# Bangladesh: Erosion Protection Test Programme at the Jamuna River

**Ex-post Evaluation Report**

| | | |
|---|---|---|
| **OECD sector** | 41050/Flood prevention/control | |
| **BMZ project number** | 1993 65 164 | |
| **Lead executing agency:** | Bangladesh Water Development Board (BWDB); Water Resources Planning Organisation (WARPO) | |
| **Consultant** | JV Beller (Rhein-Ruhr Ingenieure), Compagnie Nationale du Rhône, Prof. Lackner & Partners, Delft Hydraulics | |
| **Year of ex-post evaluation report** | **2008** | |
| | **Project appraisal (planned)** | **Ex-post evaluation report (actual)** |
| **Start of implementation** | 3rd quarter 1993 | 3rd quarter 1993 |
| **Period of implementation** | 5.5 years | 8.5 years |
| **Investment costs** | EUR 32.2 million | EUR 37.2 million |
| **Counterpart contribution** | | EUR 5.0 million |
| **Finance, of which FC funds** | EUR 19.1 million | EUR 19.1 million |
| **Other institutions/donors involved** | French Development Agency (AfD) | French Development Agency (AfD) |
| **Performance rating** | 4 | |
| **• Relevance** | 4 | |
| **• Effectiveness** | 4 | |
| **• Efficiency** | 4 | |
| **• Impact** | 5 | |
| **• Sustainability** | 4 | |

## Brief Description, Overall Objective and Programme Objectives with Indicators

The programme comprised 2 out of a total of 26 components of the Flood Action Plan (FAP) drafted in 1989. In response to the extreme flood incidents in 1987/1988 that incurred the heaviest ever damage to basic economic and social infrastructure, considerable harvest losses and the highest death toll on record, the aim of FAP was to sound out the technical feasibility, the economic viability, the environmental impacts and institutional aspects of comprehensive flood prevention and control and integrated water management. The first programme component consisted in developing and testing new bank protection measures, such as groynes and revetments (FAP 21). The second component involved checking the feasibility of regulatory measures for bank stabilisation by simple means (FAP 22). The original programme objective was to draft a set of tried and tested guidelines for the cost-effective design, planning, execution and maintenance of erosion protection measures on riverbanks. The intention was to raise the effectiveness and efficiency of future erosion protection measures. No indicator was defined for the programme objective.

The overall objective was to contribute to reducing the loss of infrastructure facilities and farmland (ancillary indicator: Use of the tested guidelines by the Bangladesh Water Development Board (BWDB) as the competent water engineering authority for future measures in bank protection).

The programme measures comprised planning and constructing erosion protection works as well as advisory inputs, including baseline studies and monitoring the operations and efficiency of the installations over several years. Moreover, as programme executing agency, BWDB was assisted in different areas as part of FC- financed personnel support (including strengthening monitoring capacity; improved assessment of potential erosion; training in cost-effective protective measures for riverbanks and adequate maintenance of bank protection structures).

## Programme Design/Major Deviations from Original Planning and Main Causes

FAP 21 at the Jamuna River consisted of 3 test projects, 1 test works for bank protection with open groynes using different piles with different spacing and permeability as well as 2 test works with various materials for stabilising embankments. Over several years of flooding, the erosion protection constructions built in FAP 21 have proved that they are capable of providing lasting protection with appropriate servicing and maintenance. Another outcome was the successful testing of an appropriate monitoring and evaluation method for erosion and silting up under water. This method enables the adequate ongoing upkeep of erosion protection measures, also under the difficult conditions at the Jamuna.

The 3 FAP 21 test structures still discharge their tasks, can be put to appropriate use for protection purposes and have proved effective till now. The test installations are in full use, primarily during floods in the rainy season, are in good, operational condition for the most part and have not required any major repair measures by BWDB since their completion.

The bank protection and embankment stabilization approaches tried out in FAP 21 have, however, not been adopted in practice and have not been broadly disseminated. This adverse assessment applies in full to the new approach of open groynes for bank protection, which has not been replicated up to now, partly due to the very high specific investment costs. The newly developed methods for embankment stabilisation were adopted to a limited extent as an approach, but their practical implementation called for new, costly research work, particularly with a view to the substantial reduction of specific investment costs.

In the FAP 22 component, simple practical trials (small earth dams, plain wood and bamboo structures, floating elements) were carried out to influence the course of the Jamuna River at two sites. As a result of various technical difficulties in operating these test installations, it became evident that the anticipated outcome could not be achieved under the prevalent local river engineering and socio-cultural conditions. The trials were then terminated by the executing agency in 1998 with our consent without further outcomes, so that no subsequent practical implementation took place.

The entire programme implementation was in the hands of the executive consultant, Jamuna Test Works Consultants, a Franco-German-Dutch team headed by the Rhein-Ruhr Ingenieur-Gesellschaft mbH (subsequently Beller-Consult), in cooperation with various local service providers. Owing to the considerable deficits in the Flood Plan Coordination Organization (FPCO) initially in charge as the formal executing agency and its provisional status, the consultant was already commissioned at programme start to plan and carry out the whole programme largely on its own, including erecting the test works. This helped to keep actual contingency costs within the budget and limit delays, despite the technical and political difficulties that arose. The main reasons for prolonging the implementation period by approx. 3 years were the unplanned installation of additional test works using residual funds and the considerable extension of the monitoring period for the test constructions.

## Key Results of Impact Analysis and Performance Rating

Due to the pilot function of the programme and its clear emphasis on research and development, no detailed analyses of the financial and economic programme returns were carried out as a part of appraisal or at ex-post evaluation. The primary socio-economic results at local level are the full protection of the inhabitants in the test works catchment area against threat to life and loss of economic infrastructure as well as harvests due to heavy flooding. The recruitment of landless women as temporary labour for constructing the test works contributed to raising income. Conserving farmland as a source of employment and income assures rural subsistence for the inhabitants in the protected areas. For lack of empirical data on programme results or the migration alternative, however, possible net beneficial impacts on employment and poverty cannot be assessed.

The main benefits of bank protection measures at the Jamuna River and similar rivers consist in preventing the loss of ecologically valuable wetlands on the floodland with its generally rich biodiversity. This is important for ecological reasons but equally so for safeguarding food security for the rural population. No adverse environmental impacts were recorded during the construction and test period.

For the most part, the technical or natural risk events identified at project appraisal (e.g. silting up of test sites, damage or destruction due to excessive or insufficient pressure on the installations as a result of too few flooding incidents over several years, etc.) have not taken place. However, the assessment of the risk to programme significance and sustainability, which was already rated as considerable on appraisal, proved warranted, as investments in erosion protection measures have diminished substantially since programme implementation. At present, the public investment programme in Bangladesh does not attach any high priority to the widespread application of methods developed and tested by the programme. Commitments by the donors and the Bangladeshi government fell far short of the estimates at project appraisal. This poses a high risk for financing the maintenance costs of the installations built.

Periodically recurrent flooding incidents at the Jamuna and other big rivers in Bangladesh continue to pose a serious problem and cause considerable individual and economic damage. However, after completion of the first 5-year phase of FAP, the Bangladeshi government and the majority of donors gradually altered sector policy in flood prevention and control. Extensive, largely physical construction measures were no longer viewed as a suitable remedy for these difficulties, also partly due to the high costs and environmental misgivings. In hindsight then, the relevance of the programme must rate as insufficient (Subrating 4).

The programme objective of drafting a set of guidelines for the low-cost design, planning, execution and maintenance of erosion protection measures on riverbanks was achieved, although there are considerable grounds to doubt cost effectiveness. This result, however, was ultimately only intended to raise the effectiveness and efficiency of future erosion protection measures. As due to the changes in sector policy and new priorities in bank protection and erosion prevention BWDB has put the tested guidelines to very little use, if at all, these benefits have not taken effect. The effectiveness of the programme measures can therefore only be gauged as insufficient (Subrating 4).

It is also difficult to assess the efficiency of the measures conducted, because the test programme was specific to a country and/or location, lacking either a national or international frame of reference. In retrospect, it is hardly possible to assess whether the programme design should have been amended in response to the changes in sector-policy erosion prevention priorities at the end of 1995 after completion of FAP, since it was already apparent at this time that the erosion protection methods developed would have little chance of wide application. Since the methods developed have hardly been used for planning and implementing new projects, we judge the efficiency of the programme to be ultimately insufficient (Subrating 4).

Very little contribution was made to reducing the loss of infrastructure capacity and farmland in the proximity of the test works but the overall objective of the programme i. e. the intended more extensive application did not take place. The developed and/or tested methods have still hardly been used at all in the practical implementation of erosion protection measures. The programme impacts can therefore be rated as clearly insufficient (Subrating 5).

In future also, the executing agency can hardly be expected to apply the tested and developed methods, so that there will be no subsequent beneficial impacts on the effectiveness and efficiency of erosion protection measures as anticipated. Partly due to insufficient ongoing maintenance by the executing agency to date and the still unsettled legal issues of operational responsibility, the technical sustainability of the test works is in serious jeopardy. The sustainability of the programme is therefore judged as insufficient (Subrating 4).

Weighing up the above criteria, we gauge the programme’s developmental efficacy as insufficient overall (Rating 4).

## General Conclusions

The programme was an atypical pilot measure by FC standards with a marked research and development focus and it was tailored to the very specific local conditions prevailing in Bangladesh and/or at the Jamuna River. Similar FC projects are not in current implementation and are hardly likely to be included in FC assistance in future. Despite the very special character of this test programme, experience gained in planning and implementation shows that these kinds of complex integrated water re-

source management projects call for very close and active monitoring of sectoral-policy and strategic developments and a firm commitment to ensuring coordination with other bilateral and multilateral donors. This is the only way to be able to respond adaptably, appropriately and promptly to basic changes in sector policy with suitable alterations in programme design.

**Notes on the methods used to evaluate project success (project rating)**

Projects are evaluated on a six-point scale, the criteria being relevance, effectiveness (outcome), "overarching developmental impact" and efficiency. The ratings are also used to arrive at a final assessment of a project's overall developmental efficacy. The scale is as follows:

1 Very good rating that clearly exceeds expectations

2 Good rating fully in line with expectations and without any significant shortcomings

3 Satisfactory rating – project falls short of expectations but the positive results dominate

4 Unsatisfactory rating – significantly below expectations, with negative results dominating despite discernible positive results

5 Clearly inadequate rating – despite some positive partial results the negative results clearly dominate

6 The project has no positive results or the situation has actually deteriorated

A rating of 1 to 3 is a positive assessment and indicates a successful project while a rating of 4 to 6 is a negative assessment and indicates a project which has no sufficiently positive results.
Sustainability is evaluated according to the following four-point scale:

Sustainability level 1 (very good sustainability)

The developmental efficacy of the project (positive to date) is very likely to continue undiminished or even increase.

Sustainability level 2 (good sustainability)

The developmental efficacy of the project (positive to date) is very likely to decline only minimally but remain positive overall. (This is what can normally be expected.)

Sustainability level 3 (satisfactory sustainability)

The developmental efficacy of the project (positive to date) is very likely to decline significantly but remain positive overall. This rating is also assigned if the sustainability of a project is considered inadequate up to the time of the ex post evaluation but is very likely to evolve positively so that the project will ultimately achieve positive developmental efficacy.

Sustainability level 4 (inadequate sustainability)

The developmental efficacy of the project is inadequate up to the time of the ex post evaluation and an improvement is very unlikely. This rating is also assigned if the sustainability that has been positively evaluated to date is very likely to deteriorate severely and no longer meet the level 3 criteria.

The overall rating on the six-point scale is compiled from a weighting of all five individual criteria as appropriate to the project in question. A rating of 1 to 3 indicates a "successful" project while a rating of 4 to 6 indicates an "unsuccessful" project. In using (with a project-specific weighting) the five key factors to form a overall rating, it should be noted that a project can generally only be considered developmentally "successful" if the achievement of the project objective ("effectiveness"), the impact on the overall objective ("overarching developmental impact") and the sustainability are considered at least "satisfactory" (rating 3).