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Designation :

Title : Study on Lowcost River Training Works in a Meander Bend Along the Madhumati River

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Bank erosion and sedimentation are major constraints to alluvial river management in Bangladesh. Bank erosion deteriorates the socio-economic conditions of floodplain inhabitants due to loss of valuable agricultural land and settlement. Bankline of the river Madhumati at Mollickpur has been shifted approximately 1 kilometer during the last twelve years. Due to erosion, people lost their land and jobs. Many of them, due to the lack of purchasing capacity migrated to bigger towns and cities. Some of the destitutes due to bank erosion now mostly depend on riding rickshaws for their livelihood.

The local people are very much concerned about the behavior of the river, and are of the opinion that the river will continue its erosive characteristics at the bend if proper countermeasures are not adopted. The partial protective work aggravated the downstream erosion situation, and this was met with suggestions that the whole bend should be taken under protective measures.

Physical experiments were carried out to test whether the erosion will propagate or not, after which the bend channel was examined to determine its response under a low cost protective measure i.e. permeable spur which are partially executed in a portion of the actual bend. A couple of combinations were tested to figure out its performance.

It was clearly observed that the flow tends to shift towards the concave side from the mid section of the bend channel if there is no protective work along the concave side of the bend. In the permeable cases the flow is diverted remarkably from the structure and also from the embayment zone of the series of spurs. Dikes functioned as blockages to the flow. Although the flow was shifted and maintained its direction almost parallel to the bank, the magnitude of the velocity was significantly decreased in the embayment area and also in between the spurs.

The bed morphology in the test without permeable groin (T00) shows that the bed degradation occurs at the concave side through all over the channel. The bed morphology in the permeable case is quite different. At the heads of the dikes, the flow diverted, which led to local scouring. Local scouring occurs at the toes of all the dikes. The main channel in the dike zone degrades significantly. Although the main channel is deepened, deposition is found along the near-bank area in-between the dikes.

No significant deposition occurs between 1st and 2nd spur in both the permeable cases. But the test with seven spur (T07) vividly shows sedimentation in between 2nd and 3rd, and 3rd and 4th spur. The test with ten spur (T10) also had responses in sedimentation in between 2nd, 3rd and 4th that spur relatively less with respect to T07. The highest hd/h for T00 is 0.24 and that for T10 is 0.28, where hd is deposition depth and h is water depth. On the other hand maximum hs/h for T00 is 0.36 and that for T10 is 0.37, where hs is for scour depth. After the 7th spur, deposition occurs along the outer bank in both the cases. But in T07 fresh scouring happen after a certain length of deposited near bank.

These intuitive comparisons made it clear that the permeable dikes were able to decrease the velocity in the embayment while increasing it in the main channel. As a result, they might be utilized to protect the river bank from erosion and improve the navigability by deepening the main channel. The T07 is incapable of preventing the erosion all through the outer bank. The T10 responses in a reliable manner of protecting the scour for the whole bend as indicated by the local people during social survey.