APPLICATION OF A HYDRAULIC MODEL FOR PREDICTING THE GENERAL SCOUR: A CASE STUDY FOR ELASIN BRIDGE ON THE DHALESWARI RIVER IN BANGLADESH

M. MAHBOOB-UL KABIR[1], SARWAT JAHAN[2] and AHMED ABDULLAH NOOR[3]

[1]Sr. Specialist, Human Resource Development, Institute of Water Modelling, House # 496, Road # 32, New DOHS, Mohakhali, Dhaka 1206, Bangladesh (Tel: +880-2-8824590, Fax: +880-2-8827901, e-mail: muk@iwmbd.org)
[2]Associate Specialist, River Engineering Division, Institute of Water Modelling, House # 496, Road # 32, New DOHS, Mohakhali, Dhaka 1206, Bangladesh (Tel: +880-2-8824590, Fax: +880-2-8827901, e-mail: srj@iwmbd.org)
[3]Junior Engineer, Coast Port and Estuary Management Division, Institute of Water Modelling, House # 496, Road # 32, New DOHS, Mohakhali, Dhaka 1206, Bangladesh (Tel: +880-2-8824590, Fax: +880-2-8827901, e-mail: aan@iwmbd.org)

Predicting general scour depth of a river is one of the great concerns for design of any hydraulic structure in or along a river, because the planform of a river changes from year to year and the general scour may also be changed due to obstruction of the structure. Application of a hydraulic model is a great support in computing the general scour depth of a river for design of a hydraulic structure.

Considering the importance of the prediction of scour a hydraulic model study was carried out by the Institute of Water Modelling during 2003 in connection with the design of the Elasin Bridge on the Dhaleswari River, a distributary of the great river the Brahmaputra - Jamuna. A two-dimensional Dhaleswari River hydraulic model was applied in computing the general scour at the bridge site for 'with' and 'without bridge' condition for a number of design hydrologic events.

The model revealed that at the bridge axis, the maximum bed level degradation for short-term event (1 in 100 year flood) was approximately in the order of 2.0 metre both for 'with' and 'without bridge' condition, which had been filled up by 1m at the end of monsoon. For 'with bridge' condition the maximum bed degradation for the simulation of longer-term hydraulic condition (series of 9 monsoon events of different probability of discharge) was found to be approximately 4.00m at the peak and at the end of 5 years simulation. The same amount of maximum degradation was found for nine years simulation, but at one stage of the simulation the bed degradation ceased and it began to upgrade. The minimum bed level for the nine years simulation was found to be 0.6m PWD, but at the end of nine years simulation it was found to be 1.12m PWD filling the bed approximately by 0.5. So, the model showed that the bed of the river reached to its dynamic equilibrium within nine years period and then it began to upgrade. For without bridge condition the maximum bed degradation was computed to be approximately 4.50m. So, the design general scour depth at the bridge site was found to be 4.5m.

The modelling software used for the study was MIKE 21C developed by DHI Water & Environment, Denmark.

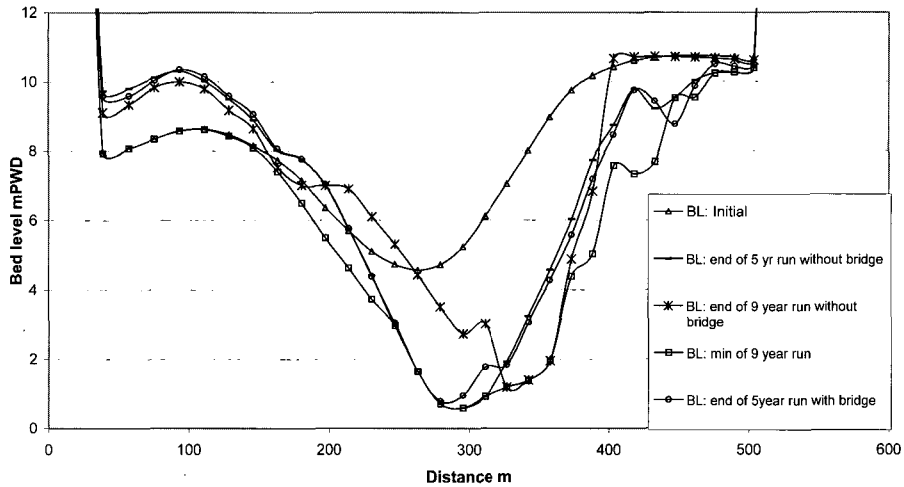

Fig. Evaluation.of general scour of bed for with and without bridge

REFERENCES

Institute of Water Modelling, 2003, Hydrological and Hydro-morphological Study of the Dhaleswari River for Elasin Bridge, 2003.

Centre for Environmental and Geographic Information Services, 2003 Planform Analysis of the Dhaleswari River in Connection with the Elasin Bridge Project.