies drastic and irreversible change in the conditions of existence for millions of Bangladeshis and in the natural environment. Such intervention has lasting consequences which cannot be mitigated sufficiently by compensating measures.

The present study has made clear that a decision to implement extensive water works can only be taken against the background of adequate insight into effects on the environment and fisheries, into socio-economic and engineering factors. This level of insight is not yet available and will still be lacking in 1995.

It seems quite feasible, however, to carry out certain less controversial activities, such as the construction of shelters for cyclone protection and protection for urban areas.

Recommendation 2:

The Netherlands should use its influence to promote for the time being construction of less controversial and less ambitious water works.

Dutch involvement in the FAP should be terminated if the FAP were to engage in the construction of large-scale technical works before such implementation can be justified in terms of balanced consideration of technical, economic, social, environmental and fishery issues.

Flood control in Bangladesh is extremely complex and the weighing of consequences is difficult. For this reason Bangladesh would benefit greatly from an effective national water-management policy based on interdisciplinary analysis. It is important that FAP studies be oriented in this direction.

Recommendation 3:

The Netherlands should pursue an active policy to contribute to a comprehensive national policy for water management. In consultation with like-minded donors and the FPCO initiatives can be taken to review the findings of the FAP studies so far for this purpose, and for the period after 1995 a work plan can be proposed that moves towards the desired integrated approach.

If the FAP does develop in the desired direction, continuation of Netherlands participation after 1995 is expedient. Elements critical to such a decision include:

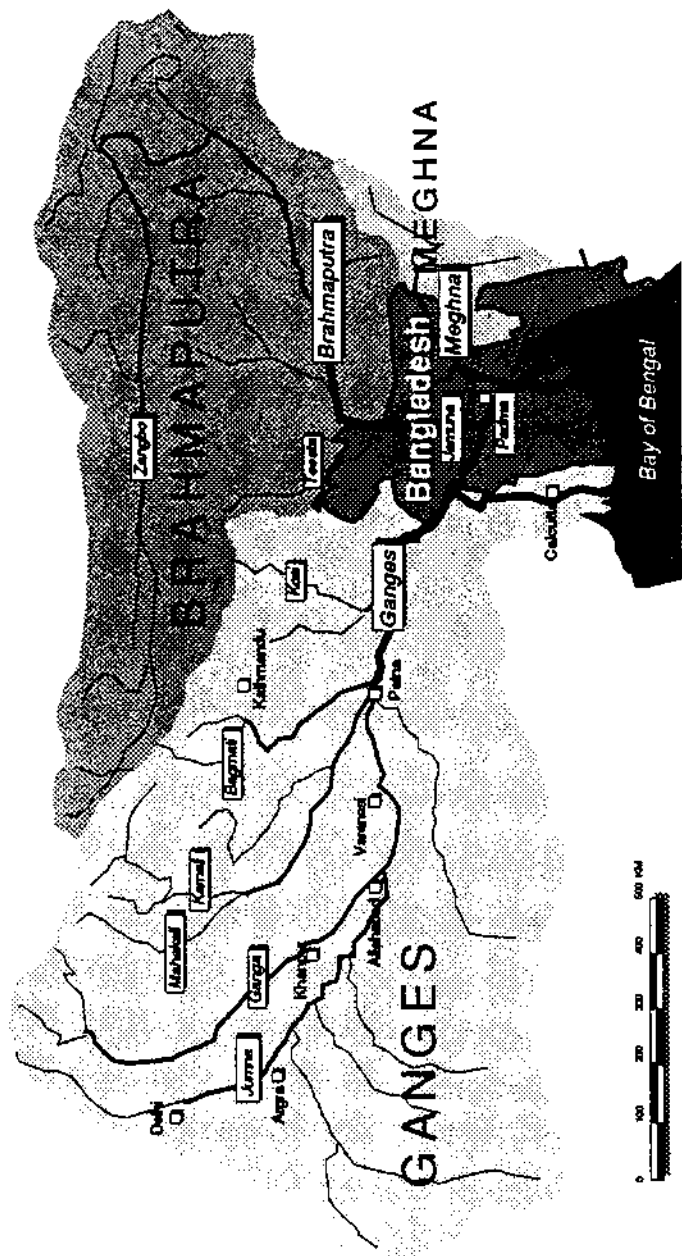
- a clear and explicit poverty-alleviation orientation;
- an increasingly integrated approach, in which effects on the environment and fisheries will genuinely be topics of consideration along with economic and technical factors;
- institutional improvement.

The present study indicates that institutional framework of the FAP is the major weakness. An effective national water-management policy can only be developed and implemented via a suitable institutional framework.

Recommendation 4:

Both the Bangladesh water-management sector and the FAP would benefit from amelioration of the institutional framework. Important here are the following points of attention:

- *Representation of the distinct groups in the population. Involvement of the critical NGOs in particular would enhance the quality of the FAP debate and would improve popular participation.*
- *Availability of the input of all relevant disciplines.*
- *Institutionalization of cooperation with other important organizations.*
- *Adequate learning capacity within the institutional framework. In this way experience and knowledge gained through FAP studies can be translated into policy. For the immediate future the creation of a separate organization within the FPCO is likely to serve this purpose. In the long run it is important that an institution be established for research and training in the area of natural resources.*
- *Accountability; access to information.*



Map 1. Bangladesh and the catchment areas of the Ganges, the Brahmaputra and the Meghna rivers
 Source: World Bank, 1989.

Chapter 1. Problem and approach

1.1. Occasion for the present study

The Flood Action Plan (FAP) in Bangladesh is subject to widespread criticism. Critique is expressed in research reports from Bangladeshi advisory institutions, in articles written by scientists and journalists, in NGO reports, in demonstrations in Bangladesh, in memoranda by Bangladesh-based development workers, and in stands on certain aspects of the FAP taken by donors and advisory agencies. The scope and severity of the objections raised warrant a careful evaluation of them.

1.2. The FAP, FAP-20 and the criticism of the FAP

In 1989 the World Bank and the Bangladeshi government agreed to coordinate existing proposals in the area of flood control. This led to the Flood Action Plan, which is supported by 17 countries. The objective of the Flood Action Plan is to identify, plan, design and implement high-priority flood-control projects which are technically, economically, environmentally and socially feasible. The FAP concept is guided by a set of formulated principles which include 'controlled flooding' and 'compartmentalization' (cf. chapter 2, fig. 2.1.).

The first phase of the FAP (1990–1995) consists of studies, research and pilot projects. Estimated expenditure for this first phase is US\$ 150 million. For a more extensive description of the FAP see chapter 2.

The Netherlands co-finances two FAP studies: FAP-20 and FAP-25. The Dutch contribution to FAP-25, a project meant to develop a flood management model, is relatively modest: Dfl 0.22 million (approx. US\$ 115,000) to meet the costs of technical assistance. DANIDA is the leading donor for this project.

Dutch support to FAP-20 is substantial: Dfl 8.15 million (approx. US\$ 4.25 million). The Netherlands is the leading donor for this project, which consists of a number

of studies and pilot projects. FAP-20 combines the development of experimental 'compartments' with studies designed to formulate and test criteria for compartmentalization. Basically, compartmentalization refers to the subdivision of a protected area into technically and institutionally controllable water-management units. FAP-20 is considered crucial to the FAP as a whole.

In response to the still growing criticism of the FAP, participating donors, themselves not without reservations either, state that in the studies attention is being paid to the major objections. FAP advocates say that no final decisions have been taken so far, but critics fear that the phase of study will gradually move into implementation while answers to basic questions are still lacking. Chapters 4–10 of this report offer a more extensive review of the critique and the relevant FAP standpoints. Some main issues in the debate concerning the FAP are:

On social aspects

- Supporters: uncontrolled flooding implies more poverty and even greater inequality among the people.
- Opponents: flood control will lead to growing inequality, and the poor will have less access to means of production.

On civil engineering aspects

- Supporters: in spite of the physical problems (a river may 'migrate' 500 m in a single year) the plan is undoubtedly technically feasible.
- Opponents: if the plan is implemented the consequences may be disastrous, since the vulnerability of the system necessitates a higher standard of planning, design, construction and maintenance than is attainable in Bangladesh.

On institutional aspects

- Supporters: institutional requirements are given special attention.
- Opponents: the FAP is oriented to engineering and interested in building water works. It can be questioned whether institutional solutions will do justice to the multidisciplinary character of water management.

On agronomical aspects

- Supporters: in view of the population growth the anticipated agricultural improvements are essential to Bangladesh.
- Opponents: agricultural opportunities will not improve much.

On economic aspects

Supporters: in view of the macro-economic developments the future maintenance costs are reasonable.

Opponents: Bangladesh cannot carry the cost of permanent maintenance.

On ecological aspects

Supporters: reliable and thorough environmental impact analysis (EIA) will permit prevention of unacceptable damage to the environment.

Opponents: the question is whether Bangladesh is able to carry out the highly complex EIA needed for this programme, whether sufficient data are available and how these will be used.

On fisheries

Supporters: negative consequences for fisheries will be mitigated as much as possible through implementation of special measures.

Opponents: negative effects on fisheries will primarily threaten food security for the poor and cannot be compensated for.

1.3. Netherlands policy regarding the FAP

In the Country Policy Plan (CPP) for Bangladesh 1989–1992 support of flood control in Bangladesh is motivated as follows: ‘The objective of sector support is mainly to increase agricultural production and agricultural income, in particular for small farmers’ (DGIS, 1988b). Elsewhere the document mentions the objective of protecting the population against floods, but on the whole the emphasis is on poverty alleviation through agricultural improvement.

In the CPP a specific strategic choice is made: the strategy is not focussed directly on poverty-oriented projects; rather, the aim is a gradual improvement of poverty-alleviation policies by Bangladeshi institutions. This implies long-term cooperation. The choice for this strategy rests on the following considerations:

- appreciation for the policy pursued by the Government of Bangladesh and recognition of the need to conform to it as much as possible;
- experience teaches that if cooperation is extended over a longer period it is possible to achieve policy changes with more emphasis on poverty alleviation;
- in development cooperation continuity is of paramount importance.

In the light of the CPP Bangladesh 1989–1992 support for FAP-20 should be viewed as a contribution to increased orientation to poverty alleviation in the development of FAP-policy.

1.4. Purpose of this study, central questions

The goal of this evaluation report is to determine whether criticism of the FAP should affect the Netherlands point of view regarding the Flood Action Plan. Two questions need to be answered:

1. Which points of criticism are well founded, and hence pertinent to that point of view?
2. If these criticisms are justified, can the Dutch contribution to the FAP still be seen as in harmony with Netherlands development cooperation policy?

The first question refers exclusively to criticism which is of immediate relevance to the Dutch point of view regarding the FAP. The second question implies assessment in terms of Netherlands development cooperation policy or, more specifically, in terms of the Netherlands policy for bilateral cooperation with Bangladesh as formulated in the Country Policy Plan Bangladesh, 1989–1992. The formulated target-group policy allows rephrasing of the second question as follows:

If criticism of the FAP is justified, is the Dutch contribution in accord with the Netherlands policy of supporting poverty-alleviation objectives in Bangladeshi FAP policy via long-term cooperation?

Evaluation of the main questions needs to be based on an assessment of the following issues:

1. Does the FAP lead to improved agricultural opportunities for small farmers? (In CPP '89 the motive for opting for flood control is that this is seen as a necessary condition for agricultural improvement)
2. Does the FAP also lead to improvement in the position of small farmers? (As CPP '89 notes, a potential raise in income does not ensure improvement in their position)
3. What are the effects of the FAP for the landless, for women and for fishermen? (Although CPP '89 contains no clear normative statements regarding landless people and fishermen, it is certainly in line with the plan to raise this question)
4. What are the effects of the FAP on fisheries? (CPP '89 underscores the importance of food security)
5. What are the net environmental effects of the FAP? (Concern for the environment is mentioned in CPP '89 and more explicitly in CPP '92)

1.5. Organization and methods of the evaluation

The study was started in October 1992 with a literature review meant to gain insight into the discussions regarding the FAP. This inquiry also provided materials for the subsequent field mission and the concluding report. In December 1992 two papers were written, based on the literature study. These were commented on by fourteen experts, including proponents as well as opponents of the FAP.

A mission composed of a sociologist, a civil engineer, an ecologist, an agricultural economist and an IOV staff member visited Bangladesh during the last week of January and the first week of February 1993. Interviewing was the most important method; a brief visit to the FAP-20 area provided some field observation. This emphasis on interviews fitted the purpose of the mission, which was: to obtain a second opinion on the value of the criticism and the FAP point of view on these issues through talks with both friends and foes of the FAP, in order to determine which conclusions should be drawn from this for the Netherlands position on the FAP. A reference group provided counselling for the inquiry.

1.6. Delineation of the evaluation

The notes appended to the questions in section 1.4 suggest a first restriction: the focus is on well-founded and relevant criticism.

To keep the mission to reasonable proportions it was necessary to assess which disciplines were most relevant. Experts were chosen in the areas of engineering, sociology, agricultural economy and ecology.

FAP-25 was not given special attention, that is to say, no more than most other FAP studies. The Dutch contribution to FAP-25 is modest and on the basis of current progress little can be learned about general FAP characteristics.

FAP-20, however, was studied more closely than the other FAP components. There were three reasons for doing so. First, study of FAP-20 yields more reliable information than is obtainable for other FAP studies; much material dealing with FAP-20 is readily available. Secondly, from the point of view of the Netherlands development cooperation the objectives of FAP-20 are crucial for a development of the FAP which would include orientation to poverty alleviation. An important part of the critique turns on topics studied in FAP-20. Thirdly, FAP-20 is looked upon as a cornerstone of the FAP as a whole.

Data relating to other FAP studies were studied insofar as these could provide additional insight. In other words, the study concentrated on the criticism rather than on a systematic review of every FAP component.

Chapter 2. The Flood Action Plan

2.1. Flood control in Bangladesh

The construction and maintenance of embankments in present-day Bangladesh dates from pre-colonial times. Long before the period of British colonial rule there were thousands of kilometres of mud banks. The system was operated by feudal landlords who had the right to levy taxes from the local population (Pearce, 1991). Some of these embankments were modest, others were quite large.

Under British rule the traditional system of operation and maintenance declined. Taxation by the colonial government amounted to much more than earlier levies. The old embankments were no longer maintained, agricultural performance dropped and famines began.

From the beginning of the nineteenth century up to the middle of the twentieth century provincial and district authorities undertook some infrastructural development. After Bangladesh achieved independence (1971) development of the infrastructure was intensified. An estimated 60 per cent of the embankments as proposed by the FAP is already in place. Part of them need renovation, however.

The FAP is not the first plan in the flood-control sector in Bangladesh. Many aspects of the current FAP discussions are well-worn topics. The Bangladeshi government and the donors operate with different strategies and ideas. Emphasis on large-scale water works alternates with interest in small-scale projects accentuating the agricultural infrastructure.* In 1959 the East Pakistan Water and Power Development Authority (EP WAPDA) was established (Rahman, 1989). Jointly with the US International Engineering Company (IECO) EP WAPDA designed a master plan for the development of water resources. Work on this plan continued until 1967. The objective was to protect 5.8 million ha (40 per cent of Bangladesh). Implementation of the plan, which comprised 58 projects, would take twenty years.

*In this context the distinction between large scale and small scale is the difference between embankments to protect entire regions of the country and projects comprising a 'mere' few thousand hectares.

In 1972 the Bangladesh Water Development Board (BWDB) was created to succeed EP WAPDA. During the years immediately following Independence priority was given to small-scale projects with drainage components. In 1983 the Government of Bangladesh (GOB) established the Master Plan Organization, meant to produce a national water plan as framework for the period 1985–2005. In that year the National Water Council, intended to supervise the planning of water resources, was established as well.

2.2. General description of the FAP

The current Flood Action Plan was instigated by the floods of 1987 and 1988, in response to which the GOB wrote a national flood-protection programme (1988). This was followed by a UNDP-sponsored flood-policy study (UNDP/GOB, 1989) and a prefeasibility study of flood control in Bangladesh (May 1989) financed by the French government. At the same time USAID financed the Eastern Waters Study (Rogers et al., 1989) and Japan paid for a report on flood control planning in Bangladesh (May 1989). An important difference between these studies is that the UNDP and the French studies are in fact master plans, while the American study investigates problems and options, and does not propose worked-out plans. The studies arrived at different conclusions.

According to the American study large-scale embankment in Bangladesh is not yet feasible. The USAID point of view is that flooding must be accepted and the emphasis should be on means of floodproofing.

The Japanese proposal lays particular stress on protection of urban areas and flood forecasting.

The French propose flood prevention and extensive embankments. This is in line with proposals such as the IECO master plan.

The UNDP/GOB study proposes controlled flooding and drainage. To this end embankments should contain the large rivers and the protected areas should be divided into compartments. The land can be flooded via fully controlled and semi-controlled structures.

Concept

The UNDP/GOB concept of *controlled flooding and drainage* (FCD), which combines the benefits of flooding with the advantages of protection against flooding, became the basis of the FAP. The UNDP/GOB proposals further include structured attention to people's participation, to social, environmental and economic aspects and to operation and maintenance.

The eleven Guiding Principles formulated by the GOB in 1989 state the considerations on which a flood-protection plan should be based. These Guiding Principles cover protection of urban and rural centres, controlled flooding where possible, effective management of land and water, strengthening of disaster management, improvement of flood forecasting, regulation of the water flow through embanked and channelled rivers and coordinated planning and construction (cf. figure 2.1).

According to the UNDP/GOB proposal the results of the programme will depend greatly on the development of relevant institutions and procedures, especially in connection with operation and maintenance of the completed schemes.

Donors

In June 1989 the World Bank and the GOB agreed to coordinate a five-year Flood Action Plan as first phase of a long-term programme. International support for the plan was obtained during a meeting of representatives of the world's seven major industrial countries in Paris, July 1989. In December 1989 the FAP was presented at a conference in London and approved by the community of donors.

Donors involved in the FAP are: the World Bank, the Asian Development Bank, EEC, UNDP, Canada, the United Kingdom, Denmark, Finland, France, Germany, Japan, the Netherlands, Sweden, Switzerland and the United States.

Purpose

The objective of the FAP is to identify, plan, design and implement projects which are feasible in technical, economic, environmental and social terms. The approach is in phases; during the initial years there is a concentration on regional FCD and support studies to provide inputs for planning and design of the major components of this and following action plans (FPCO, 1992j).

Timetable

After the first phase of the FAP (1990–1995), in which the focus is on planning, three successive five-year phases are projected in which the accent is on implementation. Completion of the plan will require a total period of twenty years, from 1990 to 2010.

Components

The FAP includes 26 components: 11 are planning components (mostly regional studies); 15 are supporting studies in the areas of environment, fisheries, institutional development, hydrology, etc. (cf. figure 2.2).

GUIDING PRINCIPLES

1. Phased implementation of a comprehensive Flood Plan aimed at:
 - protection of urban, rural, commercial, industrial and public utility centres and communication networks;
 - controlled flooding, wherever possible and appropriate, to meet the needs of agriculture, fisheries, navigation, urban flushing, soil productivity and recharging the surface water/groundwater resource with minimum dislocation of the environment.
2. Effective land and water management of protected and unprotected areas, involving compartmentalisation, drainage, irrigation, drainage decongestion, land use, cropping patterns, environment, ecology, erosion/sedimentation control, etc.
3. Strengthening and equipping the disaster management machinery including building infrastructure for quick and effective communication and transmission during disasters.
4. Improvement of the flood-forecasting system and establishment of a reliable and comprehensive flood-warning system with adequate lead times and at the same time evolving techniques for dissemination.
5. Safe conveyance of the large cross-boundary flow to the Bay of Bengal by channelling it through the major rivers with the help of embankments on both sides.
6. Effective river training works for the protection of embankments, infrastructure and population centres, linked wherever possible with the reclamation of land in the active river floodplain.
7. Reduction or distribution of load on the main rivers through diversion of flows into major distributaries or interception of local runoff/local rivers by channelling through major tributaries or special diversions.
8. Improvement of the conveyance capacity of the river networks to ensure efficient drainage through appropriate channel improvements and ancillary structures to provide regulation and conservation.
9. Development of floodplain zoning as a flexible instrument to accommodate necessary engineering measures and allocate space for habitation patterns, economic activities and environmental assets.
10. Coordinated planning and construction of all rural roads, highways and railway embankments with provision for unimpeded drainage.
11. Encouraging maximum possible popular participation by beneficiaries in the planning, implementation, operation and maintenance of flood-protection infrastructure and facilities.

Figure 2.1. The Eleven Guiding Principles
(Source: UNDP/GOB, 1989b)

	Title	Donor(s)
FAP-1	Brahmaputra Right Embankment Strengthening	IDA
FAP-2	Northwest Regional Study	UK/Japan
FAP-3	North Central Regional Study	EC/France
FAP-3.1	Jamalpur Priority Project	EC/France
FAP-4	Southwest Area Water Management Study	UNDP/ADB
FAP-5	Southeast Regional Study	UNDP
FAP-6	Northeast Regional Study	Canada
FAP-7	Cyclone Protection Study	EC
FAP-8a	Greater Dhada Protection Project	Japan
FAP-8b	Dhaka Integrated Town Protection Project	ADB/Finland
FAP-9a	Secondary Towns Protection Project	ADB
FAP-9b	Meghna Left Bank Protection Project	IDA
FAP-10	Flood Forecasting and Early Warning Project	UNDP/ADB/Japan
FAP-11	Disaster Preparedness Programme	UNDP
FAP-12	FCD/I Agricultural Review	UK/Japan
FAP-13	Operation and Maintenance Study	UK/Japan
FAP-14	Flood Response Study	USA
FAP-15	Land Acquisition and Resettlement Project	Sweden
FAP-16	Environmental Study	USA
FAP-17	Fisheries Study and Pilot Project	UK
FAP-18	Topographic Mapping	France/Finland/ Switzerland
FAP-19	Geographical Information Systems (GIS)	USA
FAP-20	Compartmentalization Pilot Project	Netherlands/Germany
FAP-21/22	Bank Protection, River Training and Active Flood Plain Management Pilot Project	Germany/France
FAP-23	Floodproofing Pilot Project	USA
FAP-24	River Survey Programme	EC
FAP-25	Flood Modelling Management Project	Denmark/Netherlands/ France/UK
FAP-26	Institutional Development Programme	UNDP/France

Figure 2.2. Components of the Flood Action Plan and donors
(Source: FPCO, 1992j)

A large number of donors has indicated willingness to finance or co-finance components. Implementation of the distinct FAP components is supervised by foreign and Bangladeshi consulting agencies. When the study activities include constructions (as in FAP-20), the BWDB is the executive agency.

Costs

Initial estimated cost of the FAP for the preparatory phase up to 1995 is c. US\$ 150 million. Expenditure for the construction of infrastructural works (implementation of which has not yet been decided on) is not fixed. Estimates run from US\$ 3,500 to 4,000 million (UNDP/GOB, 1989) up to US\$ 10,000 million, or even more for plans which include channelling of the rivers. Such figures are premature because no decision has been taken to date concerning FAP activities after 1995.

2.3. FAP organization

The FAP is coordinated by the Government of Bangladesh and the World Bank. On the Bangladesh side the Ministry of Irrigation, Water Development and Flood Control (MIWDFC) has final responsibility. Institutions within the ministry are the Action Plan Technical Committee (TC, chairman: Secretary MIWDFC), the Review Committee (RC) and the Flood Plan Coordination Organization (FPCO). The FPCO was created to support the ministry in planning, preparation, monitoring, coordination and supervision of FAP components. It is in turn supported by a largely UNDP-financed Panel of Experts (POE) composed of foreign and Bangladeshi experts. The Bangladesh Water Development Board (BWDB) is responsible for the implementation of large water works (see figure 2.3).

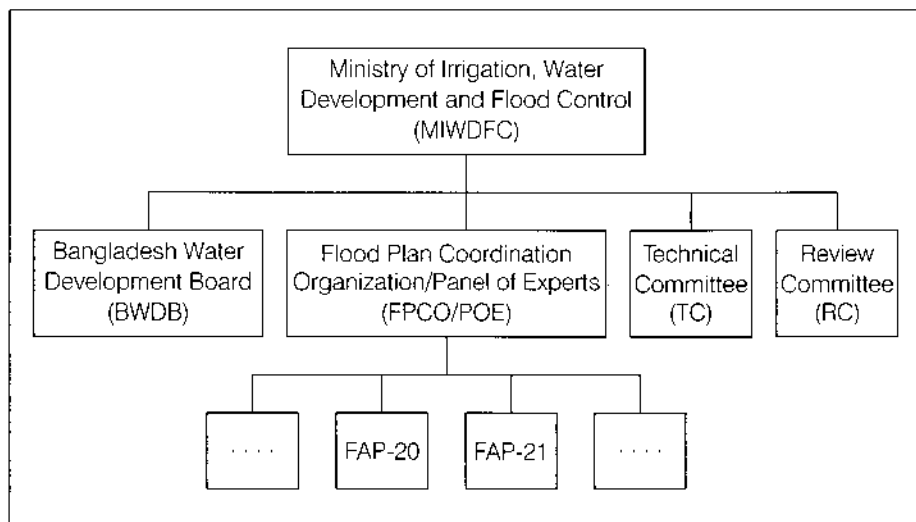


Figure 2.3. Organization scheme FAP

More generally, the BWDB—an independent body since 1972—is responsible for the design, construction, operation and maintenance of water works for a number of purposes: flood control, drainage and irrigation, erosion control, urban protection and river training.

In addition, involvement on the Bangladeshi side includes the National Flood Council, chaired by the Prime Minister, and the Implementation Commission, chaired by the minister of IWDFC. The Master Plan Organization and the River Research Institute have a supporting role. In practice, however, involvement of these four bodies is marginal, at least up to the present time.

FAP reporting

The FPCO coordinates the preparation of the Technical Assistance Project Proforma (TAPP), based on the preliminary terms of reference (TOR). The TC reviews the TOR and the TAPPs and approves them. Consultants' reports are sent to the FPCO, the BWDB and other governmental agencies, to representatives of the donors and to members of the POE. Their comments and the reports are inspected in the Review Committee. The review paper and the reports are sent to the TC for formal approval. All relevant governmental agencies participate in TC meetings—or are expected to.

2.4. Progress in the FAP

According to the original planning as given in the World Bank document (IBRD, 1989a) most of the studies would provide enough information within a few years, so that in 1993 the implementation of a number of works could be started. Meanwhile, this planning has been partially abandoned. The studies are seriously behind schedule and simultaneously raise so many new questions that large-scale implementation prior to 1995 no longer seems possible. Implementation prior to 1995 will be restricted to short-term measures in, for example, FAP-1 (the Brahmaputra Right Embankment), FAP-7 (Cyclone Protection), FAP-8A/B (Dhaka) and FAP-9A/B (Six Towns, Meghna Left Bank). These activities were planned before the FAP commenced.

Implementation is preceded by feasibility studies. Feasibility studies are being carried out for FAP-3.1 (Jamalpur Priority Project), FAP-2 (Northwest Regional Study) and FAP-5 (Southeast Regional Study).

Towards the end of December 1992 the TOR and TAPP of all components were approved, except those of FAP-11 and FAP-26. At that time the inception reports of 23 FAP projects had been submitted, 19 interim reports and 7 final reports (FPCO,

1992j). Since some supporting studies were delayed there is a danger that these will be completed too late to have an impact on the feasibility studies which come after the regional studies.

According to the FPCO the approach has changed significantly in the course of two years of FAP activities. For example, environmental issues are currently given more attention in the regional studies. Also, initially more stress was placed on mitigation of flooding effects whereas at the present time the focus is shifting to integrated water management (FPCO, 1992j).

2.5. Changes within the FAP

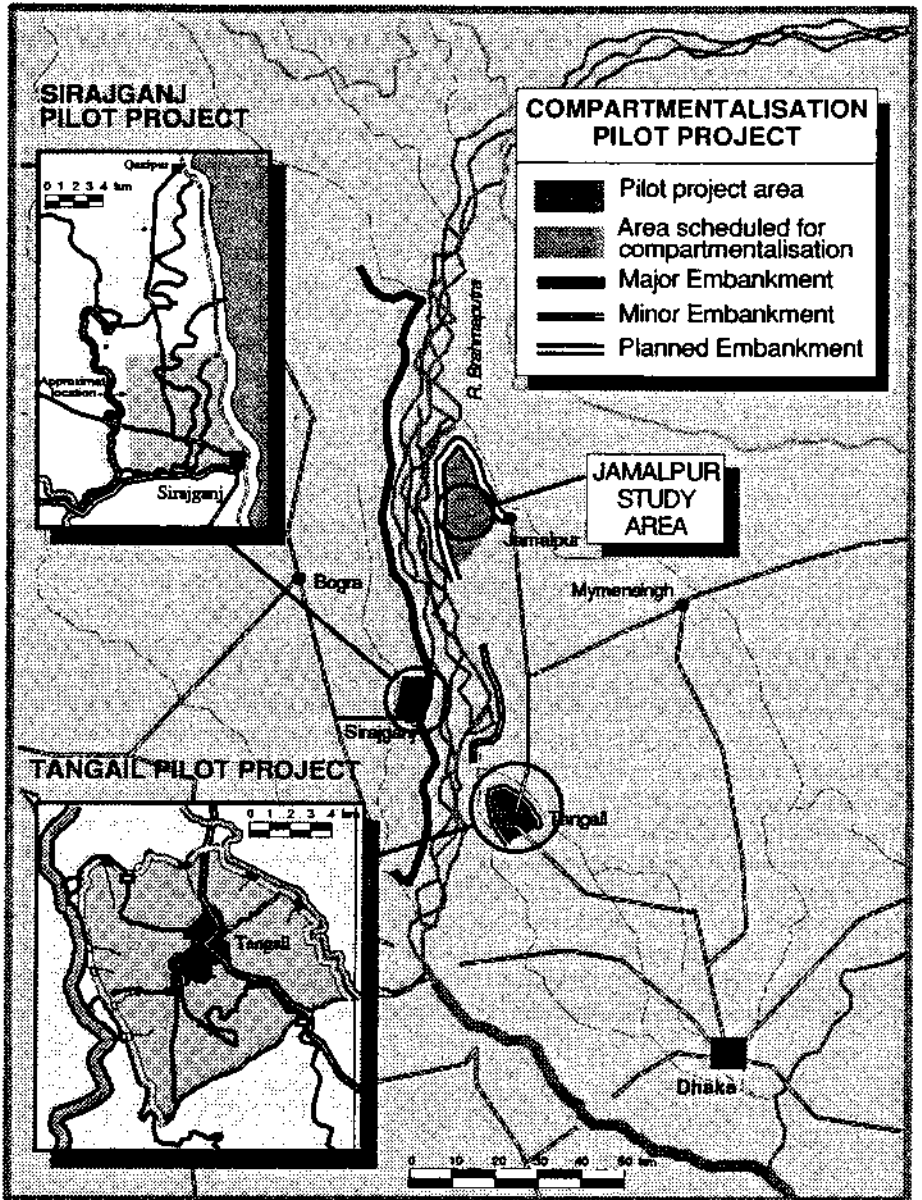
The above description is based on FAP documents and FAP progress reports. In spite of the fact that these documents exist there is much confusion regarding the status and objectives of the FAP. The reasons for this are as follows:

- The highly divergent views expressed in the studies dating from 1988/89 are still alive. However contradictory they may be, elements of all of these views can be found in the FAP. Since a consensus is lacking, no decision has been taken concerning the future direction of the FAP.
- At stake are considerable political and financial interests. This is why the various parties tend to entrench themselves and are reluctant to listen to others. This is another reason why no consensus has been reached yet regarding the future of the FAP.
- The complexity of the subject matter was underestimated. A group of donors is shifting away from implementation; the tendency among these donors is to see the FAP as an effort in policy preparation. Others still seem to aim straight at early, large-scale implementation.
- Owing to insufficiently reliable data and the intrusion of conflicting interests the opposing parties have an erroneous image of the FAP, so that discussions are often not to the point.

It seems as if the critics and the FAP are at a stalemate. The FAP is unforthcoming with information, in part because unjustified criticism is anticipated. On the other hand, some of the criticism is indeed unjustified, in part because the critics are not informed about the FAP.

Not all aspects of the FAP are controversial. Roughly, four groups of studies can be distinguished:

1. Studies which can lead directly to implementation of controversial activities such as embankment of large rural areas. Of this type are FAP-1 through FAP-6, i.e. especially the regional studies.
2. Studies which lead to construction projects for cyclone protection and protection of urban areas, infrastructure and landing stages (FAP-7/8/9). There is little criticism of these projects since they are economically justifiable and have few negative effects. For this reason they will not be discussed at length.
3. Projects aiming at floodproofing, forecasting and warning systems (FAP-10/11/14/23). These topics are not considered controversial.
4. Studies, pilot projects and surveys which may support both controversial and non-controversial activities (FAP-12/13, 15–22, 24–26).



Map 2. Project areas FAP-20

Source: FAP-20, 1989

Chapter 3. FAP-20

3.1. Introduction

A separate chapter is devoted to FAP-20, the Compartmentalization Pilot Project, because it is one of the most important FAP components, is co-financed by the Netherlands and information is readily available. Sections 3.2 and 3.3 offer a brief description of FAP-20. Section 3.4 presents the findings. These findings are not meant as an evaluation of FAP-20, nor should they be read that way. Assessment of the progress made in FAP-20, however, does give some indication of the feasibility of the overall FAP objectives. FAP-20 is meant to determine whether participation and organization of the people can be realized and how the interests of fisheries, the environment, agriculture and industry should be integrated into the formulation of technical proposals.

3.2. Background

Compartmentalization, which FAP-20 is to test in the field, means division of an embankment-protected area into water-management units. The objective is to provide a more secure environment for intensive agriculture, fisheries and integrated rural and urban development through water management (controlled flooding and drainage) and in this way to improve the economic security and the quality of life of the floodplain population (FAP-20, 1991b:6). Flood protection by means of embankments and FCD by means of gates and regulators must create favourable conditions for intensification of agriculture and other economic activities. The concept of controlled flooding was not new when officially introduced in the UNDP Flood Policy Study (UNDP/GOB, 1989). Experience with it was not yet available, however; hence, the UNDP study also suggested a pilot project. This was adopted in the Flood Action Plan in December 1989 (IBRD, 1989b).

The Netherlands was involved from the first phase of the FAP in deliberations about implementation and financing FAP-20. This involvement was in line with

experience with medium-sized flood-control projects, four of which the Netherlands was supporting at the time. A selected group of consultants in cooperation with the Bangladeshi government commenced work in July 1991.

In the initial proposal, approved in 1991, estimated costs for the period 1991–1995 were approx. US\$ 10 million, of which the Netherlands financed Dfl 8.15 million (approx. US\$ 4.25 million). For the period 1991–1997 a recently adjusted proposal estimates expenditures at US\$ 27.9 million which, if the adjustment is approved, will be financed by the Bangladeshi government, Netherlands development cooperation and the German Kreditanstalt für Wiederaufbau.

The project is carried out behind existing and planned embankments along the Jamuna river: Sirajganj (right bank) and Tangail (left bank) respectively.

FAP-20 is meant to provide data and guidelines for the FAP as a whole. Hence, the FPCO and donors regard the project as a cornerstone of the FAP.

3.2.1. *Objectives*

The general objectives of FAP-20 are:

1. to arrive at feasible systems of water management for the development of protected areas;
2. to arrive at guidelines for the development of protected areas in the FAP generally.

To realize the first objective FAP-20 should introduce in Tangail and Sirajganj a system of water management which is feasible, practicable and durable in technical, social, ecological, institutional and economic terms.

To realize the second objective FAP-20 has to provide:

- documents and plans regarding structural elements of compartmentalization: the design of compartments and guidelines for the sectors involved, i.e. agriculture, fisheries, animal husbandry, marketing, communication, navigation;
- guidelines based on multicriteria analyses for non-structural (i.e. social, institutional and economic) elements of compartmentalization.

3.2.2. *Organization*

The general organization of the FAP was described in chapter 2. To supervise FAP-20 a formal Board of Management has been created, subordinate to the Action Plan Technical Committee (see figure 2.3). The most important members of the

board are representatives of the MIWDFC and the FPCO, the Project Director of the BWDB and the teamleader of the consultants.

According to the terms of reference a project team (PT) from the GOB side has an executive role whereas the consultants' team (CT) advises and assists. The CT would be dismantled after 18 months of intensive involvement. In practice, however, the PT restricts itself to preparation and construction of works, while the CT conducts virtually all research. The PT would consist of government officials of the BWDB complemented with specialists from sectoral departments. In practice the PT initially was a rather monodisciplinary team. Eventually a number of staff members from other departments were added. The composition of the CT is multidisciplinary and the team consists of foreign and Bangladeshi experts.

FAP-20 exchanges information and cooperates with other organizations operating in the project area, with other relevant components of the FAP and with a few other Netherlands-supported projects in the area of flood control.

3.3. Progress

Activities

Whereas the work in 1991 still consisted mostly of preparation, culminating in the Inception Report, FAP-20 developed a broad spectrum of activities for Tangail in 1992:

- Baseline surveys, primarily in the areas of hydrology and social economy.
- Supporting studies and proposals for fisheries (in part together with FAP-17), environment (with FAP-16), institutional aspects, training, and preparing mathematical hydrological models (in part with FAP-25).
- Multidisciplinary studies and household surveys inside and outside the project area.
- Preliminary studies and cost calculations for alternative solutions (options) on the basis of the surveys and existing expertise.
- Initiation of a process of decision making to arrive at choices between the options. Efforts were made to consult with all concerned parties.
- First stages of design and preparation for the construction programme of winter/spring 1992/1993.

These activities are meant to lead to engineering interventions which will subsequently be tested during a number of years.

The activities for Sirajganj are one year behind those at Tangail. Activities for the Jamalpur Project (FAP-3.1) were foreseen as well, but these have remained limited.

Development options

On the basis of field studies, multidisciplinary research and multicriteria analyses, four development options were elaborated which were meant to be discussed with the local population and with all relevant agencies and experts. These options vary from simple improvement of drainage to full flood protection (cf. box 1).

Box 1: The four options

- A improved drainage during pre- and post monsoon through re-excavation of existing *khals*,
- B option 'A' plus throttled inlets to mitigate the danger of additional flooding under option 'A',
- C option 'B' plus gated inlets and additional embankment works to provide a higher degree of flood protection and the possibility of monsoon water level regulation,
- D option 'C' plus strengthening of the southern boundary and placement of outlet regulators to provide full flood protection.

Source: FAP-20, 1992e.

On 29 June 1992 a meeting of FAP-20, the FPCO and the POE was convened to determine strategy. The FPCO/POE decided that only those options could be considered which involved flood protection through the use of controllable inlets. After this, the first two intervention options were withdrawn and, after abridged consultation with various interest groups, six other alternative implementations were worked out. These alternatives all presuppose complete compartmentalization. The differences between them are the successively greater degree of flood control and concomitantly reduced opportunities for example for fisheries and navigation (cf. box 2).

An actual choice from among the six new implementation alternatives was postponed to the summer of 1993. This means that there is more time to gather additional data, to consult with the population and to bridge differences in viewpoints within the project.

Management

FAP-20 will put in a great effort in the institutional area. The study in Tangail demonstrated the need for improvement of the coordination between GOB departments at every level and with the NGOs. In addition, water-management agencies have to be established and mechanisms have to be created so that beneficiaries

Box 2: The six implementation alternatives

- Ia Full compartmentalization: All peripheral structures gated with the exception of the ungated or partly gated, navigable inlet structures *Lohajang* and *Sadullapur*; limited peripheral road (20 km); southern embankment as feeder road with bridges/ungated structures; flow regulators between *Lohajang* and sub-compartments 9, 10 and 11 only.
- Ib The same as Ia, but also gated, unnavigable inlet structures *Lohajang* and *Sadullapur*; including mooring facilities (or lock).
- IIa The same as Ia, but also including flow regulators between *Lohajang* and remaining sub-compartments.
- IIb The same as Ib, but also including flow regulators between *Lohajang* and remaining sub-compartments.
- IIIa The same as IIb, but with closed/regulated structures along southern embankment, with exception of the open *Lohajang* outlet.
- IIIb The same as IIIa, but with complete peripheral road (60 km).

Source: FAP-20, 1992e.

share the costs. This last point should be realized via a multilevel structure of user groups.

Special handbooks and programmes of training will be developed and introduced; these will be tested for usefulness for other regions.

Anticipated effects

According to the Interim Report FAP-20 expects, on the basis of the proposed options, that the interventions will lead (in various degrees) to the following effects:

1. Of the total population in the Tangail area the urban inhabitants of Tangail Town will probably benefit most. The effects for farmers will be mixed; large farmers will benefit more than small farmers, and fisheries will experience negative effects.
2. Owing to the increased reliability of the water economy farmers will invest more in rice cultivation (improved varieties, fertilizer) during the monsoon and thus perform better. Cropping intensity, however, will not increase greatly. In spite of more attention to monsoon cultivation, the farmers will continue to think of Boro, a rice variety grown during the dry season, as the most important crop.

3. Fisheries and navigation will be affected negatively, in spite of fish-friendly structures and the introduction of new fishing technologies.
4. From a purely economic point of view the options can hardly be justified. According to FAP-20 the economic internal rate of return (EIRR) would have been higher in areas less developed than Tangail, since in Tangail the cropping intensity is quite high as it is (FAP-20, 1992c).

3.4. Findings

Institutional aspects

The institutional study is solid in design. The question is whether there will be enough room for experiments. Time is limited and the recommendations actually imply a shift in the power relations between the agencies concerned.

Another question is whether the relevant knowledge gained to date, for instance via multidisciplinary surveys, can be retained in Bangladeshi institutions.

A third issue is whether an intensive approach as taken in FAP-20 is in fact feasible in the FAP as a whole.

Civil-engineering aspects

Because FAP-20 is a pilot project, because experiences with current practice in water-management projects indicate a low level of design, implementation and maintenance, and because especially the poor are vulnerable to the effects of possibly unreliable water works, it is entirely appropriate to demand high standards in FAP-20 technical experiments.

It appears that FAP-20 makes no use of certain aspects of modern planning and design such as risk analyses, sensitivity analyses, integration of operation and maintenance in the design and documentation systems. If application of these aspects of modern planning and design should prove impossible it would a priori seem irresponsible to move on to implementation.

Environmental aspects

Environmental aspects receive insufficient attention in the TOR and the work plan. For this reason the implementing team has interpreted the TOR as widely as possible. The environment was a point of special attention in the multidisciplinary basic needs study. This can be seen as a significant improvement. Important is, further, the recognition that men and women assess environmental problems differently. However, a basic needs study provides no insight in the links between changes in the environment and changes in means of production and water economy. FAP-20 anticipated this; hence an environmental impact assessment (EIA) was added.

This EIA was carried out in Tangail by FAP-16, the environmental study of the FAP. It became clear once again that there are significant gaps in knowledge of, for instance, groundwater effects and biodiversity.

FAP-16 has formulated an environmental management plan, but this amounts to little more than a list of relevant points of attention.

In view of the limited available time given by the TOR, it seems that none of the activities will provide enough information to ensure that environmental effects will be an important factor in the final weighing of the options. Moreover, these exercises have (temporarily) required the input of so many persons that there is some doubt about the feasibility of large-scale application.

Popular participation

The households survey is fairly traditional; still, it would benefit other FAP studies if the experiences gained with this technically reliable survey were retained and available for future reference.

As a formula the multidisciplinary subcompartmental survey (MDSC survey) is a good method to consult the people. It provides useful data to determine which water-management scenarios are important for further study. The BWDB is not unfamiliar with a multidisciplinary approach for smaller projects. Application of this approach in a large-scale project, however, is a new development. FAP-20 has gained valuable experience in organizing a multidisciplinary survey of this kind, especially in the areas of preparation, training of interviewers and problems in the execution.

Notwithstanding appreciation for the approach up to now, questions should be raised about the progress of participation activities. The MDSC survey did yield insight into the wishes of the people, but there has been no genuine participation so far which might lead to adjustment or perhaps cancellation of plans which *prima facie* seem technically feasible. There is reason to believe that the project team of FAP-20 has agreed only reluctantly to a CT proposal to improve the consultation process.

More participation is necessary to ensure that in 1995 “compartments are planned, designed, implemented, operated and maintained in ways that meet beneficiaries’ needs and minimise the kind of conflicts between groups in the area that can adversely affect project performance” (TOR FAP-20; FPCO, 1990). This observation is in line with the third recommendation of the Task Forces regarding the FAP, namely, to encourage fully participatory consultation, open to discussion of a broad variety of opinions on flood-control issues, before major decisions are taken (cf 1991c:389). Once the people’s wishes are known—and they are likely to differ per vocational group and income bracket—the next task is to achieve a general consensus. After that it remains to be seen if that consensus can stand up in practice.

Participation and the TOR

The concept of popular participation is interpreted in different ways. The FPCO/POE and the BWDB hold that answers to crucial issues encountered in other FAP projects require early testing of compartmentalization. Consulting with the people comes later, in connection with operation, maintenance and evaluation. In contrast, the CT would base the infrastructural options on the needs of the population and accords great weight to participation and voice procedures. The interpretation adhered to by the CT is completely in agreement with Netherlands policy.

On the one hand, then, the FPCO claims that implementation cannot justifiably be postponed; on the other hand the CT says that implementation is at present not justified. Both parties refer to the TOR, which offers no clarity on this point.

In the early phases no attempt was made to specify the concept of popular participation. Now that implementation and testing are nearer at hand the two views prove increasingly harder to harmonize and FAP-20 and its workers would benefit if ambiguity were reduced.

3.5. Conclusions

At first sight, the findings of FAP-20 present a contradictory picture. FAP-20 has achieved certain notable successes. Experience gained in multidisciplinary baseline research, the EIA, the first steps in participation, insight into the effects for some specific target groups—all of these are important for the FAP generally. FAP-20 has made evident contributions to FAP discussions on participation and institutionalization at the local level.

On the other hand, it seems that the studies do not yet yield adequate results. In the area of engineering the studies can be improved for instance through the use of risk and sensitivity analyses. Inquiry into environmental aspects produced more questions than answers. The study of fisheries has not yet progressed to the point that the FAP impact is sufficiently clear to weigh it against other effects. The people are not yet involved to the degree that one can speak of genuine participation. In sum: compared to water-management views and water-management planning before 1990 there are evident improvements; from a target-group perspective, however, these improvements do not yet permit warranted decisions concerning the implementation of water works.

An important point for the FAP as a whole is that a multidisciplinary approach to water management turns out to be far more complex than anticipated. While the socio-economic situation is more intricate than expected, the potential of

studies and pilot projects is more limited. It is difficult, for instance, to prepare an EIA because baseline data are lacking, and institutional regulations for water management demand measures which are not easily translated into practice.

How FAP-20 is assessed depends very much on which criteria are applied. Measured in terms of Netherlands policy, FAP-20 has an unambiguously positive pioneering role and has fulfilled the expectation that in FAP policy the orientation to poverty alleviation would be strengthened. Measured in terms of the high hopes entertained by the FAP and the FPCO the objectives will be achieved only partially.

The most important lesson to be learned from the progression of FAP-20 is that FAP-20 objectives need clarification. Essentially, the FAP is viewed in two opposed ways: the FAP as flood-control project and the FAP as a development project. As FAP-20 (and the FAP generally) moves forward it will be difficult to combine the different points of view into a single work plan.

Chapter 4. Hydraulic engineering aspects

4.1. Introduction

4.1.1. Hydrology

In Bangladesh the hydrology is determined by the following factors:

- A tropical monsoon climate with dry winters. Most of the annual flooding is caused by heavy monsoon rains.
- The confluence of three very large, in part highly unstable rivers in the low-lying delta plain. The catchment area of these rivers (Ganges/Padma, Brahmaputra/Jamuna and Meghna) covers 1.5 million square kilometres, 10 per cent of which lies in Bangladesh. When the run-off is high flooding occurs, inundating 20 to 60 per cent of the land. The effects of flooding may be beneficial or harmful, depending on the time, nature, volume and region. Extreme flooding, as occurred in 1987 (flash floods) and 1988 (simultaneous peaks) causes serious damage. The 1987 and 1988 floods claimed more than 1,500 casualties each (Brammer, 1990).
- The geographical location. The adjacent Gulf of Bengal is the cradle of disastrous cyclones during the pre-monsoon and post-monsoon periods. The death toll after the last cyclone in 1991 reached 130,000 (FAP-23, 1991a).

In this report the focus is on flood-control measures aimed at flood protection. Cyclones, droughts, saline intrusion and measures to combat these are discussed only insofar as they are relevant to flood control.

4.1.2. Flood control in Bangladesh

Essentially, there are three ways of coping with flooding: flood reduction, flood-proofing and controlled flooding.

Flood reduction aims at mitigation of flooding in selected areas through storage

of the water (above or below ground) in other areas. The high population density and the flatness of the land preclude this in Bangladesh.

Floodproofing is intended to restrict damage caused by flooding without recourse to expensive engineering interventions. Examples are shelters, artificial mounds, improved warning systems and adjustments in building design, cropping calendar and plant breeding. Flood preparedness on the basis of a disaster plan also belongs in this category. In fact, floodproofing is an extension of the traditional adaptations to flooding.

Controlled flooding occurs through canalization of floodwater by embankments and through dredging or excavation of drainage channels. This is the approach to flooding which is chosen most widely. The majority of the FAP measures, too, are of this type of flood control.

Rural Bangladeshis have always had to live with flooding; they adapted to it by building embankments and improving drainage. Local embankments are rather low. They keep the water out when flooding is not beneficial, but openings are made in them for drainage, to prevent breaching or to let water in when needed for irrigation. This is technically feasible as long as the water rises slowly and does not reach danger levels. When flooding is extreme, however, they offer no protection. During the rainy season the effect of improved drainage is limited because downstream the high river level (pushed up by the high sea level) causes congestion.

Over the past decades the government, aided by foreign organizations, has built many embankments. These are much higher than the earlier ones and were supposed to do away with flooding altogether. It is estimated that owing to local and governmental efforts sixty per cent of the total embankment as initially proposed by the FAP is already in place. However, much of it is in poor condition (Brammer, 1990).

Until now flood protection through embankments as built by the government has had little net effect. The reasons are that embankments often block the beneficial effects of flooding as well and that usually they perform poorly. In addition, a number of measures proved unfeasible. Ineffectiveness is caused by poor planning, lack of hydrological knowledge, inadequate operation and maintenance, and intentional breaching. Moreover, current projects are running behind schedule. Finally, although embankment can influence the duration and depth of inundations, there is no technology available to contain the erosive action of these enormous rivers over long tracts in durable and economic ways. The rivers may migrate laterally as much as 500 m in a single year and in very short order cut channels of up to 40 m in depth.

In view of the limitations of the various interventions it is understandable that rural Bangladeshis continue their current attitude of adapting to the way things are.

The FAP has accepted the concept of 'controlled flooding' as a guiding principle. This means a return to the farmers' notion of open embankments, although the aim is to achieve a greater degree of control by means of higher embankments with controlled and semi-controlled structures.

Controlled flooding would keep the depth and extent of inundations within bounds, so that the damage caused by extreme flooding is limited while beneficial effects such as on the water economy, soil fertility, fish stock, environment and navigation would largely be retained.

In urban and industrial areas controlled flooding is less suitable. For these complete protection is considered desirable.

The general tendency, then, is a cautious shift from flood control to integrated water management. This rather recent trend can be traced in the development of the Dutch policy as well. The FAP, too, expresses growing awareness of the problems and has taken initial steps towards an integrated approach.

4.1.3. The FAP and flood control

Integrated water management

The FAP has introduced significant changes in the area of flood control. The harmful effects of flood-control projects are recognized, which is why the concept of controlled flooding is accepted. In the context of the FAP regional studies and preliminary plans (FAP-1–FAP-6) are undertaken.

To support these, studies were initiated to find ways to embrace a broad variety of issues in the planning and design of projects, including aspects of the environment (FAP-16), fisheries (FAP-17), navigation, income distribution and agriculture (FAP-12). In addition, important technical studies were carried out in for example river morphology, river-bank protection, river training and hydrological models (FAP-21/22/24/25). Other FAP components, though less extensive, emphasize the integrated approach. Examples are: cyclone protection (FAP-7), floodproofing, disaster preparedness and forecasting/warning systems (FAP-10/11/14/23).

In discussions regarding the FAP one should keep in mind the vastly different conditions and the diversity of proposed interventions per area. One should further take into account that there is much uncertainty about the degree of control that can be gained over the rivers and the inundations.

River embankments

Embankment design differs greatly per area and purpose. If the objective is urban protection the embankments must be high and strong; at the borders of the subcompartments low embankments will suffice.

In rural areas the embankments have inlet structures so that water can be let in if desired or when extreme flooding is expected. They are further equipped with strengthened overflow sections, to reduce the risk that during extreme flooding the whole length of the embankment might be overtopped and damaged.

In the northeast of Bangladesh entirely submersible embankments are used, meant to ward off the early and most injurious flooding.

At present it is still unclear which strategy the FAP has chosen regarding river embankments. Basically, there are three options:

- The most incisive option is to train or confine the rivers by embankments alongside of them. This requires heavy investments in river-bank protection.
- A second option is to train the rivers by means of paired, fixed points (e.g. bastions) along the river at intervals of perhaps twenty kilometres (UNDP/GOB, 1989; FPCO, 1992e).
- For the time being, however, the regional study FAP-3 does not envisage river training, and opts for a wide riverbed and embankments set back far enough from the main channel so that the braided river is unlikely to cause much erosion damage to them (which may mean retreating a number of kilometres). Determination of the optimal distance is not only an engineering matter, but involves economic and sociological issues as well, such as the interests of *char* dwellers.*

Owing to insufficient insight into the morphological changes it is not known which types of embankments and technical structures would perform best, nor how large they should be. Until recently the practice has been to build embankments along the large rivers capable of containing floodings that occur once in fifty or a hundred years. The flooding in 1988 was of a magnitude which the Jamuna reaches once in a hundred years. For embankments within compartments as proposed in FAP-20 the standard is set at floodings occurring once in twenty years. For urban areas higher safety margins are observed.

Compartmentalization

The idea is to divide embankment-protected areas into water-management units (polders). This is called compartmentalization. A compartment is enclosed by

* *Chars* are sediment bars in the rivers and along the coast. They are vulnerable to erosion and storms, but are often inhabited by the poor.

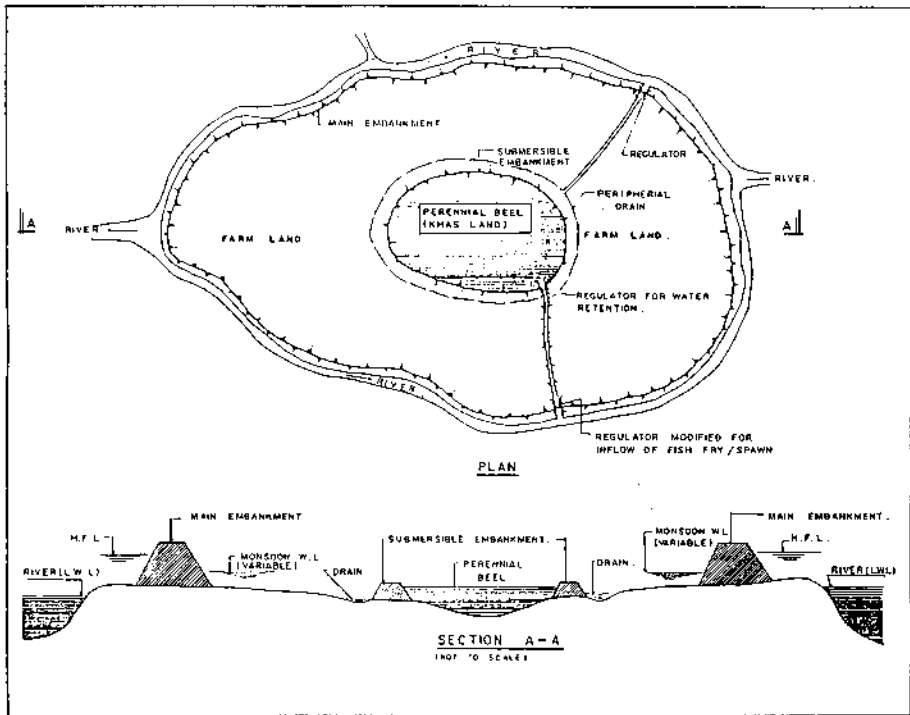


Figure 4.1. Schematic representation of FCD compartment with beel managed for fisheries

an embankment, part of which may be the river embankment. The embankment contains inlet structures at the upstream side and outlets at the downstream side.

Implementation

The first phase of the FAP covers mostly regional project-preparation and supporting studies, to be completed in 1992 or 1993. Implementation of water works was expected to begin immediately afterwards (IBRD, 1989a). Funds have in fact been committed for the components FAP-6, 3.1, and FAP-8B, 7. Owing to criticism, doubts among donors, changed insights and delays in the studies and project preparation, implementation runs behind schedule. It seems unlikely that prior to 1995 construction will be undertaken on the scale initially envisioned.



4.2. Findings

4.2.1. *General effectiveness*

The coordinated and essentially phased FAP approach is praiseworthy; nevertheless, both the literature and the findings in the field give rise to concern about engineering aspects in the FAP. In this connection it should be remembered that Bangladesh is widely different per region. The worry expressed above primarily relates to the region of the large rivers and in particular has to do with the proposed interventions in the floodplain and the riverbeds of unstable rivers like the Jamuna. These interventions are the most extensive and most crucial components of the FAP. Interventions such as coastal embankments to combat saline intrusion and the submersible embankments to counter flash floods in northeastern Bangladesh are largely left out of consideration here. In the FAP context these are less important and subjected to less criticism.

Experience shows that the protective objectives of flood-control projects are often not reached because of technical shortcomings. Embankments may be breached, drainage problems may become more serious, effects may be harmful and neigh-

bouring areas may find their problems multiplied. The region which suffered most from the flooding and drainage problems in 1988 was protected by the Brahmaputra Right Embankment (BRE) (IBRD/OED, 1992). In protected areas the damage owing to constricted drainage and breached embankments often exceeds that in unprotected areas, especially because a breach in an embankment causes a sudden inrush of water, which is more damaging than the normal, more gradual floodings are.

In Bangladesh the major causes of increased risk of breaching are:

- deteriorated embankments due to bank erosion;
- higher peak levels in the river, owing to embankments;
- negligent operation and maintenance of water works;
- intentional breaching by injured groups in the population.

Critics and advocates of the FAP do not agree on the extent to which these problems have affected the impact of projects negatively. They also differ in their assessment of the capacity of the FAP to overcome these problems (UNDP/GOB, 1989; Sklar, 1992; Maniruzzaman Miah, 1988; FAP-20, 1991).

4.2.2. *Protection against flooding*

Not enough is known of the technical problems inherent in protective measures to draw reliable conclusions. Consequently, on this point, too, opponents and defenders of the FAP can arrive at different risk calculations.

The possible effects of interventions as referred to above hold for both river training and retired embankments. A separate section will comment on the feasibility of river training.

Major issues in the discussions are:

Deterioration of embankments owing to bank erosion

Virtually all river embankments, including those along smaller rivers, are subject to recurrent breaching because of bank erosion. Effective river works demand reliable and economic engineering solutions. Rivers tend to scour the riverbed to depths of dozens of metres when they encounter bank-protection structures. This can also occur when construction activities for upstream compartments cause water congestion resulting in extreme local flow velocities and erosion.

Attempts to protect the banks of the large rivers near urban areas, landing-stages and infrastructure have failed on account of inadequate structures. In the FAP

potentially suitable technology is tested. Up to now, however, a frequent response is to set the embankments back some kilometres to a safer position, but this means that thousands of square kilometres of unprotected *chars* and their inhabitants (2–5 million) run far greater risk than before the embankments were built.

Advocates and critics of the FAP recognize the complexity of the erosion problem. The general feeling is that it will take some time before the relevant FAP studies (FAP-1 and FAP-21/22) will present satisfactory conclusions or solutions. The studies will include experimental construction of water works.

Higher flow velocities and water levels

Due to embankments, especially when implemented on both sides of the river, the flow concentrates and velocity increases because the flow profile is reduced. This means that morphological changes such as greater channel depths and sedimentation will take place. Moreover, water levels will rise because of reduced storage capacity. All of this results in higher risks for the embankments, the protected and the unprotected areas.

The FAP documents confirm this problem. The study of models in FAP-25 indicates that the measures proposed in FAP-3.1 by themselves suffice to produce significant downstream effects. For this reason the FAP wants to apply floodproofing measures to the *chars* until the time that full protection of even these areas (through river training etc.) can be achieved.

Riverbed changes

In a number of cases the embankments preclude silt depositing in the floodplain, which has caused the rivers to raise their beds and thus raise the water level. Consequently, the embankments have to be raised as well.

In view of the gaps in knowledge and the present state of research in river morphology the conclusion must be, at best, that this phenomenon occurs in some rivers whereas other rivers may get deeper in places. Accurate prediction of river behaviour still seems many years away (Roger et al., 1989; Pearce, 1991; Barrett, 1990; UNESCO, 1992).

Earthquakes and changes in river morphology

During the brief history of projects involving complete embankment there have been no earthquakes or incisive morphological river changes and their concomitant disasters. Chances are, however, that in future these events will take place (Boyce, 1990). Changes in the morphology of the rivers probably occur gradually and perhaps state-of-the-art technology can respond with timely corrections. Sudden earthquakes leave no room to respond. Risk analyses will have to be based on further study.

Technical feasibility of river training

The technical feasibility of complete river training (with or without channelling) is highly relevant in determining how realistic the idea of controlled flooding is. This is why the FAP investigates how rivers, including the 10 km wide Jamuna, can be trained or perhaps channelled, so that as much land as possible will be protected. If a river is to be trained intensive study will be needed to determine the route and width of an unimpeded riverbed. Crucial here are the configurations of the riverbed and the flow and sedimentation characteristics.

Much study will have to precede river-training interventions. In view of the complexity and dynamism of the Jamuna, estimates mention at least ten years of concentrated study for that river. The Task Force also holds "that continuous collection of good river data is essential for all future planning" (Task Forces, 1991c:373). Implementation of river training will take decades and for the most ambitious objectives will cost staggering amounts of money. In view of the complexity, the scope and the costs, solutions along this line of thinking must be considered unfeasible for now.

Local river training of the kind that leaves the present riverbed undisturbed, on the other hand, is considered feasible.

4.2.3. *Drainage*

Drainage problems are a normal phenomenon in Bangladesh because the land is flat, drainage channels silt up and downstream the level of the river and the sea is high just when local rainfall causes high discharge. Embankments to block the water or for road construction, regardless of how well or how poorly they are built, often obstruct run-off to the river and the land is inundated that much longer.

Many projects, including all the projects evaluated in FAP-12, suffer medium to serious drainage problems related to embankments. The result is that people from within or adjacent to the protected area purposely breach the embankment (BRE, Sirajganj IRDP), that flood damage is greater than when the embankments were not yet built (Meghna Dhonagoda, BRE), and that crops fail and so threaten the viability of the projects (Maniruzzaman Miah, 1988; FAP-12, 1992a; Pearce, 1991; Van Ellen, 1989b; FPCO, 1992e; Rogers et al., 1989).

FAP-12 concludes that most drainage problems in flood-control projects are due to faulty planning, design and construction. As a rule drainage problems are badly underestimated.

Compartmentalization will probably improve drainage during the monsoon, but the impact will remain limited because of the adverse hydrological conditions downstream (Barret, 1990; FPCO, 1992e; FAP-20, 1991b; UNDP/GOB, 1989).

4.2.4. *Effects for adjacent and downstream areas*

Narrowing of the Ganges and the Brahmaputra riverbeds and embankment of the floodplain leads to larger volumes of discharge of water and sediment and more rapid rise of the flood level in neighbouring and downstream areas during peak run-off periods. More serious damage than previously will result in these areas, unless the water works are suitably adapted (Rogers et al., 1989; Barrett, 1990; Pearce, 1991).

4.2.5. *Planning, design and implementation*

The success of controlled flooding and drainage depends wholly on the quality of the planning, design and implementation.

Planning and design practice

When water works in Bangladesh function poorly or not at all the cause often is that planning and design were inadequate. In the FAP significant attempts are undertaken to improve these points. However, it will take a lot of time and effort to achieve results.

The findings in the field indicate that modern design techniques and contemporary methods of operation and maintenance are not applied as much as they might be. No use is made of 1) integrated design and policy analysis, 2) qualitative and quantitative risk and sensitivity analysis, 3) quality control, 4) systems of hydrological information for all water works, 5) operation-supporting hydro-meteo systems, 6) periodic testing arrangements.

Since baseline data continue to be insufficient and unreliable, and because not enough experience has been gained in popular participation, improved operation and maintenance and integration of non-technical conditions, the risks are far greater than the plans and designs suggest. This means that a much longer period of preparation is needed to reduce the risks to an acceptable level. Furthermore, BWDB engineers need training in modern designing techniques and systems of operation and maintenance.

Building practice

Essential to the success of water-control projects is the quality of implementation. Often, however, this is glossed over in discussions. Project evaluations and the FAP-12 study confirm that quality has been inadequate. In view of the higher standards required in the FAP this problem will escalate. Many of the negative effects of water-control projects are caused by:

- delayed or unfinished construction;
- poor quality of construction (compaction, drainage, road building, regulators) (FPCO, 1992c; FAP-12, 1992a).

Regional studies

Prior to the FAP, projects were implemented without cognizance of their regional hydrological context. Sometimes this would render projects ineffective or even counterproductive. The five regional studies (FAP-2–6) are a step forward compared to earlier practices. Still, they were implemented more or less in mutual isolation, so that at present no harmonized plan of flood control for Bangladesh is available. Decisions are needed on new multiyear plans for national flood control.

Mathematical models

The regional studies and FAP-20 base their engineering proposals on mathematical discharge and inundation models. Their usefulness proves limited owing to the lack or inaccuracy of available data and the complexity of the situation and because the behaviour of braiding rivers is difficult to predict. Reduction of these problems to workable proportions will take years.

Supporting technical studies

At present measurements are being taken on the rivers and study is being made of river dynamics and opportunities for human intervention. The feeling is that not enough attention is paid to evaluations of earlier studies. With an eye to post-1995 continuation it is very important that the technical studies be retrievable because in one way or another they will be needed for future developments.

4.2.6. Operation and maintenance

Poor operation and maintenance is one of the major factors when water-control objectives fail. In FAP-13, the O&M study, seventeen projects were investigated. In twelve of these the embankments and engineering works were in poor condition; in thirteen projects there were conflicts in the operation management. Supporters of the FAP, too, therefore hold that implementation, operation and maintenance as carried out by the BWDB needs far-reaching improvement if some form of integrated national flood control in Bangladesh is to become successful. The main problems underlying inadequate operation and maintenance are:

- poor planning, design and implementation;
- insufficient local participation;

- the non-representative composition of local management committees;
- restricted means for the responsible agencies;
- no local financial contribution, owing to lacking participation and project returns (FAP-13, 1992a).

Operational management

The daily operation of controlled flooding and drainage in the compartments is delegated to the local authorities. Within the compartments there are important conflicts of interests (between small and large farmers, inhabitants of dry and wet lands, city-dwellers, boat people and fishermen), and it is likely that those whose influence is greatest will prevail. The decisions to flood or not to flood a compartment in the event of extreme high water levels will be made at the central level. Should this happen the local inhabitants may well object.

Maintenance

Periodic and preventive maintenance is virtually absent in most existing projects, nor does the project design include integration of aspects of operation and maintenance. Emergency repairs are seldom carried out. In the case of the FAP the high annual expenditure for maintenance and the practice of neglect combine to pressure meticulous and regular maintenance (FAP-12, 1992a). For this reason operation and maintenance needs to be integrated with the design.

4.2.7. Less controversial activities

The evaluation did not focus on the less controversial activities. They are largely left undiscussed here. Examples are: forecasting and disaster-preparedness activities (FAP-10 and 11), floodproofing (FAP-23), coastal embankments and cyclone protection (FAP-7 and parts of FAP-4 and 5), protection of urban areas and essential infrastructure (FAP-8 and 9). The technical feasibility of these activities often is no less doubtful than the intended protection of rural areas along the great rivers is, but economic feasibility or target-group relevance renders them more feasible generally. Moreover, interventions in the context of floodproofing and urban and industrial protection have relatively little impact on the water level and the course of rivers.

4.3. Conclusions

The impetus towards a coordinated and basically phased approach to water control is the core of the FAP. On the basis of the literature and findings in the field, however, there is cause for concern regarding the engineering aspects of the FAP. Particularly worrying are the interventions in the river floodplain, i.e. embankments and compartmentalization in rural areas. Breached embankments, increasing drainage problems and more flooding in adjacent areas are genuine problems to which these interventions may lead.

In connection with compartmentalization and especially river works there are serious doubts about:

- the technical feasibility of the proposed works;
- the availability of reliable baseline data on which to base proposals;
- the feasibility of good planning, implementation, operation and maintenance;
- the side effects.

In essence it is possible to control flooding in rural areas and to embank urban and coastal areas. In practice, however, the technical feasibility of the way the FAP would realize controlled flooding has not yet been demonstrated. This is especially true for the rural areas in the floodplains of the great rivers. At this point in time there is still too much uncertainty with respect to the safety margins which should be observed and the conditions which have to be met.

The technical plans for large-scale bank protection, and especially those for training the large rivers, must be considered unfeasible in the immediate future. This in turn may affect intended compartmentalization, since it rests on the assumption of maximum protection by river embankments.

The noted gaps in knowledge can be filled, at least partially, by means of the present series of supporting studies. To this end they must be continued, expanded and adjusted after 1995. It is important that Bangladeshi institutions assume responsibility for these studies.

Many methodologies are available to arrive at reliable constructions; the FAP, however, does not make sufficient use of modern design techniques and modern methods of operation and maintenance. Risk and sensitivity analyses, for example, are seldom or never applied.

FAP documents state that the performance of governmental organizations in implementation, operation and maintenance needs to be improved incisively if

integrated national water management in Bangladesh is to be successful. Meticulous and regular maintenance cannot be guaranteed in view of the high costs and the present negligent maintenance practice. Even if all other conditions were met the maintenance problems by themselves are sufficient reason not to consider new water-management projects.

Chapter 5. Agriculture

5.1. Introduction

5.1.1. Agriculture in the floodplain

The region most relevant to the FAP is the delta area of central Bangladesh. It is characterized by a monsoon climate with periodic flooding and sometimes lasting droughts. The farming system is adapted to these conditions.

Three agricultural seasons are distinguished:

1. the early monsoon season (*kharif I*), from March/April to mid-June;
2. the late monsoon season (*kharif II*), from mid-June to October;
3. the dry season (*rabi*), from October to March/April.

Rice is the major crop and is cultivated in each season. Specific *rabi* crops are wheat, mustard, potatoes, vegetables and pulses. During *kharif* jute and vegetables are cultivated next to rice. Sugar cane grows throughout the year.

The types of rice cultivated are these:

Aman – (*kharif II*). Planted during the monsoon (June/July), harvested in November/December. Broadcast (B. Aman) or transplanted (T. Aman).

Aus – (*kharif I*). Planted prior to the monsoon (March/April), harvested in July/August. Broadcast (B. Aus) or transplanted (T. Aus).

Boro – Planted in winter (December/January). Harvested in March/April (local varieties) or April/May (high-yielding varieties).

Flooding plays an important role in each of the growing seasons:

Kharif I: Pre-monsoon rains and an early monsoon are advantageous for the yield of *kharif I* crops. The water should not rise too quickly since in that case the growing rice cannot keep up with the rising water level. The Aus planted in this season is mostly of the local deep-water variety.

Kharif II: This the period of heavy rains and high water levels. In this period the greatest risk factor is damage caused by flooding.

Rabi: Dry-season agriculture is dependent on the available quantity of water in the soil and in irrigation reservoirs (groundwater, rivers, *beets*). The duration and intensity of the annual inundations determines the degree to which the groundwater is replenished and salinity (in the coastal area) is pushed back. Post-monsoon rainfall is another important factor.

Crop-growing, especially Boro, during the *rabi* season has become more significant in recent years. Three factors contributed to this:

- the rapid spread of irrigation pumps;
- the spread of high-yielding varieties (HYVs);
- the disappointing experiences with flood-control projects intended to stimulate Aus and particularly Aman production.

The importance of floods is not restricted to the water economy; they also play a role in retaining soil fertility without the need for large quantities of fertilizer. Next to nitrogen fixation via blue-green algae in flooded areas, fine-grained sediment deposits probably contribute to this. The effect of coarse sediment, as a rule deposited near the rivers, is assessed negatively by most experts.

Extreme flooding is the major cause of damage, as in 1988. Crop damage also occurs when the flooding is unusually early or late, or when the water rises very rapidly or does not drain off quickly enough. The most damage-prone varieties of rice are Aus, deep-water Aman and especially T. Aman.

Damage consists of reduced production and, indirectly, of underinvestment in inputs on account of high flood risk. The figures for indirect damage are unknown, but estimated direct damage in extreme years like 1988 comes to fifteen per cent of the *kharif* crop yield (Brammer, 1990; Rogers et al., 1989).

Irrigation is important for the dry-season crops, especially for HYV Boro, which cannot be cultivated without it. Traditional irrigation in Bangladesh is via gravitational flow from channels drawing on the rivers or via breaches in the embankments, sometimes aided by siphons and, nowadays, low-lift pumps (LLP). At present the largest area is irrigated by means of tubewells. From the 1970s onwards tubewell irrigation has a great impact on agriculture. Initially, deep tubewells (DTW) were installed; shallows tubewells (STW) are more popular at present.

Typical for Bangladeshi agriculture is that on average the farms are very small. Statistics show that between 1977 and 1984 the number of farms smaller than

0.4 ha has increased from one million to four million. Landownership relations are very unequal, and the available data indicate that in the past years inequality is becoming more pronounced.

Agriculture continues to be one of the major sectors of the Bangladeshi economy. Agriculture contributes some forty per cent to GNP, provides employment for more than fifty per cent of the labour force and is good for almost two thirds of the country's exports. However, the relative economic significance of agriculture is gradually decreasing. Employment in agriculture is not in step with the population growth, which is 2.1 per cent per year.

Crop production is low. The annual returns, 3 to 4 tonnes per ha, is below the level attained in other rice-producing regions in Asia. To keep the steadily growing population fed a continuous production increase is necessary.

GOB policy is strongly oriented to food self-sufficiency. For this reason rice cropping is given high priority. In the past the government played an important role in the distribution of inputs and the marketing of rice. More recently these activities were privatized, which seems to influence the total agricultural performance positively.

5.1.2. *The FAP and agriculture*

Although the damage caused by the floods in 1987 and 1988 led to the inception of the FAP, the expected agricultural developments, especially the production of rice, constitute the core of its socio-economic justification. The anticipated benefits are of three kinds:

1. reduced crop damage;
2. increased yield per ha because the water economy can be adjusted to agricultural needs, which promotes the introduction of high-yielding varieties;
3. intensification of agricultural performance because the risk of flooding is reduced and, hence, the climate for investment is improved.

5.2. Findings

Questions can be raised about the assumptions in the area of agriculture on which economic justification of FAP implementation is based. This remains true even if the feasibility of the engineering, implementation, operation and maintenance are assured. The points at issue are mentioned below.



5.2.1. Integration with the Bangladeshi agricultural policy

Although the original FAP proposals are legitimized on the basis of anticipated agricultural benefits, the Ministry of Agriculture and agricultural institutions have not in fact played a part in the FAP. Moreover, neither the evaluation of the agricultural impact of earlier projects, nor the agricultural policy of the government have been instrumental in the elaboration of the FAP concept and the studies.

When in the 1960s the idea of large-scale flood-control projects was launched, the focus was mostly on encouraging a shift from B. Aman to T. Aman, rice varieties grown during the monsoon. Later the high-yielding varieties of Boro were introduced, which made the dry season more important (UNDP, 1989).

Accordingly, policy as pursued by the Ministry of Agriculture and agricultural experts no longer assigns top priority to monsoon flood control. Agricultural developments over the past two decades have rendered flood control less urgent. Agricultural experts now emphasize the need to continue stimulation of dry-season irrigation, to promote privatization of the distribution of inputs and credits, to adjust macro-economic policy and to pay greater attention to fisheries. In addition, the importance of further research is pointed out. Others point to the significance of quite different matters such as crop diversification, land reforms and other measures.

The discrepancy between the FAP concept and the stated priorities in the agricultural sector must be considered a serious drawback.

5.2.2. *Harmonization with local needs*

The FAP concept as formulated in the early documents has little affinity with what farmers usually consider important. Like the agricultural experts, farmers also emphasize the significance of the dry season. Agricultural needs during the monsoon differ greatly per locality. Consultations with farmers about improvement in monsoon cultivation in Tangail (FAP-20) suggest that farmers are less interested in protection against extreme flooding in July/August (the FAP documents implicitly assume that they are). What they want, rather, is protection against pre- and post-monsoon floods, which deposit coarse sediment and cause more erosion. In addition, they attach great importance to rapid drainage following the monsoon. When a large embankment is already in place, as in the case of the Brahmaputra Right Embankment in Sirajganj (FAP-20), farmers feel that the embankment should function properly, keep flooding out and not impede drainage (FAP-20, 1992b; 1992e).

5.2.3. *Anticipated benefits*

Reduced damage to crops

Existing documents frequently note that crop damage owing to normal flooding is limited, and that flooding is often followed by high yields in the next dry season. During the interviews conducted in Bangladesh crop damage was seldom mentioned as an important justification for the FAP.

Increase and intensification of agricultural production

Increase in production primarily aims at rice. Improved water management has different effects per locality. The expected general tendency was that the *kharif* II crop B. Aman could be replaced with local T. Aman, and in certain cases even with HYV Aman. Yield per ha of these last two is generally higher than that of B. Aman.

Flood-control projects generally lead to intensification of agriculture. For the most part, however, intensification is due to added impetus to irrigated dry-season cultivation of rice (usually HYV Boro). This is a process which has been going on for years and basically has little to do with flood-control measures. It is only in areas where early flash floods occur that flood control via submersible embankments is important for the protection of the crop towards the end of the Boro growing season. In addition, improved water management makes it easier to cultivate dry-season crops on residual soil moisture in areas which formerly remained inundated throughout the year.

FAP supporters admit that at this time flood control is no priority in agricultural terms, since irrigation development for the dry season has much greater potential. It is immediately pointed out, however, that dry-season agriculture will exhaust its possibilities for expansion between now and the year 2000. It is further argued that future development will be feasible only in well-protected, properly drained areas. This is why it is none too soon, the argument continues, to work towards improvement of monsoon cultivation.

But opponents claim that in this way expansion of the total agricultural production is not guaranteed, because there are still too many uncertainties with respect to flood-control (side) effects on agriculture, especially in the long run.

5.2.4. Anticipated negative effects

Local diversity of needs

Within compartments different areas may each have their own flood-control requirements. Even in small sections, slight variations in level can have noticeable consequences for agricultural production. At present it is not clear to what extent flood control can meet highly specific local demands. If the water level can be regulated it is likely that the interests of rural elites will dominate water management. And where water management is in the hands of rural elites or government agencies water levels will be less predictable for farmers. This sort of thing is not unknown even in large-scale flood-control and irrigation projects in Bangladesh. Practice shows that in such situations the small farmer will not dare to invest more than he did before, when flooding was not 'controlled'.

Effects on soil fertility

The impact of flood control on soil fertility is significant. Interventions less incisive than those proposed in the FAP would suffice to alter the growth of algae appreciably. Large amounts of fertilizer might be needed to compensate for the effect. Little is known about this problem, as is recognized in the FAP documents; it was not before the end of 1992, however, that a minor study of this aspect was added to FAP-16.

Effects on the water economy

During monsoon agriculture the effect of controlled flooding on the water economy will be positive, but in some areas less groundwater will be available because of changed inundation patterns (FPCO, 1992e). In other protected areas post-monsoon drainage will be impeded due to poorly functioning drainage systems and technical structures (UNDP/GOB, 1989; FAP-12,1992a). These effects will

be harmful particularly for *rabi* crops. These problems are recognized in the FAP documents as well. The experiments carried out in FAP-20 will only in the long run show whether these negative effects can be mitigated.

Effects on the spread of plagues and pests

A third possible effect is that blights, plagues and pests will become more frequent because flood control changes the agricultural environment greatly. The diversity of crops and of crop varieties is reduced: more rice and less jute, vegetables and pulses. High-yielding varieties are less resistant to blights and plagues. When the rhythm of flooding and dry spells is broken, its regulative impact on pests and weeds is gone as well. Moreover, important wetlands and other habitats of predators in the vicinity of the farmlands will disappear.

Loss of arable land

A fourth effect is that arable land is lost owing to the construction of water works. To begin with, land is needed to build embankments on. The legal and socio-economic implications of this are studied in FAP-15. Secondly, unprotected *char* lands will experience higher flood levels, as a result of which monsoon cultivation will be less productive or perhaps the land will be left unproductive altogether. The present FAP proposals aim at a short-term solution to this generally recognized problem via floodproofing. The proposed long-term solution is to train the rivers via embankments located as close to the main channel as possible. The feasibility of this approach has not yet been demonstrated. The effect will depend on the design parameters ultimately decided upon. See also chapters 4 and 9.

Effects on animal husbandry

Finally, in the past embankment projects have led to a reduction in livestock, cattle especially, because of diminishing grazing grounds and feed. HYVs give fewer by-products useful for livestock (straw) than the local varieties. This problem has been noted in a late stage. There is no evidence that the FAP regards the problem as a serious one.

5.3. Conclusions

From its inception the FAP aimed at securing and increasing agricultural production through:

- increased yields of current cropping varieties;
- intensification of agriculture through greater use of HYVs;
- reduction of damage to crops due to flooding.

It seems that for the decade ahead expansion of the irrigated region and intensification of dry-season cultivation are more promising ways to increase agricultural production. In the longer run, however, alternative solutions must be sought to keep the growth of agricultural production in step with the growth of the population. To this end flood-control measures in support of monsoon cultivation, as envisaged in the FAP, will gain in importance over time.

The field study confirms the picture drawn in the literature, i.e. that the effects of the FAP on agricultural production are still far from clear. Since it is not known what precisely the role of flooding is in the distinct farming systems, the consequences for agricultural production when part of this factor is taken away cannot be predicted. In addition, the actual scope of crop damage due to extreme flooding is still unclear for the longer term.

It seems that in the early days of the FAP the self-evident assumption was that the plan would serve agricultural development most of all. However, it is highly probable that the positive impact of flood control on agricultural production will be limited and dissimilar per location. Furthermore, it may cause major local impediments for agriculture.

At present the FAP organization has little detailed knowledge of existing farming systems. Greater insight into the impact of flood control on the distinct systems is needed.

Finally, the FAP should pay more attention to the effects of hydrological engineering on other economic sectors, in order to replace the present orientation of the FAP to agricultural interests with a broader approach.

In conclusion it can be said that agriculture will benefit most from:

- Greater involvement of the Ministry of Agriculture and of agricultural experts, in proportion to the importance attached to agriculture in the justifications and objectives of the FAP.
- Determination of the degree to which improvement of monsoon cultivation will become prominent in the future.
- Postponement of technical works until more is known of the impact of water management on agriculture.
- Implementation of projects such that the interests and insights of farmers are part of the considerations on which the proposed measures are based.
- Agriculture-relevant FAP research by independent and specialized institutions (cf. chapter 11).
- Refinement of the interventions to fit local needs and interests.

Chapter 6. The environment

6.1. Introduction

General

The environment of the Bangladeshi lowlands is determined by very large rivers, strong tidal influence, cyclones, a flat topography and a tropical monsoon climate. These factors shaped a landscape that is in continuous change. The annual floods are important for the environment because of their function of cleansing and renewal of soil fertility and water replenishment. The flora and fauna have adapted to the seasonal extremes in rainfall, flooding and temperature by way of complex systems of reproduction and migration in which both the rivers and the floodplain or wetlands play a role.

Next to biophysical factors the environment is determined by the uncommonly high population pressure and the poor socio-economic situation of most of the rural population.*

The role of biodiversity is important (and underestimated) in the nutrition and survival strategies of marginal farmers, fishermen, landless people and minorities. The ecosystem of the floodplain is still largely unknown, in part because reliable research is lacking and in part because the system is highly complex. Evident is the mutual interdependence of all components and thus also the importance of the wetlands for the ecosystem as a whole. Wetlands are hydrologically significant because they act as buffer for river run-off, and replenish groundwater to function as reservoir for irrigation and fishery in the dry season. Wetlands are important for the biodiversity as well;** many varieties of plant- and wildlife which are important to humans depend on well-functioning wetlands. Certain birds, insects and fish

* A common definition of environment which can be used in this context is: The sum of all the physical and biological components and processes which make up the surroundings of man. In the FAP the following definition of environment is given: "Environment is the totality of the natural and human environments on which the project will exhibit influence, and it includes all biophysical components of the natural environment and all socio-economic components of the human environment" (cf. ISPAN, 1992b). Since in most cases the socio-economic environment is dealt with under socio-economic aspects, this chapter treats the biophysical environment only.

** Biodiversity may be defined as the fullest range of fauna and flora species normally represented in a pristine region or ecosystem.



which are of importance beyond the wetlands (Bangladesh, India, Nepal, Central Asia, China, Russia) must retreat to the wetlands to survive the dry season.

The long-term problems which undermine the environment arise mostly from the growing population pressure and its concomitantly intensified exploitation of the environment. Intensified use of natural resources causes loss of biodiversity in cultivated areas and reserves; upsets the ecological balance, for instance between predators and their quarries; is harmful to public health because of pollution and nutritional impoverishment; leads to energy shortage because of de-afforestation; reduces performance in agriculture, animal husbandry and fisheries due to causes mentioned in the relevant chapters; and makes for greater insecurity since more people must live in areas where the risk of flooding, cyclones and pollution is high.

Population pressure is still increasing, which means that pressure on the environment will only become greater. Concern with the environment and measures aimed at protection and better management of the environment are expanding as well. The question is, however, whether protection and management of the environment can be effective, in view of the limited effectiveness of local authorities and the large, direct interests of user groups such as poor villagers, rich farmers, merchants or industrialists.

The FAP and the environment

The FAP is meant to provide controlled flooding, improved drainage and protection against extreme floods. Restricted flooding is accepted, which means that in general the watery environment will silt up, that the hydrology will change and that efforts are made towards more control over the environment. To be sure, the FAP stipulates that all its projects must be ecologically sound, and that in the event of negative impacts corrective and compensational measures should be taken. Monitoring is to take place throughout the project period in order to ensure adequate and timely action. All project proposals are subject to an Environmental Impact Assessment (EIA).

FAP-16 deals specifically with environmental aspects. Nevertheless, descriptions of environmental aspects in the FAP documents are rather superficial (UNDP/GOB, 1989). In the debate advocates of the FAP do stress the importance of the environment for the survival of the Bangladeshi population.

6.2. Findings

The themes in the discussion relate to 1) FAP procedures and their application, and 2) impact on and use of the environment.

6.2.1. Procedures and institutions

Within FAP circles it is pointed out that a handbook and guidelines for EIAs are available. Apparently, the Ministry for the Environment intends to have the EIAs for all interventions modelled along the lines set out in these documents. Critics, however, point out that comprehensive EIAs cannot be worked out due to lack of data, that environmental matters are weakly embedded institutionally and that in the FAP overall integration of environmental inputs is lacking.

As such, the EIA seems a useful instrument. Experiences with it in other countries have been put to good use. Improvement is conceivable in connection with the parameters of the multicriteria analyses. The priorities of Bangladeshi governmental policy should be introduced. Furthermore, it is not clear yet which institutions will execute the EIAs. The organizational solutions suggested to date (FAP-16, BWDB, foreign consultants) still seem to pay inadequate attention to expertise, independence and institutional memory.

The eleven Guiding Principles drawn up when the FAP was started reveal a prejudice in favour of engineering. The environment is underrepresented in the basic documents and references to it are in very general terms. No norms are formulated, so that weighing of the factors is really left to the implementing agencies. Accordingly, the expectation is that the FAP requirement, i.e. 'ecologically sound' in practice will mean that anticipated damage to the environment will not influence decision making unless based on incontestable figures. To obtain 'hard' data, however, will not be easy.

With respect to the studies it can be said that at the start of the FAP environmental issues and the complexity of the situation were underestimated. The initial approach to environmental aspects proves inadequate. In the comprehensive regional studies, for example, too little room is left for environmental inputs. FAP-20 is lacking in this respect as well (cf. chapter 3).

Approval of the EIAs came too late to be taken up into the implementation of the relevant FAP components. The lack of data was noted above. Furthermore, the EIA guidelines hold only for the feasibility phase and, in less elaborate form, for pre-feasibility studies in projects. Criteria and rules for the formulation of TORs on behalf of project identification and input of environmental expertise have not been elaborated sufficiently. The same applies to the integration of environmental management plans into project design and implementation.

For meaningful ecological studies more time is needed than the FAP currently reserves for them. The point is that they take years; brief studies completed within a year will probably be of little value. Moreover, regional studies such as FAP-3 show that the hydrological models used are unable to predict changes in water levels, sediment transport etc. with sufficient accuracy for EIA purposes.

FAP-16 investigated a number of questions in greater detail. The themes studied relate to inventories of *char* lands, fishing by the landless and the poor, insect-carried disease related to inundations, soil fertility, nutritional and health indicators. Assessment of the degree to which these studies are able to provide answers is not possible at this time. A telling point is that not all parties are aware of them.

6.2.2. *Environmental effects*

The environmental impact of the FAP measures cannot be seen in isolation, but must be placed in the context of the overall intensification of the exploitation of natural resources. For example, effects related to the intensification of agriculture (HYVs and agro-chemicals) will occur not only in the wake of FAP interventions,

but also in large-scale expansion of dry-season irrigation. Without doubt the most important environmental effect will be the loss of the existing hydrological system and the radical change in ecological balances (Barret, 1990). But the actual impact is still largely unknown, due to lack of data (Dalal-Clayton, 1990).

Immediate environmental effects attributed specifically to the FAP are:

- silting up of the environment through land reclamation and extraction of water;
- blocking of migration routes of aquatic fauna owing to water structures and embankments;
- water pollution due to increased stagnation of water behind embankments;
- reclamation of wetlands;
- higher water levels on the river side of embankments;
- increased risk of breach-caused disasters;
- change in the hydrological regime of the river, with consequences for saline intrusion in the coastal area, changed flow velocities and water depths, etc. This implies change of the biophysical environment as well.

Impact on biodiversity and wetlands

The ecosystem, based on interaction between the rivers and the wetlands, is disturbed by embankments, gates and improved drainage. Experiences so far indicate that flood-control projects can inflict much damage to the ecology of the floodplain. But effects on the biodiversity and on the wetlands are seldom demonstrated with actual cases occurring in Bangladesh. To this can be added that little attention is paid to native knowledge. The importance of this knowledge, especially for the poor, must not be underestimated.

Effects on the use of land and water

For the impact on agriculture and animal husbandry, see chapter 5 of this report. For the interaction between flooding and fisheries, and for the potential effects of drainage, embankment and river training, see chapter 7.

The *groundwater level* is not only influenced by embankments and groundwater irrigation (cf. chapter 5). Drainage works, too, will affect the groundwater level, because they shorten the period of infiltration and reduce hydraulic pressure.

A number of aspects of *public security* are brought forward in the discussion and in the literature:

- Experience shows that damage due to flooding after large embankments were built is often greater than before (cf. chapter 4).
- During periods of flooding the water levels and flow velocities outside of the embankments are higher, which means not only that the risk of breaching

increases, but also the risk for inhabitants of unprotected areas. It should be noted that during severe flooding embankments fulfil an important function as place of refuge—an advantage correctly pointed out by the BWDB.

A number of *public health* issues are brought forward:

- A lower groundwater level affects drinking water.
- A changing environment may imply proliferation of disease-carrying organisms, for instance because their natural enemies (fish, birds, insects) become less numerous or because drainage problems cause stagnant water. Malaria and cholera are mentioned in this connection. On the other hand, certain health problems may become less frequent (gastro-enteritis). It is not known whether this is actually the case.
- An important public-health issue is nutrition. Critics expect that owing to the harmful impact on fisheries, livestock and crop diversity the diet will contain less proteins. This holds especially for the very poor, on the one hand since they, more than others, depend on freely accessible sources such as fishing water, grazing land and wetlands, and on the other hand because project benefits are linked to landownership, hence do not extend to landless people, which in turn means that they will find it hard to obtain high-protein foods.
- The expectation is that the FAP will stimulate high-input-dependent agriculture and more production. Experience teaches that to do this large amounts of agro-chemicals like pesticides and fertilizers are brought in. Especially the former imply risks for man and beast.

Critics point to the negative effects for *navigation* if many water routes are closed or drained. Advocates say that opportunities for road transport and in some cases shipping (dredged water routes) will expand. Whatever the net effect, it is unlikely that the same group and socio-economic class will reap the benefits of the new situation.

Concerning the effects on the entire watershed region, few individuals point to the need for a regional approach, i.e. in cooperation with Nepal, China and especially India. It is a politically sensitive issue. It cannot be doubted, however, that the impact of upstream water-management works extends down to Bangladesh, affecting mangroves, fisheries and saline intrusion. These matters should be taken into account explicitly in the development of hydrological models.

6.3. Conclusions

The discussion of the environmental impact of the FAP is hampered by the lack of clear-cut data. Opponents point to the negative effects, the lack of knowledge about the environment and the off-handed way the FAP deals with environmental issues. Advocates point to the need of intervention and the possibilities of mitigating the harmful effects.

On two points all agree. First, implementation of the FAP will have negative consequences for the environment. This means that the basis for existence of the target groups of Netherlands policy is at stake. It is still unclear just how much the environment will suffer and to what extent the damage can be reduced. Secondly, some of the negative effects will also occur if alternatives such as large-scale groundwater irrigation are introduced.

Direct environmental effects of the FAP are silting up of the land, disruption of ecological chains and alteration of the hydrology in the system of rivers, floodplain and *beels*. Secondary effects are water pollution and increased flooding risks in many areas. The erosion of the ecosystem and, hence, of the biodiversity and the basis for agriculture, fisheries and animal husbandry has been demonstrated both qualitatively and quantitatively, but supporting research data regarding the processes underlying it are lacking. Best known are the effects on fisheries.

Furthermore, the FAP will have a mixed impact on public health and public security—the harmful effects will be felt especially by the poorer segment of the population.

The FAP states that all its projects must be ecologically sound. In view of the prejudice in favour of extensive technical works and the pressure to commence implementation of water works very soon, it is expected that 'ecologically sound' in practice will mean that potential damage will affect decision making only if incontestable data are presented. To obtain these in Bangladesh, however, is extremely difficult.

In the FAP attention to environmental issues is growing. Since these factors prove far more complex than anticipated, interventions in the natural system must be postponed until environmental aspects can be weighed against social and economic benefits. By 1995 this condition will not be met for the great majority of the planned areas and proposed interventions. In addition, the degree of priority assigned to environmental policy in the national and FAP objectives should be made clear, so that decision makers in the FAP can base their deliberations on multicriteria analyses.

The FAP is the first nation-wide programme in Bangladesh in which attention to the environment is an issue.

From an environmental point of view the following elements should be taken into account in a strategy for the future:

- a. Formulation of priorities, norms and rules on the part of the Bangladeshi government, on the national level and in the FAP.
- b. Postponement of the implementation of technical works until sufficient knowledge is available concerning the natural system, its components and functions.
- c. Small-scale implementation of technical works,
 - if the benefits, technical feasibility and mitigating or compensating measures are not controversial;
 - if the implementation occurs in an experimental context, is small in scale and meant to enhance practical experience in the integration of environmental factors with water management or development;
 - if the benefits are greater than those of alternative development options.
- d. A procedure to record every project phase, from TOR formulation up to and including post-completion monitoring.
- e. Establishment of an institutional memory in the area of the environment, via
 - structural input and influence of environmental expertise for planners and implementors of interventions in the natural system;
 - placing FAP activities with independent institutions, possibly a new institute for research and management of natural resources. Although per definition institutes of this kind belong in the area of applied science, room should be created for pure research as well.
- f. It is important that the FAP retain its national scope. Proliferation of isolated projects increases the risk that the overview of and insight in (cumulative) effects is lost.

Chapter 7. Fisheries

7.1. Introduction

7.1.1. *Fisheries in Bangladesh*

The Bangladeshi delta landscape contains many freshwater and seawater habitats for fish and other water fauna: rivers, lakes and *beels*. These habitats cover from ten per cent (dry season) to fifty per cent (monsoon) of Bangladesh. Fish adapt to the extreme seasonal differences in hydrological and climatic conditions in an annual cycle of migration and reproduction, in which the distinct habitats each play a specific and significant role.

The focus of the present chapter is on freshwater fish, which is the most important in Bangladesh in terms of quantity. During the dry season the fish live in the rivers, *beels* and channels, while in the wet season the floodplain, rich in food, is important especially for the fry, eggs and larvae. Almost ninety per cent of the freshwater fish in Bangladesh depends on the floodplain as spawning grounds.

The majority of the rural families fish for food rather than for income. Of the animal proteins consumed in Bangladesh eighty per cent is fish. In addition, fisheries are important for professional fishermen (a million households). Most fish is caught on the floodplain during the monsoon. Fifteen per cent is bred in fishponds which also depend on the floodplain for stock. Fish and especially shrimp are important export products. Shrimp culture occurs mostly in the coastal areas.

7.1.2. *Developments in fisheries*

From the 1960s onwards the catch has been falling off badly (SIDA, 1991). The main reason for this is the decline in freshwater fishing, a decline which can only be partly compensated for through coastal fishing and the increasing number of fish farms. The interviews confirm that the catch is diminishing. Causes mentioned are:

- the acreage of surface water is becoming smaller, especially owing to flood-control projects;
- the migration of fish is impeded by water works;
- water pollution is getting worse;
- stagnant water and anaerobic local conditions in embanked areas;
- overfishing;
- disease, often said to be linked to pollution;
- changed habitats because of altered flow velocities and water levels;
- large-scale catches in open water of fry for the fish farms.

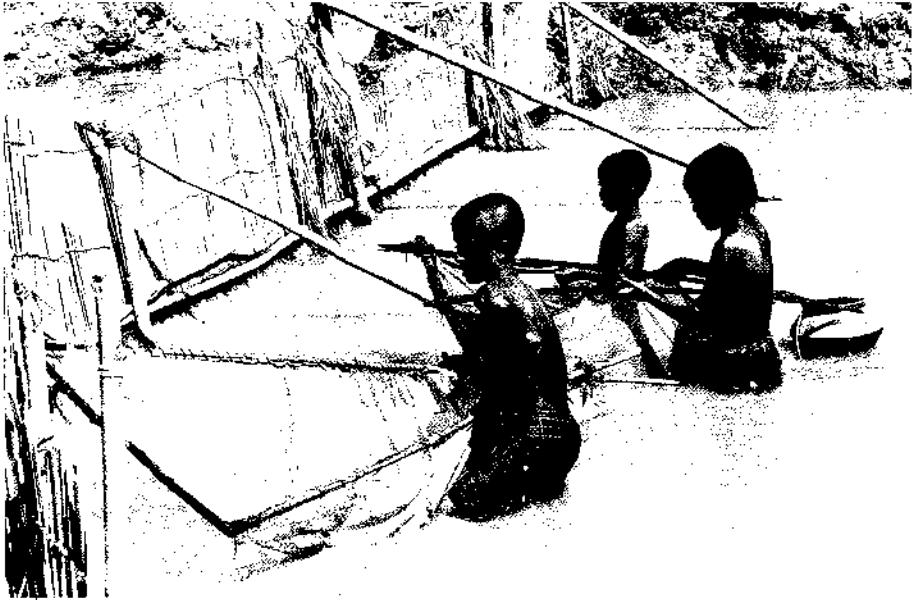
The situation as sketched above, the trends and the relations to flood-control projects as described in this chapter for freshwater fish in open water are largely similar for fish in salt and brackish water along the coast, for freshwater mussels, freshwater shrimp, frogs and other aquatic fauna.

While freshwater fishing in open waters is declining, fish farms and shrimp culture are expanding. In the long run, however, in quantitative terms this increase will yield only partial compensation; in terms of money and nutrition the families engaged in fishing will hardly be compensated at all. Socio-economically, the shift from open-water fishing to fish farming and shrimp culture is quite incisive. Traditional fishing is done in freely accessible waters used by fishermen, landless people and small farmers. Fish farms are private property—the owner-families are relatively rich. Whereas formerly fish was a common resource mostly for the poor, it is turning into a private resource of the larger farmers.

On the basis of existing trends in the population growth, agricultural intensification, development of infrastructure and embankments, the decline in open water fishing is expected to continue. Measures to combat overfishing and to regulate putting out fry or expansion of fish farming all meet with serious institutional, social and technical problems (UNDP, 1989b; BARC, 1989). To this should be added that governmental recognition of fisheries in Bangladesh is of recent date, and that most donors have not yet made this move. One consequence of this is that there are large gaps in knowledge about current fishing practices, the production potential, and the sort of water management needed for fishery.

7.1.3. Fishery objectives in the FAP

Growing awareness of the cumulative negative impact of flood-control projects on the fish stock throughout Bangladesh led to special attention to fisheries in the FAP.



One FAP objective is that along with the realization of the major goals the needs of fisheries are accommodated. However, the basic documents do not elaborate on fisheries, and the regional studies do not cover the topic adequately either. There is a special FAP study for fisheries (FAP-17), but it was started only recently (1992). In other studies, such as FAP-20 and FAP-16 (environment), fishery components receive some attention.

7.2. Findings

7.2.1. FAP impact on fisheries

Critics and advocates agree that flood-control measures will have serious consequences, directly or indirectly, for the fish stock and hence for those who depend on fishing in open water.

Significant effects are the blocking of migration routes because of gates and flow regulators in the embankments and the embankments themselves. Furthermore, the plains are not flooded sufficiently, which means that they lose their function as feeding ground. Again, flood-control projects often lead to improved drainage and reclamation of *beels*, which means a reduction in fishing acreage (Rogers, 1989;

Banu and Shariar, 1991; Boyce, 1990; FAP-12, 1992a). Another effect is that agro-chemicals and stagnation pollute the water and poison the fish. The effects are sometimes felt far downstream, but water samples are usually taken on the project location.

Catch reduction due to embankments is generally estimated to be about twenty to forty per cent, but much higher percentages are mentioned as well. The figures vary per area and per inquiry. Different assessments are also given regarding the question whether the impact of the FAP will differ from that of earlier projects. It is remarkable that many of the FAP documents fail to pay attention to this important aspect, or at best pay qualitative attention to it. FAP documents which do take fisheries into consideration do so in the context of the total FAP impact. FAP-12 shows that fishery losses in five of the seventeen projects investigated are such that in retrospect the EIRR turns out to be unacceptably low (FAP-12, 1992a).

On the fisheries issue the FAP is generally criticized because:

- Not enough attention is paid to the actual consequences of FAP interventions for the fish stock. Moreover, attention to fisheries is introduced too late. The POE, for example, has no expertise in the area, FAP-17 was begun only recently and in the regional studies fisheries are hardly mentioned. Consequently, the impact of the measures on fisheries and, conversely, the influence which fisheries should have on the measures remain underestimated.
- Too little consideration is given to specific effects for population groups who depend on fishing.
- In costs/benefits analyses the negative impact on fisheries is not included, or cannot be included for lack of data.

Attempts are made to arrive at compensating and mitigating measures for fisheries, but no modifications of FAP concept are being introduced.

7.2.2. Specific effects for the poor

Critics point out that socially speaking the fisheries sector is not neutral; a negative impact on fisheries will have harmful consequences for the poorer segments of society. This observation is correct. Seventy-three per cent of the rural households engage in open-water fishing. Approximately one million households (about four per cent of the total population) are entirely dependent on fishing. Both these professional fishermen and the subsistence fishermen belong to the poor classes. Their

diet (qualitative and quantitative) and (additional) income depends heavily on this natural resource and, accordingly, they invest much of their time in exploiting it. A very important aspect in all this is that the open water is freely accessible to everyone.

Fishing waters and fish stock are dwindling. Prices are increasing, Fish farms and shrimp culture are promoted. The implications of this are:

- Higher prices make fishery more attractive as investment projects for the rural and urban elite, who have the means to compete successfully with the poorer, traditional fishermen.
- The reduced size of fishing waters makes them more readily identifiable and controllable. These waters are rented or leased to the elite.
- Fish farming and shrimp cultivation depend on landownership and investments; hence they are activities undertaken by richer farmers and merchants.
- The quality and the quantity of food become less, which, in view of traditional family relationships, will affect women and children especially.

Flood-control measures reinforce these tendencies. In flood-control project areas many fishing villages are run-down. FAP-12 noted that seventy-five per cent of the fishermen were adversely affected by the projects. Losses of up to seventy-five per cent of the catch were not uncommon (FAP-12, 1992a).

Because the measures proposed in the FAP so far also reinforce these trends it can be concluded that the impact of the FAP on fisheries will lead to a widening of the gap between the rich and the poor.

7.2.3. The situation along the coast

In the coastal region embankment creates improved opportunities for shrimp culture. The so-called shrimplords, rich merchants, have the embankments breached in the dry season to let in salt water, and so force the farmers directly or indirectly to cultivate shrimp. This leads to conflicts between the shrimplords and the farmers whose rice cultivation is threatened. Drinking-water supply, livestock, gardens etc. are affected as well. To be sure, a World Bank study shows that, technically, rice and shrimp cultivation can occur together, but the feasibility of this has not yet been demonstrated in the local context. The FAP pays too little attention to criticism on this point (Rogers et al., 1989; Adnan, 1991a; Boyce, 1990).

7.2.4. *Mitigating and compensating measures*

In FAP documents a number of possible mitigating and compensating measures are mentioned (FAP-20, 1991b; FAP-20, 1992i; FAP-12, 1992a):

- Stimulation of fish farms. In the long run, however, the loss of open-water fishing cannot be made up for in this way, and only the better-situated benefit.
- Rice cultivation and fish farming combined. Obviously, this does not help the landless. In addition, the techniques involved are not suitable for a situation in which tradition and knowledge are lacking, and where rice cultivation (HYV Boro) depends on chemicals.
- Dredging and protecting existing *beels* and *khals* (depressions and lakes).
- Putting out fry. Constraints on the supply of fry enter the picture here. Moreover, the strict regulation needed for this leads to illegal practices or to situations in which the well-to-do profit most.
- Improved management of public fishing waters. In spite of the above, some see genuine possibilities to improve the techniques for catching fish and to mitigate the adverse effects for fishermen.
- Fish-friendly structures, such as adapted sluice gates and fish ladders. The possibilities are being explored, but feasibility is highly doubtful, especially on account of poor maintenance and the operating conflicts that usually attend such measures.

It appears that the results of FAP-17 will be too late for integration in feasibility studies and possible modifications in more explicitly implementation-oriented FAP components. Against this background there is justifiable worry about the effects and the implementation of mitigating and compensating measures as proposed for instance in FAP-20.

7.3. **Conclusions**

The FAP is the first large flood-control programme in Bangladesh which includes the interests of fisheries. Expertise on aquatic fauna and the impact of water works on the fish stock is expanding rapidly. Even so, the impression remains that the effect of flood-control measures on fisheries are underestimated. More insight in the factual harmful effects on fisheries is badly needed, on the one hand because fisheries may have an important bearing on the EIRR of flood-control projects (which usually is not very high to begin with), and on the other hand because the consequences for those whose livelihood depends on fishing are great. Up

to now the FAP seems to accept losses in fisheries. It is true that mitigating and compensating measures have been suggested, but critics correctly assert that their feasibility is low.

The present state of expertise is such that the economic feasibility of the FAP measures is undermined by the effects on fisheries. The poor, who are the target group of the Netherlands cooperation policy, will experience important negative effects of FAP interventions.

In connection with the implementation of the FAP fisheries would benefit especially from:

- postponement of implementation of large-scale technical works, until more is known of the effects and possibly alleviating measures; this will not be attainable prior to 1995;
- determination on the national level and in the FAP of the priority given to fisheries in decision making;
- formulation of precise objectives relative to fisheries;
- further adaptation of measures for controlled flooding to fishery interests;
- continued detailed evaluation of relevant projects implemented to date;
- a stepwise, flexible implementation of projects;
- build-up of an institutional memory.

Chapter 8. Economic aspects of the FAP

8.1. Introduction

If the FAP leads to the implementation of technical constructions very large amounts of money will be spent. Accordingly, proper insight in the economic feasibility and the returns of an investment of this magnitude is of paramount importance.

The economic aspects of the FAP can be considered on three levels: those related to the national economy, the economic feasibility of flood-control projects, and the expected economic impact of the FAP on agrarian households and rural communities.

8.2. Findings

8.2.1. *National-economic aspects*

The damage caused by the floods of 1987 and 1988 was an important incentive to explore possibilities of preventing such disasters. In the UNDP/GOB study direct damage to capital goods in 1988 was estimated to amount to US\$ 1,100 million and the Bangladesh Institute for Development Studies set production losses at US\$ 800 million (Rogers et al., 1989; UNDP/GOB, 1989).

The initial intention of the FAP presupposed significant investments in technical works. Estimates made in the early stage of the FAP range from US\$ 3,500 to 4,000 million for the UNDP/GOB version to US\$ 10,000 million for the French proposals. Actually, the figures were premature since no decision had been taken regarding the future course of the FAP.

In the studies which led to the FAP the large investments are for the most part justified in terms of the assumed benefits which would follow upon damage prevention and agricultural development.

Economic returns

Those first preparatory studies already revealed that the macro-economic returns of investments are doubtful. The French study of 1989 arrived, with the help of unspecified but comprehensive estimates of indirect benefits, at an expected internal rate of return (EIRR) of ten to twelve per cent. This calculation and the later macro-economic model are under heavy criticism from various sides. The UNDP/GOB study (1989) presents a very brief description of the macro-economic costs and benefits. The EIRR is ultimately estimated at seven per cent (UNDP/GOB, 1989).

Indirect effects

According to its advocates the FAP is the motor for the local and national non-agrarian economy. Because security will improve, investments in the infrastructure etc. will increase and so provide employment. Because of this trigger effect, the interests of national security and other things, they say, the FAP need not be judged by strict economic criteria.

Critics question whether this extra growth will actually occur and point out that economic loss will surely result for instance in fisheries and navigation.

The FAP versus investments in other sectors

In the original FAP the stage from 1990 to 1995 was mostly envisaged as a study phase. According to plan, this phase would be followed with five-year periods with the emphasis on implementation. Experiences gained during the current study phase, however, may lead to changes in this timetable. For this reason the nature and the financial scope of the decision which will be taken in 1995 are not yet certain. The decision will be highly important for donor-financed activities in the water sector, since the funds to be allocated are sizable.

The results of the economic feasibility studies carried out so far are not encouraging. In spite of this no initiatives have been taken to apply a thorough macro-economic analysis in order to arrive at adequate economic justification for the anticipated investments. A study by the French organizations CERDI and CCCE (Centre Etudes et Recherches de Développement International and Caisse Centrale de Coopération Economique) is the sole exception (Maurice and Diallo, 1992). It also appears that there is little or no public or internal debate on the EIRR of the FAP. FAP benefits are insufficiently weighed against benefits from investments in other sectors. FAP choices are not compared to alternatives. In almost all cases, objectives such as agricultural improvement and increased public security can be achieved in other ways.

8.2.2. *Economic feasibility of flood-control projects*

Experiences with existing projects

A study by the Operations Evaluation Department of the World Bank of a project supported by the World Bank (Brahmaputra Right Embankment, 225 km) concludes that as a means to raise wet-season agricultural production the project was unfeasible. At the time, the choice for FCD projects could not be based on economic criteria and evaluations of investments in flood control were lacking (Boyce, 1990). In more general terms the study states that

project analysis for flood control projects [in Bangladesh] has increasingly become a formality that has little to do with reality. The imaginative search for acceptable rates of return, retroactive to the decision to transfer resources, has become the job of the project economist.

In one of the studies of the FAP (FAP-12) the economic aspects of comparable past projects were analyzed. Of the seventeen projects studied about half show acceptable economic returns (EIRR more than twelve per cent).^{*} It should be noted, however, that this analysis did not include certain indirect off-site costs in the calculation and, secondly, that only the returns of agriculture and fisheries were considered. The degree of distortion due to the omissions is hard to gauge, but it is unlikely that the results of the FAP-12 study are affected by them in a fundamental way. The conclusions of this review may be summed up as follows:

- a. A brief construction period (four years or less) is an important factor in rendering projects economically attractive.
- b. Small-scale projects of modest design yield the highest economic returns.

The economic feasibility of FAP projects

In cooperation with the POE the FPCO has drawn up guidelines to standardize the financial-economic feasibility studies of the various FAP components. According to these guidelines, project planning and project preparation should include studies of technical, economic, financial, social and institutional feasibility and an assessment of environmental feasibility.

To this end an economic analysis (with EIRR), a financial analysis and a multi-criteria analysis must be carried out.

In the regional studies preliminary feasibility studies are conducted for the identified projects. In the North-Central Regional Study (FAP-3), for example, only a minority of the identified projects proves able to reach the required EIRR (twelve per cent minimum).

^{*}According to the guidelines, the 'opportunity cost of capital' in Bangladesh can be set at twelve per cent (FPCO, 1992b).

Preliminary data from FAP-20 show that the economic returns of this project are almost nil. This does not include the additional construction costs for the technical infrastructure, which turn out to be appreciably higher than anticipated in the planning stage.

Discussion of economic aspects should include the issue of operating costs. Operation and maintenance of the flood-control system and the embankments are crucial for durable protection of the land. The UNDP/GOB *Flood policy study* (1989) assumes that annual operating costs amount to five per cent of the initial investment, which at an investment of US\$ 5,000 million would mean around US\$ 250 million per year. This figure equals that of the estimated average annual flood damage. Moreover, 250 million dollars is many times more than current Bangladeshi expenditure on operation and maintenance. It can be questioned, therefore, whether the GOB can take on this burden. Contributions by interested parties could be used for maintenance. A FAP-20 report (1992e) proposes that water tax, if introduced, be levied by user groups. It is also noted, however, that experience with this in Bangladesh has been less than satisfactory.

8.2.3. *Effects on agriculture*

Agriculture is expected to be the major beneficiary of flood control. There are two kinds of effect on agricultural production:

1. *Reduction of damage to crops.* Existing documents repeatedly indicate that flood-caused crop damage is limited, and that in seasons following extreme inundations the harvest tends to be better than average.

2. *Higher crop returns.* The rise in production would have to come from rice cultivation. The underlying concepts of the FAP are almost exclusively based on water-management needs in rice cultivation. This is in line with national policy, which aims at self-sufficiency in rice.

The primary effect of improved flood control is that traditional rice tends to be replaced with higher-yielding Aman rice in the monsoon. Cropping intensity remains the same.

Feasibility calculations of the various projects prove quite sensitive to the price of rice. Since Bangladesh is close to complete rice self-sufficiency there are uncertainties in this respect.

Because most of the intended technical investments cannot be justified on the basis of rice cultivation alone, it becomes the more important to weigh them against



alternative investments in agricultural development (irrigation, export crops, horticulture). This kind of weighing, however, is not done in the FAP because flood control rather than agricultural policy is the basic principle. At higher levels such weighing does not occur either (see chapter 5).

8.2.4. Effects on fishery

It is generally agreed that flood-control projects have an injurious impact on open-water fisheries. FAP-12 for instance indicates that in some evaluated projects the EIRR became unacceptably low or even negative by reason of fishery losses. This effect is compensated for a small part only through the impulses of flood control for fish farming. Since fish farming is done by richer landowners rather than fishermen or landless people, flood-control projects further inequality of incomes (see chapter 7). "Flood control has provided opportunities for the development of culture fisheries, which are being taken in some areas. However the benefits from these do not go to the disbenefited capture fishermen" (FAP-12, 1992a).

8.2.5. *Effects on other economic sectors*

Although originally economic justification of the FAP was mostly based on increased agricultural production, it is gradually becoming clear that the agro-sector alone does not provide adequate justification for the intended large investments. The costs and benefits of other economic sectors are gaining relevance. However, data concerning the relation between production in the industrial and service sectors and flooding are still scarce.

A study covering all sectors of the Bangladeshi economy (Task Forces, 1991a) offers no data which would suggest that annual flooding is a constraint on industrial production.

8.2.6. *Effects of flood-control measures on damage to infrastructure and housing*

Flood-caused damage to the infrastructure and housing is hard to estimate. In the North-Central Regional Study the average annual damage per household is estimated to be just under 300 Taka (FAP-3, 1992b). Almost half of this is damage to dwellings and infrastructure.*

8.2.7. *Effects on employment*

The effects of flood control on employment are:

1. Construction and maintenance of technical works is usually done in a labour-intensive way. Accordingly, there is a temporary high demand for labour while on a permanent basis a smaller work-force is needed. Income distribution can be controlled, since embankment maintenance is carried out by the authorities.
2. Because of reduced fish catches employment in this sector is receding.
3. Improved water management leads to intensification of agriculture. Especially the larger landowners will need to engage more labour for their crops during the peaks of the seasons. One estimate of the extra labour needed puts this at twenty-five to thirty per cent.
4. To build technical works land has to be appropriated, which renders a number of farmers landless and robs them of their employment and livelihood. Agricul-

*The North-Central region covers some 1.8 million households. Total damage (present average flood damage) was assessed at 532.6 million Taka, distributed as follows: 244.3 million crop damage, 159.3 million damage to households, 96.4 million damage to infrastructure, 32.6 million damage to industry (leaving Dhaka out of consideration, the national industry is proportionally represented in the North-Central region).

tural activities on the wrong side of the embankments will become riskier, and employment will be lost here as well.

8.2.8. *Distribution of project benefits*

Increased employment is mostly occasioned by the need for land labourers. The number of independent farmers and fishermen will decrease. This means that flood-control projects will probably lead to further inequality of incomes (cf. the analysis of FAP-20 in chapter 3). "Whatever the final decision, it is imperative that FAP would be consistent with the distributive justice integrated with economic efficiency" (Task Forces, 1991c:391).

8.3. Conclusions

In the economic debate on the FAP the first issue is the economic feasibility of the intended investments, both on the macro-economic and the individual project levels. A second cause for concern is that the FAP will claim very large amounts of the available funds, for instance to meet the costs of operation and maintenance. Throughout, the discussion is coloured by the great uncertainty accompanying virtually all economic aspects of the FAP.

Concerning macro-economic considerations a first conclusion is that no reliable study has been made of the economic implications of FAP investments on the national level. Various sources suggest that in macro-economic terms the cost-efficiency is doubtful. The required investments and the anticipated returns have not been compared with alternative uses of the funds.

The absence of a formal national-economic weighing is not an isolated instance.* It is a result of the absence of a coordinating mechanism on the national level which could serve as forum for discussion and have a reasonable degree of autonomy to conduct whatever studies are needed.

The lack of a project-transcending analysis which would bring into focus necessary considerations on the national level may indicate that the FAP is primarily viewed as a cluster of projects, rather than as the core of a national flood-control policy.

*The Task Force, too, concluded that in fact more data are badly needed: "It should be inappropriate to undertake any major physical construction in the various regions before adequate inputs from the studies FAP 12, 13, 14, 15, 16, 17, 18 and 19 are available. This calls for the organization and completion of supporting activities before commencing the structural measures" (Task Forces, 1991c).

As to economic justification on project level it is clear that, from its inception, the entire FAP concept was focussed on restricting damage to crops and infrastructure, and on increasing monsoon rice production through improved flood control. The conviction is gradually gaining ground that for the majority of FAP measures this is not enough economic justification. In the near future, therefore, this should lead to closer study of the relations between flood control, farming systems and production in other sectors (industry, services).

Although there are local variations, the costs/benefits ratio of most of the proposed interventions seems lower than aimed at in the FPCO guidelines (EIRR at least twelve per cent). Studies dealing with the assessment of economic damage are conducted in terms of rather global assumptions. Small variations in these assumptions may alter the picture significantly. At present, for example, the impact of flood control on the development of small-scale industries and road transport is unknown. Another example: regularly recurrent flooding impedes investments other than in agriculture, while in the long run these investments may be essential to the creation of employment.

In flood-control projects economic feasibility is no simple matter. As described in section 8.2.2, FAP-12 studies showed that, to render projects economically attractive, constructions should not require a long building period. Moreover, projects that are relatively simple in design and small in scale hold out the promise of better returns. It seems wise, therefore, to grant priority to modest, small-scale projects.

In conclusion it can be said that the economic discussion concerning the FAP is still very unclear. In part this is understandable: the scope of the FAP water works is not definite and much is still uncertain concerning the impact FAP implementation will have. For these reasons the FAP cannot answer critical questions about the priority and returns of the FAP in a satisfactory way. For another part the lack of clarity in the economic discussion is due to the often poor quality of the analyses, the lack of national priorities and the overly small basis of economic analyses, too much oriented to potential agricultural improvement.

Chapter 9. Social issues in the FAP discussion

9.1. Introduction

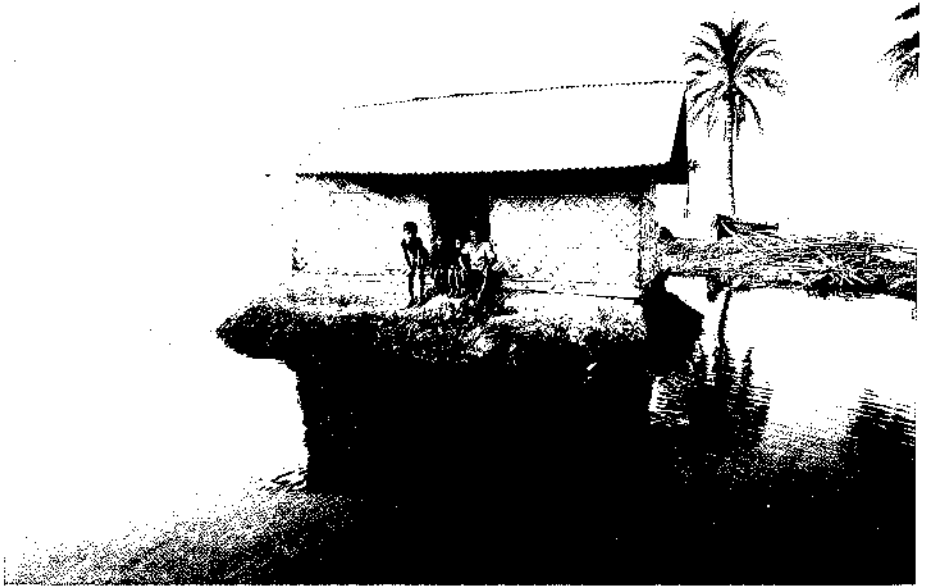
Rural society in Bangladesh is characterized by widespread poverty, unequal property relations and relations of dependence. Bangladesh has a population of 113 million, half of whom live below the poverty line as defined in terms of the minimum daily intake of calories. Education and public-health statistics point to extensive poverty.

Unequal property relations are evident especially in the distribution of landownership. Some fifty per cent of the rural households possesses less than 0.2 ha of land, another twenty per cent owns between 0.2 and 0.4 ha. Landownership of less than 0.4 ha is not enough to keep a family alive; additional income must be found. "One of the points to consider in planning is that in Bangladesh distribution of landownership is worsening and landlessness is on the increase and agricultural land is shrinking in view of the growing population" (Task Forces, 1991c:374).

Regarding relations of dependence in rural areas the Netherlands Country Policy Plan 1992–1995 states: "Bangladesh is a semi-feudal rural society, in which moneylenders, merchants, landowners and bureaucrats skim off the incomes of small producers through corruption and extortionate interest rates, by exacting high prices for inputs and paying low prices for output, and by charging high rents" (DGIS, 1992b:28).

It would be overstating the case, however, to say that the position of the poor is hopeless. Changes are taking place; the power of the rural elite is eroding due to competition among themselves and because employment can be found elsewhere. NGOs are able to reach the poor. Bilateral projects, too, be it laboriously and with great effort, achieve successes in poverty alleviation.

Indeed, Bangladeshi society is not static, as can also be seen in the development of the position of women. In this process poverty plays a central role. Divorce rates are up and men, refusing continued responsibility, leave their household. Accordingly, there is a growing number of female-managed households. Driven



by necessity, women begin to do ‘a man’s job’ outside of the home, and this leads to rapid changes in norms and values: women engage in a far greater variety of jobs than they were able to five years ago—women’s expanding role in agriculture is one example (Kabeer, 1990).

The population growth causes the average size of farms to shrink and the number of small to very small farms to increase. Bangladesh has about 1,100 people per square kilometre of arable land. In three out of the eight regions covered by the North-Central Regional Study more than 75 per cent of the households were functionally landless, i.e. they possessed less than 0.2 ha of land. In Tangail 70 per cent of all households own less than 0.2 ha (Euroconsult, 1992f).

Along the rivers and the coast lie the *kash* lands, which belong to the government and by a law passed in 1987 can be distributed among farmers. Illiterate poor farmers are passed by and the land is monopolized by the larger farmers who turn the others into tenants (IBRD, 1990; Barrett, 1990).

Flood-control projects are intensely relevant for the inhabitants of *chars* and for those whose vocation is fishing. *Chars* are sediment bars in the rivers and along the coast. They are vulnerable to erosion and storms, but are inhabited by the poor if at all possible. Fishermen belong to the marginal groups as well: most of them

are landless; they may have had land in the past, but lost it through erosion or moneylenders.

Netherlands policy

According to the Country Policy Plan for Bangladesh 1989–1992, the extreme poverty of the people was the major motive for assistance. Support in the water sector was intended to increase agricultural production and to raise the agricultural income of the small farmers in particular (DGIS, 1988b). In the country policy plans the landless are counted as target group as well (cf. DGIS, 1992a:19).

9.2. Findings

9.2.1. Popular participation

“The need for a strategy for the development of extensive public awareness programmes including educational plans is long overdue and has not been incorporated as one of the FAP components” (Task Forces, 1991c:374).

It can be said that within the FAP there is a growing recognition of the importance of consulting with social and political representatives. Consultations and conferences do take place but they are inadequate. During the Second Conference on the Flood Action Plan, in March 1992, a number of critical questions was left unanswered and the conference was open to all on paper only. NGOs are right in pointing out that failure to translate crucial FAP documents into Bangla is a telling indication of the low priority given to people’s participation. Moreover, while formally the English-language documents are public domain, in practice certain reports are hard to obtain.

Critics are not given the chance to participate in the FAP. Radical Bangladeshi critics are unlikely to desire this and their objections are so basic that cooperation would probably not be fruitful. But this is certainly not true of all critics.

9.2.2. The population and FAP priority

It is a question whether from the people’s point of view the FAP merits priority. The answer of the critics is negative, because the two main objectives of the FAP (prevention of loss of life and improvement of agriculture) can be realized better in other ways.

Prevention of loss of life could be done far more effectively via better protection against cyclones. The extreme flooding of 1988, when forty-six per cent of Bangladesh was inundated, took 1,500 lives, while the cyclone of April 1991 claimed more than 130,000 victims (FAP-23, 1991a).

Regarding the improvement of agriculture critics say that a more promising approach would be dry-season improvement and floodproofing. According to proponents of the FAP dry-season agriculture and floodproofing will not be a solution in the long term. Population pressure etc. will soon cause current production, adapted to flooding, to reach its limits (cf. box 'Demand-driven approach').

Failure to introduce incisive improvements in the ways of production will injure the poorest groups first. Neither the point of view of the critics nor that of the proponents is based on study.

FAP advocates point out that the entire population—therefore the poor as well—will benefit from prevention of damage to infrastructure, creation of a more reliable climate for development, benefits for the urban poor, employment in construction and maintenance of water works and, in general, a trickle-down effect of the developments. This point of view may well be correct, but it is not (yet) based on facts.

9.2.3. *Attention to target groups*

FAP advocates admit that flood control is a means towards general development rather than a goal in itself. This is a notable shift from recent views in the BWDB and the FPCO, i.e. a shift from a monodisciplinary to a multidisciplinary and integrated concept of water management. Critics feel however that the shift is not radical enough: awareness of water management as instrument of development in general does not yet imply recognition that different groups have different interests.

At the beginning of the FAP questions regarding the benefits for specific population groups were not centre stage. These questions are certainly given attention now. It can be concluded, therefore, that on this point there is indeed progress. On the other hand, from the point of view of Netherlands policy concern with poverty alleviation is still less than it should be.

Attention to target-groups is evident in:

- the fact that some studies were undertaken which feature topics of relevance for special target groups. FAP-12 (FCD/I Agricultural Review) evaluated not only agricultural, economic and environmental effects of existing projects but also their social consequences. FAP-15 (Land Acquisition and Resettlement Study)

The discussion: Demand-driven approach versus project approach

The FAP-20 team discussed the advantages and disadvantages of a project-oriented approach versus a process-oriented approach.

The project approach is based on the argument that the opportunities for expansion of dry-season irrigation are exhausted before the year 2000. Transplanted Aman rice is expected to offer great advantages. For this reason flood-control measures should be implemented now. The task of FAP-20 is to create a compartment, complete with all construction works, to organize operation and maintenance (through people's participation), and to develop guidelines on the basis of the results. Since other FAP projects are waiting for this the work should commence now.

The process-oriented or demand-driven approach says that the insistent efforts to raise the production of monsoon Aman have met with very little success. Since the farmers have opted for Boro it seems most unwise to try to convince them of the possible advantages of monsoon rice. The people of Tangail prefer enhanced drainage before and after the monsoon. Work should therefore be started on drainage improvement. This would mobilize the people and help to begin a process of institutionalization. The importance of monsoon rice may become greater over time and investments in real estate and urban activities will expand. In this way the need for complete protection may arise naturally. The task of FAP-20 is to study all relevant issues, to keep construction options open and to assure that the proper (institutionalization) processes are initiated so that the people and the Bangladeshi government have a chance to involve themselves in the developments. A demand-driven approach would respond better to the dynamics in a given region and the FAP would be better justified from the point of view of various aspects: technically (designs can be modified), economically (no steps are taken until cost-efficiency is assured), socially (gradual establishment of local institutions) and environmentally (less simultaneous large-scale interventions).

Others feel that the argument for the demand-driven approach is rather cheap. This sort of *laissez-faire* fails to offer farmers a perspective on genuine improvement and makes it difficult to gain their support.

researched the issue of resettlements and concluded among other things that the Bangladeshi land registry is hampered by serious shortcomings;

- the significance ascribed to the approach used in FAP-20;
- the plan to formulate guidelines for popular participation;
- the plans for mitigating measures such as improvement of the resettlement procedures;
- the recent appointment to the POE of a sociologist and an anthropologist.

On the negative side, however, are the following points:

- the intention—not carried out yet—to begin pre-feasibility and feasibility studies in a number of regional studies before FAP-20 and FAP-17 have progressed to the point that recommendations can be formulated;
- the justified doubt of critics about the feasibility of certain specific measures. Experiences so far show that compensation for disappropriation of land is a very laborious matter (GOB/IBRD, 1992a). This is recognized in FAP-15 reporting, but the question remains whether the FAP or any other project can solve this problem since the causes are at least partly structural, such as lack of available land and bureaucratic impediments;
- the intended water works open the door to further inequality of incomes. An example from other projects is the manipulation of sluice gates. An example from FAP-20: it appears that especially the rich farmers, who have access to credit, will reap the benefits of agricultural improvements (FAP-20, 1992c);
- the harmful impacts on the environment and fisheries will injure the poorest households most;
- the consequences of technical shortcomings—which, in view of past experiences, are not unlikely to occur—will be felt by the poor first. They live in the most vulnerable areas.

Experiences with poverty-alleviation projects confirm that, to attain positive effects for specific target groups, such projects demand a small-scale and group-specific approach.

9.2.4. *Attention to specific target groups*

Critics usually point to the consequences for those who live on *chars*, for fishermen, and for those who lose their land to water works. They mention landless people (though many of them are fishermen) and women less frequently. FAP-studies admit that fishermen will have difficulties, but are less sensitive to the problems of *char* inhabitants.

If attention to target groups generally is limited it is not surprising that this is true for specific target groups as well. The findings indicating this are as follows:

- In FAP studies the negative consequences for specific target groups are recognized. Even so, the critics seem right to doubt the feasibility of alleviating measures specifically for women, specifically for landless people etc. The lesson of past experiences is that efforts can be undertaken on behalf of specific target groups, but the process is laborious and complex, requiring much input of

- external expertise over a long period. Whether the FAP can be successful in this is doubtful. After all, the FAP is many times larger than the projects that did achieve a modest measure of success regarding target groups. Moreover, these projects, in contrast to the FAP, did pay special attention to this issue.
- Certain relevant topics such as the effects on employment and the consequences for women and landless people are not or insufficiently integrated in the FAP components. FAP-20 does include women as a specific target group but there will probably be little room for follow-up studies.
 - The plight of *char* inhabitants seems underestimated by FAP proponents. The FAP is considering river channelling (cf. chapter 4), which should imply *char* protection. But can the rivers be channelled? The alternative is to locate the embankments far back from the river, which means that a vast group of people—estimates mention millions—will be exposed to higher flooding risks and may have to be resettled. “The BWDB, while constructing embankments in the past could not tackle the problem of land acquisition effectively and efficiently” (Task Forces, 1991c:375).

9.2.5. Popular participation

In FAP circles awareness of the importance of people’s participation is growing. However, critics say, it all depends what ‘participation’ is taken to mean. The FAP is said to think of participation at best as consultation without voice.

Another issue in the debate is whether the people really ascribe priority to construction of embankments. According to the FAP they certainly do. The most extreme critics suggest that the people would rather tear down even the existing embankments. To prove their point they refer to the recurrent instances of illegal breaching. People worry about the proper water level at the proper time. Moreover, whether a person is for or against embankments differs per locality and per group (cf. chapters 4 and 5). In Tangail, for example, a system of ‘open embankments’ is seen as positive rather than negative, while the people of Sirajganj much prefer a strong, continuous embankment.

Regarding the quality of participation as proposed by the FAP the interviews reveal notable improvement (cf. also chapter 3), though it must be said that no attempt whatever is made to delegate actual decision making to the people, witness how things are done in FAP-20 (chapter 3) and the hurry in preparing and implementing water works before FAP-20 is ready.

Significant in this connection is, further, that no proposals have surfaced to require the people to contribute to investments in the water sector. Apart from the matter

of feasibility—it would indeed not be simple—the point is that such proposals would at least show that popular involvement is on the agenda.

The changes up to now are the first rather simple steps towards popular consultation. The next steps, which ultimately must lead to modifications in the technically most attractive solutions and the like, will be far more difficult. They are steps which presuppose an orientation which is not yet generally subscribed to in the BWDB and FPCO. Apart from this there is the matter of feasibility. It seems correct to say that the knowledge needed to do justice to the interests of the various population groups is almost certainly not available prior to 1995 (cf. chapter 3 on FAP-20).

9.2.6. Efficacy of the FAP-studies

Widespread criticism was expressed that the FAP has not sufficiently taken to heart the lessons of the past. This is true for popular participation as well, even though there are countless experiences in this area. FAP-12 and FAP-13 achieve satisfactory results based on evaluations of earlier projects. However, FAP representatives say, projects comparable to the FAP in size and approach have been yielding little in the way of experience with participation. Still, for efforts that are smaller in scope, like the functioning of user-group committees, useful information could have been gained from evaluations of existing projects.

9.2.7. Institutional aspects of participation

There are those who feel that the BWDB and the FPCO are strongly centralized organizations, one-sidedly focused on hydraulic engineering. This is why their suitability to incorporate the wishes of the various parties into planning, implementation and management of flood-control projects is considered limited.

FAP representatives emphasize that there is progress, or at least a series of small improvements. Critics, however, are less optimistic about the potential on this score. It is difficult to gauge the potential for change on the basis of interviews. The literature evinces little enthusiasm concerning the capacity of the BWDB to tackle water management in a multidisciplinary way.

Finally, there appears to be insufficient cooperation between the BWDB and organizations which, in terms of experience or competence, are better equipped to deal with social aspects. Examples are NGOs and LGEDs (local government engineering departments).

9.3. Conclusions

From the point of view of the poor, critics say, the FAP merits no priority. The poorest segment of the population would benefit more from enhanced floodproofing and development of dry-season agriculture. Advocates of the FAP, on the other hand, consider this shortsighted. Given the population growth the traditional, floodproofing-based ways of production will soon have exhausted their potential. Neither proponents nor critics can back their point of view with data.

The question raised, though, is important, and it must be said that the FAP does not convincingly justify its scant attention to alternatives like floodproofing and to measures to improve dry-season agriculture.

It would be wrong to say that issues important to the poor are neglected altogether. There are, for example, procedures for land acquisition and resettlement. It is uncertain, however, whether the proposed measures can be carried out and how much priority they will be given. Experiences in other projects indicate that these measures demand a small-scale approach which is explicitly oriented to target-group interests. The FAP does not yet advocate this. It appears that the larger farmers will benefit most when enhanced flood control leads to increased agricultural production. Attention to the people's interests has grown, but does not yet go far enough.

This is true also for attention to specific population groups: women, *char* inhabitants and open-water fishermen. The effects for these groups are still far from clear. The studies have not (yet) provided insight into the impact on employment in transport, horticulture, fisheries, small-scale industries and the informal sector.

Concern with popular consultation has shown an evident increase, but genuine participation requires that further steps be taken. A kind of participation in which the voice of the people is given greater weight is not yet generally accepted in the FAP.

To determine and do justice to target-group interests a weighing of all relevant factors is needed: fisheries, environmental, economic and technical aspects. So far the planning agenda does not include this.

In FAP-20 the study in participation would have benefited if more use had been made of past experiences, for instance, by reviewing evaluations of earlier projects.

Social aspects have an institutional dimension as well. Experience shows that the BWDB is able to handle social aspects, except that this has been in the context

of small-scale projects. Integration of social aspects in policy making is entirely absent, as is an adequate learning capacity on this point. This means that there is a real danger that the insights of FAP-20 will be lost.

In short, the critique to the effect that the FAP leaves the social dimension out of consideration is one-sided. There certainly are developments which may be called positive. To be sure, the changes are fragile; nevertheless, in the context of Bangladesh reality they constitute a notable shift.

It is true that this shift is far from complete. If in 1995 implementation will indeed commence as planned, the works will probably begin while the impact on the poorer segments of the population are still unclear. If the FAP is intended to lead to an umbrella policy framework in which the people's interest is one of the major principles, then additional time after 1995 is needed for further study.

It is clear that, in terms of poverty alleviation other interventions merit priority. But this is no reason not to support the FAP studies. Many interventions aimed at poverty alleviation imply water management in the long run. To assure the quality of these projects it is important that water-management be embedded in a broader policy framework. Indirectly, then, development of FAP policy is a necessary condition for target-group policy implementation.

Similarly, from the angle of bilateral country policy plans, which call for lasting cooperation with governmental agencies, the fact that there are other priorities is no reason to discontinue cooperation with a given agency.

Chapter 10. Institutional aspects of the Flood Action Plan

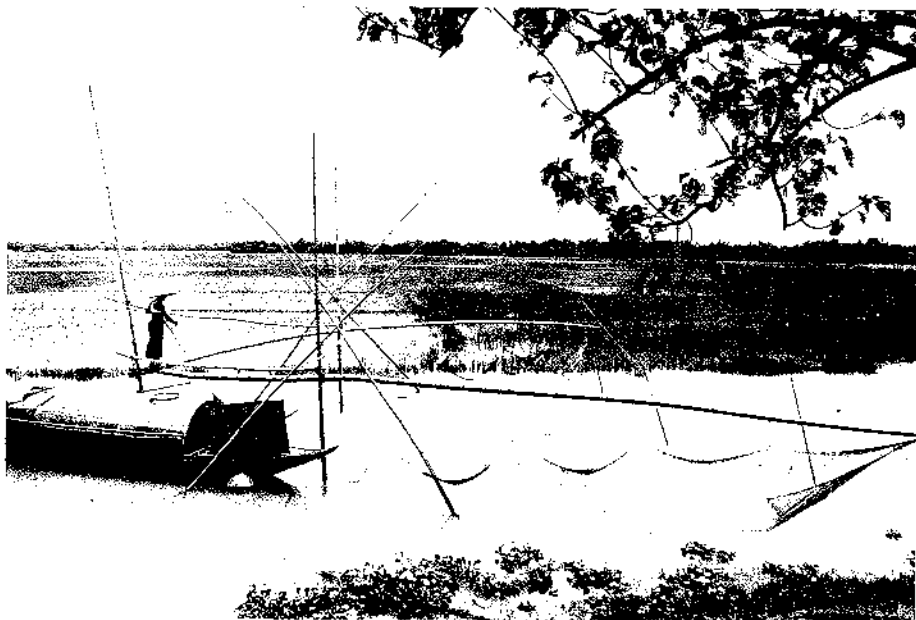
10.1. Introduction

From the start, coordination of the FAP was entrusted to a separate organization, the Flood Action Plan Organization (FPCO). This is a temporary arrangement. The FPCO is supported by a panel of experts (POE), composed of fourteen local and eight foreign experts. Representatives in the POE are not only civil engineers but also agronomists, sociologists, economists, environmental experts and specialists in fishery. The resident coordinator of the World Bank is a member of the FPCO as well. According to the World Bank (GOB/IBRD, 1992a) the FPCO fulfils a positive role in accelerating the bureaucratic procedures of the government of Bangladesh (GOB).

Although the FAP seeks to bring NGOs in, their involvement with the FAP is incidental. The reasons for this are on the one hand a degree of reluctance on the part of the NGOs themselves, and on the other hand the initially closed character of the FAP. Little information was given to outsiders. Currently NGOs do take an interest in the FAP, both actively and critically. The intention is to involve them more fully.

Within the ministry responsible for the FAP a Water Resources Planning Organization (WARPO) was created alongside of the BWDB and the FPCO. The WARPO's tasks are to prepare a national water resources master plan, to assist in formulation of water policy, and to manage data regarding water use. Its mandate is in continuation with the master plan of EP WAPDA and IECO (1960s) and with the Master Plan Organization (created in 1983). Until now, however, the WARPO has not been involved in the FAP.

In the discussion between proponents of the FAP and its critics institutional aspects have always been at issue. Criticism was primarily aimed at the dominating role of the FPCO and the BWDB and the subordinate role of other relevant departments



and ministries. It is presumed that this causes technical aspects of the FAP to predominate.

All parties concerned understand that the institutional aspect is of major importance in thinking about the future of the FAP. In discussions relating to technical, environmental, economic, fishery and social aspects institutional shortcomings are repeatedly felt as a serious impediment.

10.2. Findings

10.2.1. The nature of the FAP

The FAP is not an institution. It is not embedded in a permanent organization with a clear status and mandate. The FPCO is arranged and equipped as a temporary set-up. It is not clear what institutional measures will be taken after 1995. Over the past years the character of the FAP is changing. Originally it was rather blueprint-like in character and oriented to technical works of appreciable size. It was assumed that the period from 1990 to 1995 would mostly be in preparation of an implementing phase which would take at least twenty years. Gradually, however,

certain changes have taken place, prompted, among other things, by criticism in Bangladesh and abroad.

Actually, the FAP is a package of regional studies, supporting studies, pilot projects and priority projects of which it is not at all certain that after 1995 they will be translated into large infrastructural works. Views as to where the FAP will lead are in flux—not formally, and certainly not in the minds of all, but *factually*: the FAP is being seen, not so much as preparatory to implementation but rather as in preparation of a comprehensive policy plan. Those donors who are becoming more critical regarding short-term implementation of large water works are emphasizing the policy-supporting significance of the studies.

10.2.2. Donor coordination

Donors involved with the FAP are the World Bank, the Asian Development Bank, the EC, UNDP, Canada, United Kingdom, Denmark, Finland, France, Germany, Japan, the Netherlands, Sweden, Switzerland and the United States.

Proponents note that in Bangladesh the FAP at last achieved coordination in the water sector, which was badly needed since interventions in the various regions must obviously be in harmony with each other. Opponents reply that donor coordination invites greater donor influence. This is why, they say, the FAP is a BWDB/FPCO/donor-affair, rather than a popular effort; in spite of the possibly disastrous consequences of the plans the people are not informed or consulted. Moreover, there is no consensus among the donors, who emphasize their own favourite topics. Critics further point to the World Bank. Up to now the Bank has used a model in which attention to social and environmental aspects has been marginal.

Essentially, donor coordination may be considered advantageous. It appears that the like-minded group is growing.* Members of this group caution against rushing into implementation. USAID exercised this caution from the start. The attitude of the United Kingdom and Japan is said to alter in the same direction (influenced, among other things, by Japanese environmentalists), although no formal statements about this have been made.

As a secondary advantage of increased donor influence, especially via the POE, mention is made of enhanced accountability. On the other hand, increased donor control should not lead to a situation in which responsibilities are taken over. If a mega-project like the FAP cannot be implemented responsibly it should not be implemented at all. The critics are right when they state that one result of donor

*In this context the like-minded group is a set of donors who agree on a number of issues. In many cases these countries are Denmark, Sweden, Norway, Finland, Canada and the Netherlands.

coordination is that the FAP tends to become a FPCO/donor-affair, and that it reinforces the blueprint character of the FAP. On the other hand, the donors are the ones who urge people's participation.

It is to be expected that there will be less donor coordination once implementation becomes possible of projects which suffer from the shortcomings noted in this report. Donors are not agreed on the right moment to begin implementation. The EC (the EDF) and France seem very keen on early implementation. The view taken by some other donors, the Asian Development Bank for instance, is still unclear.

10.2.3. *Institutional capacities*

Many FAP proponents are aware of gaps in institutional capacities in agencies involved in the FAP. Their general argument is that there is no alternative; it is more effective that the organization with the most experience, dynamism and common ground be allowed to dominate. This is the BWDB. According to critics, the FAP (BWDB, FPCO and POE) is lacking in institutional capacity in three areas:

First, the *institutional structure* of the FAP is inadequate. Critics hold that the POE does not have enough authority regarding fundamental issues in the FAP and that the structure of the BWDB is that of a top-down organization.

Secondly, there is a lack of *accountability*. Experiences with BWDB projects show that in policy and implementation choices quality control is not always a priority. Project supervision is inadequate.

Finally, shortcomings are pointed out in *learning capacity* in the FPCO and the BWDB. Neither is equipped to shoulder a broadly oriented and complex mega-project. The BWDB cannot absorb and retain knowledge; the experiences of the past do not inspire confidence in an adequate future level of planning, design, operation and maintenance. The fact that FAP studies are mostly carried out by foreign consultants (involving Bangladeshi experts too sparingly) is a negative influence on the learning capacity.

Proponents of the FAP, too, think that an adequate institutional structure should be designed. They also urge improvement of an institutionally secured learning capacity in the FAP.

On the basis of the interviews and considering the views of critics and proponents, the following points can be made:

- Institutional capacities in relation to the FAP are sensitive and urgent issues. This view is shared by external critics, consultants, POE members and representatives of donors.
- Concerning the institutional structure all parties are virtually unanimous in saying that the WARPO should take charge of planning, policy, coordination, evaluation and monitoring. The BWDB should retain responsibility for implementation. In view of the WARPO mandate this would seem a logical approach; however, it proved impossible to assess the potential for improvement in WARPO capacities.
- The interviews revealed more concern with learning capacity on the part of both opponents and advocates of the FAP than the literature suggests. This is very important, since if donor coordination shrinks and criticism grows there is a real danger that the FAP will be just one more shelved ambition. It would also mean the loss of data and analyses which could be utilized in other or future plans.

Along with measures to improve the institutional capacity of the FPCO and the BWDB as proposed in a number of FAP studies, strict conditions, pilot projects and monitoring seem important. Moreover, the process requires time and political will. As to the institutional measures on the local level as proposed by FAP-20 (cf. section 3.2.2.) the first signs are that the process is not going smoothly. The proposed solutions in fact demand drastic shifts in power relationships.

10.2.4. *Technical orientation*

FAP proponents admit that the make-up of the FPCO, the BWDB and the POE is too technical, and point out that recently the POE was expanded with experts from the socio-economic disciplines and an ecologist.

Critics assert that to strive for multidisciplinary capacity has little significance, since the interests of the BWDB and the FPCO lie elsewhere and the BWDB will not change easily. Persons involved in target-group oriented projects of the BWDB and some critics state that in the BWDB there surely are opportunities for changes, but it is very difficult to obtain room for target-group oriented interests.

Although one can point to a gradually broader orientation of the FPCO and the BWDB, the required interdisciplinary attitude demands drastic change, as does the enhancement of the institutional capacity of these organizations.

There are clear indications that the POE has insufficient voice in environmental and social issues. In interviews it was mentioned that in the POE the engineers generally have more influence than the members who represent other disciplines. Potentially the POE could surely play a more useful role. Opportunities should be explored to improve the independent status of the panel and to promote its interdisciplinary character.

10.2.5. *The role of NGOs*

In principle the FAP means to involve NGOs on the project level. Critics point out that NGOs lack capacity and that in associating with the FAP they will lose their autonomy.

At present most NGOs are adopting a wait-and-see attitude and there is little in the way of formal ties with the FAP. Some NGOs are among its most outspoken critics. Their critical attitude is explicable in view of their entirely different principles and backgrounds. The BWDB and the FPCO are markedly bureaucratic, closed organizations with a relatively well-developed internal cohesion and *esprit de corps*. NGOs are oriented to their target groups. Next to the organizational difference this implies a vast difference between them regarding assumptions and objectives. Cooperation between NGOs and the FPCO will have to avoid many a pitfall.

Information regarding the FAP is an important problem. The FPCO has been inadequately informative and so helped give rise to erroneous perceptions. The French mega-plans especially have done a lot of damage in this respect. NGOs often are poorly informed about the FAP and have too little access to it. Conversely, NGOs frequently contribute to erroneous or superseded images.

According to Bangladeshi critic Adnan involvement of NGOs in the FAP should start with a phase of information and discussion. Next, a network could be created to exchange information; NGOs could enter the public debate and carry out studies into aspects of participation which are not covered by the FAP (Adnan, 1992b).

Since the FAP is currently under heavy criticism, most of the larger NGOs are not eager to associate themselves with it. In the long run it would enhance the quality of the FAP if critics were involved with it, for instance via an organization operating on behalf of a network of NGOs. That organization would be able to function as independent consultant having the ear of donors or, better, as formal adviser in the FAP, alongside of or as part of the POE.

10.2.6. *Local authorities*

Bangladesh is divided into 460 *thana* (formerly *upazila*). At the local level there is no BWDB staff responsible to the *thana* authorities. The local government engineering departments (LGEDs, established in 1985) provide districts and *thana* with technical assistance. Although it was stipulated in 1985 that the LGEDs would take over responsibility for the operation and maintenance of smaller FCD/I projects, the actual transfer has not yet been made (FAP-13, 1992a).

According to the SRP, the BWDB intends to form Structure Committees. In practice these either do not exist or, if they do, they are dominated by specific interests. The Sluice Committees, too, usually serve local leadership rather than integrated water management. There are no federations of user groups to take care of operation and maintenance. Both the BWDB and the farmers experience the disadvantages of the situation (FAP-20, 1992q).

Local authorities are confronted with the BWDB/FPCO as a strongly centralized and technically oriented organization with political connections on the central level. Locally, there are no technically oriented departments which can counter-balance the BWDB. The role of local government in the FAP, therefore, remains limited.

10.2.7. *The FAP studies*

FAP-26, the institutional development study, is of doubtful value. Its final report was not accepted by the UNDP and GOB, and its recommendations are not FAP policy. Donors could investigate institutional options by evaluating past experiences and results of the FAP studies. Whether a separate study (FAP-26) would influence this process may be questioned because institutional change ultimately depends on political decisions. Most persons interviewed by the mission share the conclusion of the first report of FAP-26, which was rejected by the FPCO, in which involvement of the WARPO was recommended. But they also point to the limited capacities of the WARPO.

10.3. **Conclusions**

Essentially, the donor cooperation can be considered as positive. Care must be taken, however, that it will not strengthen the blueprint character of the FAP.

The measures as proposed by various FAP studies to enhance the institutional capacity of the FPCO and the BWDB will probably not suffice.

As to their technical orientation, the FPCO, BWDB and POE are in a slow process of improvement, although these organizations continue to be oriented too much to technology and to technical aspects of flood control. The FPCO and the BWDB certainly need to become more multidisciplinary, and their learning capacity and accountability should be improved.

At present the attitude of the NGOs is aloof and critical. It would be in the best interests of the quality of the FAP if the NGOs were to be brought in more fully; one of the conditions for this is improvement in the provision of information.

It is not clear what institutional measures will be implemented for the post-1995 period. The FAP will perhaps be more successful if for the time being no effort were made towards implementation, and an in-between phase were used to draw up a general framework for internal institutional development. If this framework were to provide a solid basis, implementation could come next, primarily oriented to non-controversial projects like improved drainage and urban protection. The institutions involved in the FAP should meet the following conditions:

- a. a broadly developmental perspective and capacities for an interdisciplinary and interdepartmental approach to overcome the present predominantly technical orientation;
- b. improved technical capacity, expressed in:
 - an adequate institutional structure and satisfactory procedures regarding planning, coordination, monitoring and evaluation;
 - accountability, in terms of both policy and the use of funds;
 - improved learning capacity, for instance via involvement of Bangladeshi expertise and the creation of an independent, research and training institute in the area of resource management;
- c. involvement of NGOs and local authorities in planning and implementation.

Chapter 11. General conclusions

11.1. Characteristics of the discussion

Discussions concerning the FAP tend to be confusing, for the following reasons:

- Incorrect perceptions. Critics sometimes refer erroneously to the FAP as a plan for water works on the scale of the earlier French proposals. Proponents exaggerate when they picture the FAP as a well-balanced, multidisciplinary approach to flood control.
- Multiple points of view. FAP advocates are focused on technical aspects; environmental, social and fishery aspects must be taken into consideration, but they are secondary issues. To the critics these aspects are major parameters in a water-management strategy.
- Little is known of the effects of (controlled) flooding. All parties agree that 'something must be done'. The population explosion leads to intensification of the use of land and water resources. At the present time it is easier to say what should not be done than to determine long-term needs.
- To this must be added that large interests are at stake. The discussion tends to polarize and the parties concerned entrench themselves. The BWDB, for example, is much concerned with centralized control of nation-wide civil engineering projects. In view of the much-needed multidisciplinary approach it is unavoidable in the long run that other ministries assume joint authority as well.
- Owing to the polarization in the controversy it would seem as if the entire FAP is under critique, although a number of FAP components are far less controversial. Urban protection, cyclone protection and certain aspects of floodproofing are part of the FAP objectives too, and they meet with little criticism.
- There are divergent expectations regarding future scenarios. Those who expect that after 1995 extensive water works will be implemented are talking about another kind of FAP than those who look upon the FAP as a programme of policy and study which will continue its work after 1995.



11.2. FAP objectives

The brunt of the criticism of the FAP concept is directed against its view on development in Bangladesh. The eleven Guiding Principles stress technical aspects in the scenarios for development. The FAP's counter argument is that its approach is flexible. Technical implementation scenarios will be modified in line with results of studies in ecology, fishery, maintenance, land acquisition and social effects. The results of these studies are formulated in project guidelines which are binding for project implementation. The critics, however, are not convinced.

First, critics suspect that the FAP is not genuinely willing to accord sufficient weight to supporting, non-technical studies. Secondly, they question the feasibility of the measures aimed at target-group interests. Thirdly, critics assert that the leading institutions, primarily the FPCO, but in the background the BWDB as well, are insufficiently oriented to an integrated approach to water management.

These last two points seem correct. Many of those associated with the FAP share this concern about the institutional capacity of the FPCO, the BWDB and the WARPO to plan and implement water management in an integrated way. Past

experience with BWDB projects shows that, while target-group oriented projects in water management are not impossible, they are laborious and can achieve small-scale success at best.

The first point of criticism is partly justified. It is true that the FAP's attention to non-technical aspects of water management is not yet convincing. Interviews with a number of FAP associates reveal that attitudes are changing; environmental and social aspects, for example, are receiving more attention than previously. In addition, there is the fact that studies have been undertaken in areas which are important to the poor. On the other hand there are also indications that the FAP is little prepared to let certain supporting studies (environment, fisheries and social aspects) expand and delay implementation of technical works. In any case, it is clear that in the FAP the discussion regarding the relation between technical and other aspects have become a serious topic of concern.

The critique questions the willingness of the FAP to aim at an integrated approach to water management. It may also be asked whether the limited integration is not a consequence of the FAP concept as such. A truly integrated approach to water management would require a more incisive shift, i.e. from multidisciplinary to interdisciplinary analysis, in which the various relevant aspects are studied in their mutual coherence and interaction.

11.3. The FAP studies

The general impression is that the level of the studies, measured in terms of the original objectives, is acceptable. One exception to this are the economic studies. Some studies are exceptionally critical; there are no indications that study results are manipulated by special interest groups to assure quick implementation.

FAP-12 and FAP-13 have yielded a lot of information. FAP-20 has invested much effort and determination in a number of outstanding initiatives which are wholly in line with the Netherlands cooperation assistance policy. Little fault can be found with the quality of the EIA produced by FAP-16. The majority of the reports concerning the regional studies were not available at the time of the field mission.

It is also true that the chapters above repeatedly stated that the studies provide insufficient information. That has to do with the yardstick used. If the objectives of the FAP are the yardstick, and hence environmental, fishery and social aspects are not seen as basic parameters, then the studies can be considered adequate. But from the perspective of a more integrated approach than the one advocated by the FAP the conclusion must be that much additional information is needed.

To give an example: from the present viewpoint of the FAP concept the meaning of the phrase 'attention to the environment' means that thought should be given to mitigating measures *to counteract injurious environmental effects* of flood-control projects. From this angle the EIA is an adequate instrument and thus the FAP-16 study was successful, since it resulted in a qualitatively good EIA. If, on the other hand, 'attention to the environment' is interpreted to mean that environmental considerations must be included *to arrive at the best solution* for water management, then far more information about the environment is necessary. In that case the present studies are inadequate.

11.4. Information and learning capacity

A recurrent topic in the debate on the FAP, often mentioned as a matter of concern by FAP advocates, is the modest institutional capacity to carry out a multidisciplinary, large-scale programme. The technical orientation of the BWDB and FPCO and the question of accountability were discussed above. There are two further points pertinent to institutional capacity. These are the issue of the provision of information and the matter of learning capacity.

Keeping all parties informed about the FAP can contribute to more effective popular consultation. Greater openness and better information is also a first, necessary step towards a more constructive discussion, or better still, towards formal involvement in the FAP on the part of critical NGOs. At the moment there seems to be a stalemate: proponents of the FAP are too quick to shrug off the criticism as unworkable. This generalizing attitude is one reason why the FAP is reluctant to provide information. In a sense, however, the criticism arises from the lack of information. Sometimes the criticism is not to the point, and more openness in the FAP would enable critics to arrive at a more accurate assessment of the advantages and disadvantages of the project.

The learning capacity present in the FAP requires attention as well. 'Learning capacity' here means the ability to incorporate experiences of project implementation and findings of research activities and to translate these into policy and implementation. In the discussion above of certain crucial studies (e.g. FAP-20, see chapter 3) mention was made of useful lessons. These lessons are important not only for development of FAP policy, but also if after 1995 flood control were no longer coordinated via the FAP.

Many critics correctly point out that the FAP has not made sufficient use of past experiences. The FAP has demonstrated a measure of learning capacity—current

thinking has evidently progressed compared to the time that the terms of reference were formulated for the component studies. But the learning capacity is restricted and not institutionally embedded. The system of reporting does not lead to a cumulative build-up of knowledge; the 'project guidelines' into which all lessons are translated so far, are too limited a basis for the retention of relevant information. A further reason to call attention to the learning capacity is that remarkably few Bangladeshi research institutes are involved in the studies. What use will be made of the knowledge gained to date? The question becomes the more urgent in the event that the FAP would be discontinued. It is expected that the BWDB and the WARPO will mostly be interested in technical lessons; notably, involvement with the FAP on the part of the ministries of agriculture and fisheries is very limited.

11.5. FAP orientation to the target groups of Netherlands development policy

In general it can be said that the FAP offers the first framework in the history of flood control in Bangladesh for multidisciplinary considerations in which the sometimes conflicting interests of various segments of the population can be made visible. Implicitly, therefore, the FAP has a target-group orientation. This is an achievement which should not be underestimated. The orientation of the FAP to target-group interests can be clarified in terms of the questions formulated in chapter 1.

1. Does the FAP lead to improved agricultural opportunities for small farmers?

As shown in chapters 5 and 8, this question cannot be answered at this time. There are, however, indications that for agriculture generally, the returns of the FAP will be modest. There is, further, evidence that the returns will appear to be higher if a broader economic analysis, going beyond just agriculture, were to be carried out. It seems doubtful that participation as envisaged will safeguard the interests of small farmers.

2. Does the FAP, assuming that incomes will increase, also lead to improvement in the position of small farmers?

It proved impossible to answer this question at the present time. First FAP-20 must have made more progress in experimenting with institutional solutions for water management. It is not anticipated that sufficient clarity will be achieved by 1995; the expectations are not optimistic.

3. What are the effects of the FAP for the landless, for women and for open-water fishermen?

Once again, no definite answer will be available by 1995, because the indirect effects, such as prevention of damage to the social infrastructure and the effects on employment are not yet clear. It is unlikely that the FAP will become oriented directly to the interests of these specific target-groups. Moreover, the interests of the *char* people continue to be overlooked—how many will ultimately be victimized remains unknown.

4. What are the effects of the FAP on fisheries?

Fisheries will incur the greatest loss if the FAP is implemented. Although in the FAP this aspect is certainly considered, the lack of knowledge makes it impossible to arrive at a genuine solution before or shortly after 1995. At this point two possibilities present themselves: in the worst case reduced fishing potential and its concomitant impact on the poor will simply be accepted; or else, at best, alleviating measures will be sought—and then the question arises whether these will really help the poor.

5. What is the net environmental impact of the FAP?

In 1995 this will still be unknown, due to lack of data. The planned water works may have irreversible effects for the very basis of existence of especially the poorer groups. The EIA is difficult to implement owing to lack of expertise and baseline data. Furthermore, the present EIA procedures probably lead to mitigating proposals only.

The conclusion is that, on the one hand, the interests of the poor are given increased attention in recent planning of water works. On the other hand the target-group orientation of the FAP is not nearly enough to ensure poverty alleviation, which is a major concern in Netherlands development cooperation. The actual impact of the intended FAP interventions for the poor is still shrouded in much uncertainty. This will still be true in 1995. The process of change in the FAP from flood control to water management still has a long way to go.

Appendix I. The Operations Review Unit (IOV)

The Operations Review Unit, better known by its Dutch acronym IOV or *Inspectie Ontwikkelingssamenwerking te Velde*, was established in 1977. The IOV is responsible for conducting external evaluations of Dutch aid policy. Internal evaluations or mid-term evaluations of projects are the responsibility of the operational units, ie the country or programme desks.

The IOV is part of the Directorate General for International Cooperation (DGIS) of the Ministry of Foreign Affairs. It is a completely independent unit which reports directly to the Minister through the Director General. The reports are submitted by the Minister for Development Cooperation to Parliament, and discussed with the Permanent Committee for Development Cooperation with respect to follow-up actions.

Initially, the emphasis was on individual project evaluations. From 1977 up to the mid-1980s the reports were primarily intended for the departmental management. The status of these reports was confidential. During this period about 250 evaluation reports were produced. Gradually a need developed for more general conclusions based on these project findings. In the mid-1980s a number of sector reports were prepared, such as on drinking water, animal husbandry, women in agriculture and rural development, hospital-based health care and primary health care. These reports were made available to the public.

Since then, emphasis has shifted from individual project evaluations to thematic studies. These thematic evaluations are comprehensive; they focus on policies and modalities of implementation and cover entire sectors, themes or programmes. They contain a full review of relevant literature. A comparative study of other donors concerning the same subject matter is usually included.

Duration of these thematic evaluations is one to two years. The studies are carried out under the responsibility of the IOV, with outside experts participating in various

phases of the research. Field studies are undertaken by a special team of independent external consultants. Increasingly, local institutions or experts are invited to participate in these field missions.

The synthesis report, based on the various field and desk studies, is written by the IOV and published under its responsibility. Three to four such studies are published annually. Examples of recent thematic evaluation studies published by the IOV are: small-scale rural industry, women and industry, support to small-scale projects on the Antilles, regional development in Aceh, Indonesia, and the Western Province, Zambia, contracting-out, import support, export transactions relevant to development and food aid.

A reference group consisting of external experts and DGIS staff is appointed for every study. The reference group has three functions: to advise on methodology and approach, on relevant development theories, and feedback.

Appendix II. Organization of the inquiry

1. Inventory phase

During the last quarter of 1992, from September to December, a large number of persons were interviewed for orientational purposes. Discussion partners included both FAP associates and critics such as representatives of the consultancies and research bureaus Euroconsult (Arnhem), Waterloopkundig Laboratorium (Delft) and Resource Analysis (Delft), members of the Panel of Experts (POE), the International Institute of Environment and Development (IIED, London) and the Bangladesh People's Solidarity Centre (Amsterdam).

2. Desk studies

From October 1992 through March 1993 time was devoted to the study of files, (preliminary) FAP reports and critical articles and publications. This study was conducted by:

J.F.K. Jungheim (University of Utrecht)
Ms R. van der Sijp (Matrix Consultants)
A.S. van Riessen (Nedworc)

The literature study resulted in the preparation of two component-studies, with the status of preliminary notes:

R. van der Sijp, 'Notes on institutional, social and economic aspects of the Bangladesh action plan for flood control';
A.S. van Riessen, 'Notes on flood control, drainage, irrigation, agriculture, fisheries and environment'.

These notes were completed in December 1992; the remaining desk studies did not lead to separate component-studies.

3. External advice

Comments on the above notes were received from the following advisers:

H. Brammer, MSc. (Panel of Experts)
P. Custers (Bangladesh People's Solidarity Centre)
D.B. Dalal Clayton (IIED, Londen)
J. Dempster, MSc. (Panel of Experts)
W.F.T. van Ellen (Panel of Experts)
A. Jenkins, MSc.
S. Jones, MSc. (Panel of Experts)
F.G. Koch (Waterloopkundig Laboratorium)
R. Koudstaal (Resource Analysis)
J. van der Laan
J.C.P. Prins
G. Spreeuwenberg
H. Visser (Euroconsult)
A. Volker
K. de Wilde (CDP)

The study was counselled by a reference group, consisting of independent experts and DGIS staff members (as observers) involved in the assessment of matters pertaining to the FAP.

Members of the reference group:

Ms I. Dankelman
J. Loschacoff
P.H. Streefland
K. Zijdeveld

Observers in the reference group:

Ms E.H. Jordans (DST/VR)
L.F. Noort (DST/TA)
Ms K.P. Roelofs (DAL/ZO)
Ms A. Wevers (DST/ML)

4. Field study

During the period of the desk study (which was also partly in preparation of the field mission, the posing of the problem and the final reporting) there were consultations between the coordinator of the evaluation study, A.P.R. Visser, and the mission leader, E.W. Hommes.

The field mission in Bangladesh was carried out by:

E.W. Hommes (mission leader)
J.F. Agema
R.A. van de Putte
A.P.R. Visser
P. Wit

In the Netherlands the mission had discussions in preparation of the field study with:

D.R. Frans
E.G. Koch
T. Jansen
Ms K.P. Roelofs

In Bangladesh discussions were held with:

Major General (Retd.) M. Majid-ul Haq (Minister of Agriculture, Irrigation, Water Development and Flood Control)

FPCO and POE:

M.H. Siddiqui (FPCO)
M.N. Huda (FPCO)
Q. Shahabuddin (FPCO/BIDS)
J. Chowdhury (FPCO/POE)
D. Deppert (POE)
S.M. Kamal (FPCO/POE)
A. Nishat (POE)
K.M. Rahman (FPCO/POE)

BWDB:

A.H. Khan (Ex. Chairman, BWDB)
A. Quassem (BWDB)

A. Salam (BWDB, Central Zone Office)
M.A. Razzak (BWDB)

Representatives of other Bangladeshi governmental agencies:

R. Ahmed (Department of Environment)
A.M. Shawkat Ali (Ministry of Post & Communication)
D. Hafiz (Department of Environment)
N. Islam (Directorate of Fisheries)

BIDS:

A. Abdullah
M.A. Asaduzzaman
D. Bhattacharya
R. Sobhan

Other projects:

C. Blok (EIP)
A. Datta (LRP)
Ms Duyne (SRP)
L. van 't Leven (SRP)
P. Zijderveld (EIP)

FAP projects:

T.R. Franks (FAP-2)
H.D. Wicbe (FAP-6)
P.M. Thompson (FAP-13)
S. Hashed (FAP-14)
S. Hirst (FAP-16)
M. Huq (FAP-16)
M. Smith (FAP-17)
M. Thomas (FAP-17)
G.T.K. Pitman (ISPAN)

FAP-20:

M.O. Rahman (project director)
H. Visser (team leader)
T.P. Begum, D.R. Frans, T. Nabi (sociologists)
G. Kibria, E. Hamel, M. Rahman (civil engineers)
R. Islam, A. Ali (agronomists)

G.N. Alam (fishery expert)
M. Mohsin (management expert)

Donors:

A. van den Abeele (French Embassy)
Q.K. Ahmed (Bangladesh Unnuayan Parishad)
D.C. Anderson (USAID)
Ms S.C. Breault (Canadian High Commission)
Ms Pcony Chowdhury (USAID)
P.E. Christensen (DANIDA)
B. Curry (Rockefeller Foundation)
B. Diphoom (Netherlands Embassy)
Ambassador and Counsellor (NL)
M. Goldring (OXFAM)
K.A. Hafiz (UNDP)
G. van der Linden (ADB)
R. Offenhysser (Ford Foundation)
H. Potter (ODA)
S.A. Rana (World Bank)
G. Thiedemann (German Embassy)
W. Tick (EC)
K. Yamakawa (JICA)
J.M. de Waard (Netherlands Embassy)

Bangladesh NGOs:

Environment Coalition Group, ADAB
Kazi Faruque Ahmed (Proshika)
Ms Khushi Kabir (Nijera Kori)
Harun-ur-Rashid (CDL)

Others:

S. Adnan (RAS)
Ms Th. Blanchet (anthropologist)
A.M. Choudhury (IUCN)
A.T.M. Shamsul Huda (Krishi Bank)
Hamidul Huq (Unnayan Shohojogy Team)
S. Huq (Centre for Advanced Studies)
M.H. Dulu (Jamuna Integrated Development Project)
G. Klaassen (Waterloopkundig Laboratorium)

5. Reporting

The findings of the field mission were complemented with information gathered via the desk studies by:

A.S. van Riessen

J.F.K. Jungheim

J.C.P. Prins

In addition, these experts, together with the coordinator A.P.R. Visser, produced the summary, the appendices and some general chapters of the evaluation report.

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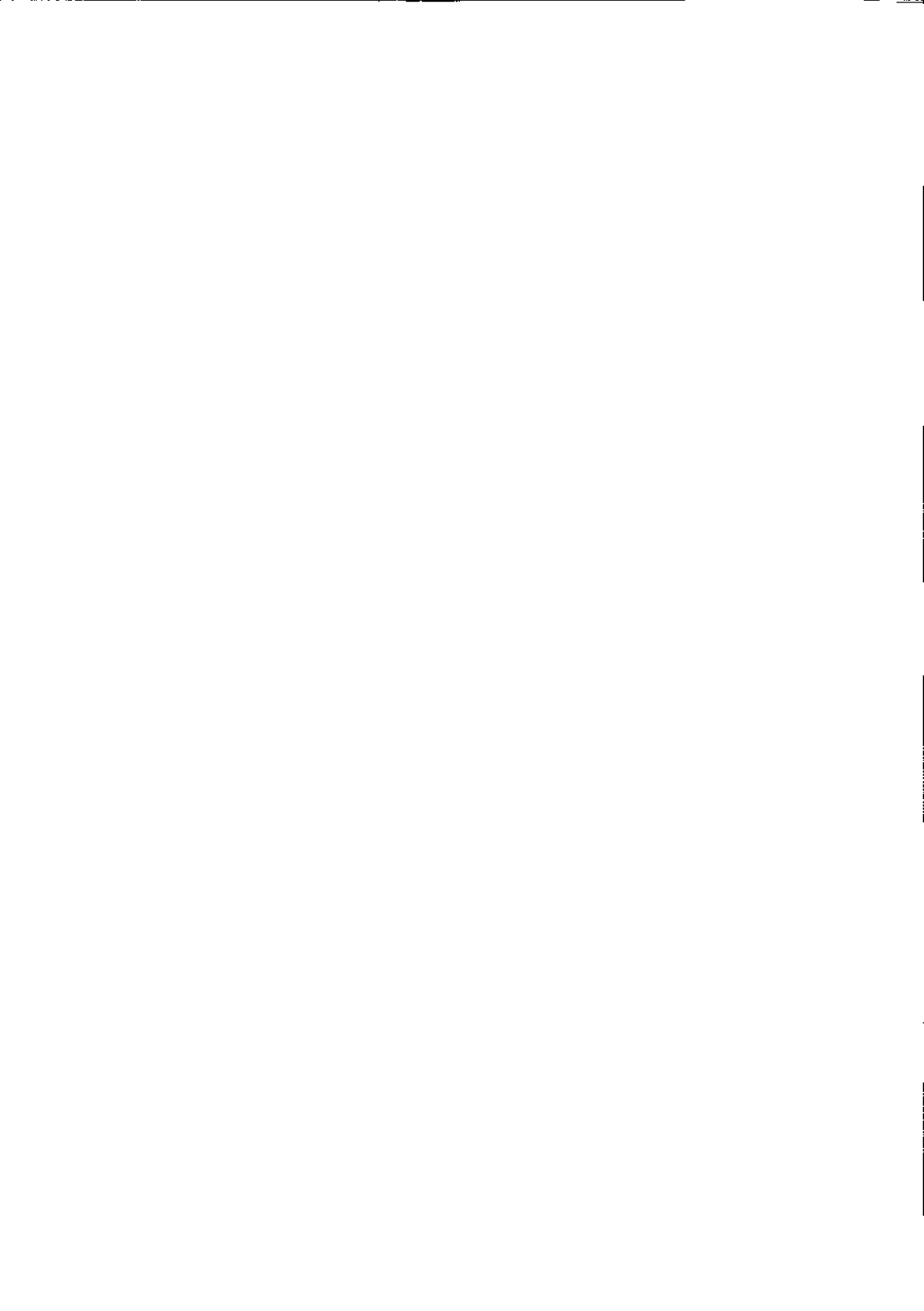
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