Environmental and Social Impact Assessment

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The EIA-SIA study of the KJDRP was part of the effort to come up with a long-term resolution to the drainage congestion problem in the project area

In 1995, GoB with financial support from ADB initiated the Khulna-Jessore Drainage Rehabilitation Project (KJDRP) to find a more permanent relief to the suffering of the local people. In 1997, EGIS was approached by the Ministry of Water Resources for an independent Environmental and Social Impact Assessment Study (EIA/SIA) of the project.

The KJDRP is located in the southwestern part of Bangladesh and comprises parts of Khulna and Jessore districts. The total project area is 127,800 hectares with a population of 1.1 million (1997 estimate). The EIA/SIA study area extended about 120 km south towards the Bay of Bengal, encompassing the Mongla Port area and the Sundarbans mangrove forest.

In the first months of the study, the concept of a tidal basin was elaborated through intensive consultation with local people and NGOs as an alternative to the regulator approach (at Shibnagar or at Madhukhali). Two tidal basin options were incorporated: the Kedaria Tidal Basin (KTB) at the upstream end of the Hari River and the Tidal Basin Management (TBM) along the Upper Bhadra River in the Buruli-Panjia-Pathra Beel.

The assessments and analysis

The evaluation rests on criteria which stem from the general objective with its four sub-objectives. The first relates to the improvement of the drainage conditions which is the primary concern and main trigger for the interventions. The second and third relate to the optimization of benefits for the local population and the minimization of negative impacts on the area downstream. The latter refers to issues of implementation, assuring environment friendliness, social acceptance and institutional 'manageability'.

Source: EGIS Report on the study Environmental and Social Impact Assessment of KJDRP

The criteria and indicators are:

- Surface water conditions in rivers and beels, hydrological conditions, salt water intrusion, and morphological conditions
- Drainage and land type distribution
- Environmental impacts: soils, groundwater, plants and wildlife, fish habitat
- Socio-economic conditions: paddy and fish production, living conditions
- Effects in the external impact area, including the Sundarbans and Mongla Port
- Implementation: technical and financial feasibility, acceptance by the local population, required mitigation and compensation measures, institutional arrangements

The comparative analysis has been done against a ZERO option, which represents the 1997 situation and a dredging option (DRE) that considers initial dredging to maintain a design drainage situation which is common to all options. The comparative analysis of the four options (the two regulator options and the two tidal basin options) started off with a series of hydraulic simulation tests by the SWMC using calibrated MIKE II hydrodynamic, advection-dispersion and cohesive sediment transport models. Results on water levels were converted in flooded areas using a digital elevation model (DEM), which was developed specifically for the study.

Results of the DEM in terms of flood characteristics and corresponding land types were used to assess changes in paddy and fish production. The land type classification also provided an important input in the assessment of environmental impacts. The socio-economic impact analysis were mainly based on an intensive field survey, public consultations and workshops in Khulna and Jessore.

Findings

After the initial dredging, all options will be able to maintain the river network system at least in design drainage conditions. However, the tidal basin options unlike the regulator options result in slightly higher river water levels at the uppermost ends of the Hari and Buri Bhadra rivers (at an average of 25 and 35 cm in the wet and dry season, respectively). The regulator options bring the river

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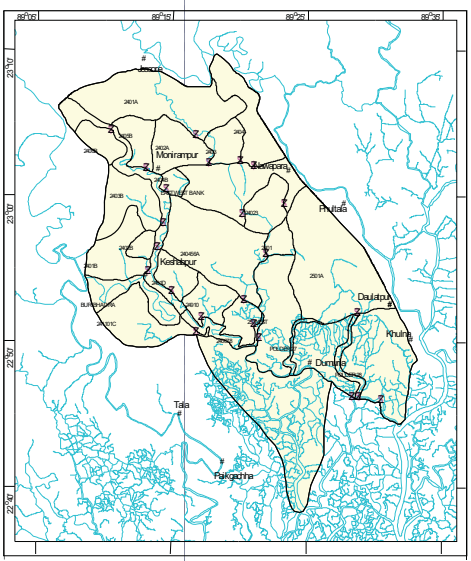
water levels substantially below design levels: as much as one meter in a major part of the upstream area of the rivers. These differences in river water levels for the four options are reflected in the distribution of land types (F_0-F_3), which represent different flood depths during the wet season.
The following points summarize the key findings:

- The regulators will keep sediments out of the project area, while the tidal basin options will keep tidal channels clear of sedimentation through the use of tidal flows in the drainage network.
- The regulators will free the river system in the project area from saline water during the dry season, while with the tidal basin options, limited land areas would be affected.
- Paddy production and revenues increase under all options compared to the ZERO option by above 30% for the tidal basin options and 35% for the regulator options.
- Open-water fisheries decline under all the options, while production from fresh water fishponds and open-water shrimp ponds is expected to increase. Brackish water shrimp ponds will disappear under the regular options.
- The reduction in open-water fisheries has important implications for employment. Total employment for the target group (landless households, marginal and small farmers and small fishpond owners) is expected to drop by 10% for the regulator options and 5% for the tidal basin options.
- The reduction in open-water fisheries will also have an immediate negative impact on the protein intake of the local population, that of the regulator options being more pronounced.
- Soil conditions are expected to deteriorate due to declining soil moisture and soil nutrient conditions for the regulator options. This may also lead to increased groundwater extraction and application of fertilizers, both undesirable from an environmental point of view.
- Groundwater conditions are adversely affected by the increase in extraction rates due to the drop in soil moisture expected particularly under the regulator options.
- Ecological changes refer to changes in land type distribution. Terrestrial vegetation will improve under all options, while for the tidal basin options the enhanced presence of tidal wetlands would be considered positive
- The fish habitat conditions supportive of open-water fisheries deteriorate for all options compared to the present situation, though less for the tidal basin options than for the regulator options.
- In the rivers immediately south of the project area, reduction in tidal volumes are estimated at 10 to 25% for the Madhukhali Regulator, which leads to morphologically unstable tidal channels.
- Salinity levels in the intermediate and the Sundarbans area would build up faster for the regulator than for the tidal basin options.
- The effect of converting aquatic into a terrestrial ecosystem in the project area, particularly under the regulator options, would be detrimental to the ecosystems in the intermediate and the Sundarbans area.
- Environmental Management Plan: A number of measures are to be undertaken to compensate for the adverse environmental effects of the tidal basin, such as establishing a two-directional flow for about eight months of the year. Enhancement measures would focus on wetlands and newly created terrestrial ecosystems for the tidal basin.
- 

Drainage units and location of structures in the hydrodynamic model

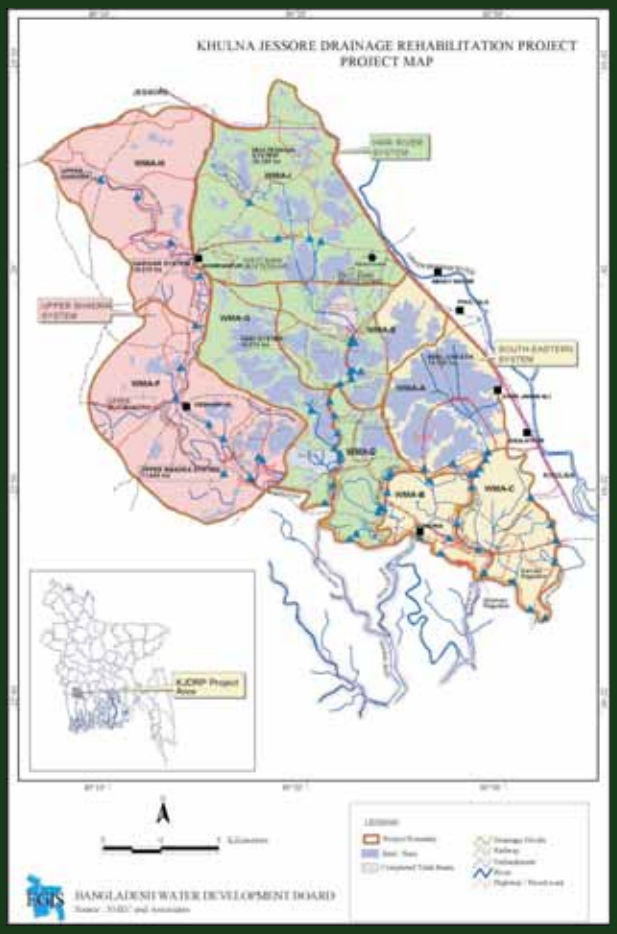
Monitoring

Monitoring is an important requirement in the pre-construction, construction and operation and maintenance stages. The monitoring plan should incorporate environmental, social and institutional parameters along with hydro-morphological or physical monitoring (the parameters comprise sedimentation vis-à-vis dredging, sediment quality, water quality, river stability, land requirement and resettlement, management of tidal basins and implementation of the EMP).

Conclusions and recommendations

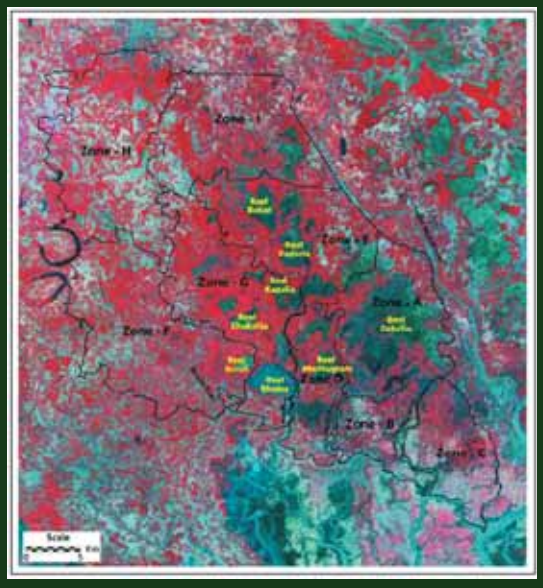
The study concludes that the tidal basin approach would offer better prospects than the regulator options for the sustainable management of water and land resources of the project area. Model tests have confirmed the hydrological performance of small tidal basins and there is wide pubic support for the tidal basin options.

Implementation of a tidal basin option could start in the upstream end of the Hari River in the Kedaria Beel and in the Upper Bhadra River in the Buruli, Panjia-pathra Beel. It is recommended that the tidal basin option be further developed based on detailed surveys and studies and be planned carefully, in conjunction with the local people. Institutional arrangements would have to be developed for coordinated management supported through an effective monitoring and management information system.

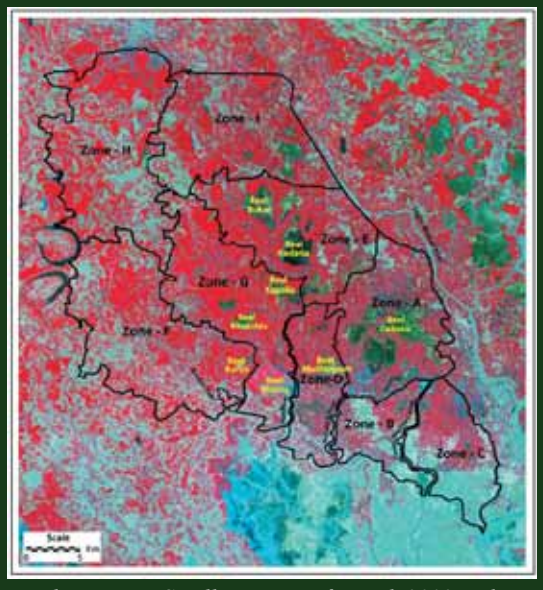


KJDRP project map

Landsat TM Satellite image of March 1997 with ground resolution of 30mx30m with WMA boundary



IRS 1D LISS III Satellite image of April 2001 with ground resolution of 24m x 24m with WMA boundary



Landsat ETM+ Satellite image of March 2002 with ground resolution of 30m x 30m with WMA boundary