

## CHANNEL STABILIZATION USING BANDALLING

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### ABSTRACT:

The sediment material of an alluvial river is transported both as bed load and suspended load. Even in the case of suspended load, most of the sediment is transported near the bed and very less sediment is carried near the water surface. This feature of sediment transport is the key to using bandals.

Bandals or bandallings are commonly applied to improve or maintain the flow depths for navigation during low water periods in alluvial rivers of Indian sub-continent. Recently, these are also used for closing off secondary channels in the large rivers like the Ganges to ensure stable single course. The essential characteristics of bandals are that they are positioned at an angle with main current and there is an opening below it while the upper portion is blocked. As a practical rule the blockage of the flow section should be about 50% in order to maintain the flow acceleration. The surface current is being forced to the upstream face creating significant pressure difference between the upstream and downstream side of bandal. The flow near the bed is directed perpendicular to the bandal resulting near bed sediment transport along the same direction. Therefore, much sediment is supplied to the one side of channel and relatively much water is transported to the other side. The reduced flow passing through the opening of bandals are not sufficient to transport all the sediment coming towards this direction, resulting sedimentation over there. On the other side, more water flows

with little sediment, resulting bed erosion of the channel on that side.

Traditional bandalling consists of a framework of bamboo driven into the riverbed and supported by struts. Bamboo matting is fixed to this framework at the water level. The application of traditional bandals is limited, since suitably sized bamboo sticks are maximum 6 m long and the typical matting is 0.9 m wide.

In order to use bandal structures over a longer period during the low water phase, improved bandals have been developed with 2.0 m wide mattings and suitable for water depths of 4 m to 5m. For the framework, bamboo can still be used but for the foundation, timber piles or bamboo bundles of suitable length are required due to the higher load on the structure. The efficiency of the improved bandals can further be enhanced when the mattings are not fixed firmly to the framework, but can be adjusted to the fluctuations of the water level in order to maintain permanently the most effective ratio of blockage to depth by using a pulley.

The effect of a series of bandals can be considered as the development of bar and pool in meandering rivers. In the present study, the theoretical basis of bandals and their performance in the alluvial rivers of Bangladesh are reviewed with field examples. The background and basic features of our ongoing research work on bandalling are highlighted and the necessities of future researches on bandals are discussed in order to develop a low cost method for the stabilization of alluvial channels.