

Coping with hostile environment

A tale of coastal water project

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OVER the last four decades, the cluster of 123 polders has been constructed, primarily to support agriculture and provide protection to life and properties of the inhabitants during cyclone. The polders, consisting of about 5,000 km embankment, 6000 km drainage channel, 2500 water control structures, in association with 1,845 multipurpose cyclone shelters and cyclone warning system, provide protection against daily tidal inundation to farms of crops, fish and salt. The polder system, where in good shape, during cyclone and tidal surges, minimises the damaging impact on the life and property over an area of about 14,000 square kilometres. As many as 59 cyclones hit the coast in the last two centuries. The cyclone occurred on the

29-30 April, 1991 caused about 140,000 deaths and severe damages throughout the eastern coast of the Bay of Bengal. After 1991 cyclone the government with the assistance of the World Bank, European Commission (EC) and Saudi Fund for Development undertook a massive programme for rehabilitation and reconstruction of 21 polders. The project while in implementation in 1997 another severe cyclone and storm surge occurred on May 19. Although no damages to life was caused but it damaged embankments and structures in many of the polders as those were inadequately maintained.

The objectives of the project were to: (a) provide improved cyclone protection, including personal security, protection of infrastructure and minimising crop and livestock losses; (b)

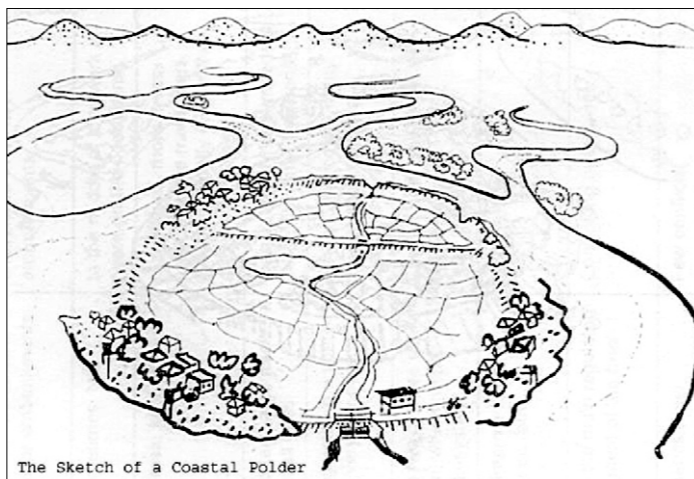
increase agricultural production through reduced saline inundation; and (c) support introduction of improved technology for the design and construction of protection work, and improved methods of embankment maintenance. Community forestry for cyclone protection and embankment maintenance would have additional benefits in employment generation, environmental improvement, and increased output of timber and other forestry products.

The project principally included the components of (a) rehabilitation and improvements to a dozen sea-facing embankments, (b) minor rehabilitation and improvements to the non-coastal sections of the polders; (c) afforestation of embankment slopes and a strip of 50 to 200 meters of foreshore to reduce cyclone damage and embankment maintenance costs; (d) improved (Operation & Maintenance) O&M of all polders; (e) a programme for compensation, rehabilitation and resettlement of people displaced by the project; (f) environmental monitoring and provision for appropriate mitigating measures; (g) studies to investigate the possibility of cost-effective protection works; (h) technical assistance for implementation support and (i) training of staff of Implementing Agency (IA) and participating NGOs, and for community participants. Further, this project includes community development to enable NGOs to implement poverty alleviation activities complementary to the project.

IA with considerable assistance from the project consultant was responsible for implementation. NGOs were also involved in the afforestation component including training and community participation aspect of the project. Project coordinating committee was established in each participating district to review progress and ensure coordination at the regional level. The Project Steering Committee was also established to overview the project implementation and ensure inter-ministerial co-ordination. The World Bank regularly reviewed the project implementation by fielding its mission at regular interval and EC monitored the project implementation process on yearly basis by deployment of its consultant.

The major physical works completed include reconstruction/rehabilitation of 120 km embankment, 13 km protection work, 43 nos hydraulic structures, 875 ha. afforestation and other non-structural components at a cost of about 500 crore taka. Generally, the project has had positive impacts on agriculture. It is unlikely that the project will have adverse impacts on open water fisheries since its embankments do not close up major or medium rivers, which are the main routes for migration of fish to the spawning grounds in the flood plains. The plantation programme is also enhancing the general physical environment of the area in addition to providing a source of income to the poor families.

The Resettlement Action Plan (RAP) was in place for implementation of the project. The RAP formal-



ities were implemented by Project Management and Resettlement Unit (PMRU) with assistance from Resettlement Consultant (RC) and NGOs. Accountability and transparency in RAP implementation were strengthened by good local level consultation, and effective information campaign and a grievance redress procedure.

Toe erosion is an initial indicator towards non-sustainability of the embankments. One of the reasons for toe erosion is close proximity of the embankment to the sea or river so that high tide water can reach up to the toe and erode it gradually. To stop the toe erosion, the conventional engineering approach is to use heavy concrete blocks and stones, but this has been found to be expensive. In this project, trials have been made in a few polders with various engineering approaches that would be more cost effective. Innovation and departure from traditional engineering practices triggered disinterest amongst the pivotal actors and key partners. The comparatively more aggressive hydrodynamics of the estuary and the coast of Bangladesh is not compatible to softer solutions to coastal erosion ubiquitously. Location specific softer solutions to embankment toe erosion with improved designs derived from engineering of the hydraulic parameters anchored by non-engineering components such as afforestation, community participation and awareness growing were found indicative to be effective and sustainable.

The project supported training of staff of IA, participating NGOs, and community participants. All this training has helped the IA staff more towards a process of participatory management in the polder systems in association with the

vegetables, timber, and fuel wood. Benefits in human lives to be saved are impossible to quantify. However, it is estimated that about 140,000 people were killed in the project area during the 1991 cyclone. The embankments would help save lives during future cyclones. Although overtopping could still occur after the construction of the new embankments, the flooding of the polders would be slowed and reduced. The massive sudden flooding of 1991, which happened due to breaches in the embankments or missing sections, would not happen in the present situation. Delayed flooding would give more time for the people to escape to safer areas or cyclone shelters.

However, the project narrowly focused on the reconstruction and rehabilitation of the coastal structures with truly no regard to water resources management inside the polders. Internal water resources management component could further heighten optimising agricultural production. A composite design of the Coastal Embankment System incorporating the engineering and non-engineering issues seemingly is a step-forward solution to the ubiquitous erosion problem. Re-settlement eased the implementing impediments. The project implementation could have been further delayed without the Resettlement Action Plan. Afforestation has demonstrated to be an integral part of the coastal embankment system, coastal livelihood and coastal environment. Lessons learned is that GO must shift from its present position as builder to work more as partner with firstly, NGOs and then with the community for achieving the project objectives. A legal coverage to contracting between the IA and the community based groups is essential for shielding its right. It will be providential while the portion of community involvement in place shall be institutionally integrated with coastal waters designed to deflate poverty. The shift in attitudinal behaviour of the IA and its staff may be taken as a starting point for future water resources planning and management of the coastal zone and advocates to be pursued further. IA's commitment to further pursue the experimentation and monitoring in more orderly manner is expected to yield better results. The full-scale application of the future version of the trials would greatly reduce the recurring operation and maintenance costs of the landward coastal embankment system, in particular. The emerging softer solutions to coastal erosion in Bangladesh has acquired cognisance and opened slot for water professionals to shrink the knowledge gap.

Despite overall satisfactory progress in polder rehabilitation and afforestation, the O&M aspects are still lagging in terms of planning and constrained by inadequate GoB budget provision. The sustainability of the rehabilitated polders will be at risk if current initiatives to introduce improved O&M procedures involving users' communities are not continued and GoB budget does not make provisions for necessary funds. The polder database based on GIS

(Geographic Information System) for a sustainable O&M is available, but future users are yet to be fully trained for use and updates. The Operation & Maintenance component appears to have been relegated. Political and institutional support from national to local level has always been in favour of rehabilitation instead of preventive maintenance. The financing mechanism and payment modalities were too weak and in cases inadequate to fully support the community based aspect. NGOs' withdrawal from the project's activities will create an institutional support vacuum which is feared by community based groups. The project's sustainability is apparently seriously deficient. Future rehabilita-

tion and re-construction project needs long-term equation with the extremely dynamic morphological characteristics of the coast bearing in mind the permissible permeability of resources through the porous project for its sustainability. Approach to rehabilitating a coastal water project seemingly thus necessitates reversing by mounting forward the thrust on non-engineering dimensions in tandem with the engineering aspects.

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