

## Characteristics of Suspended Sediment Deposition/Erosion Process around Bandal-like Structures in Alluvial Rivers

(沖積河川におけるバンダル型水制周辺の浮遊砂の堆積及び侵食特性)

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### 1. Introduction

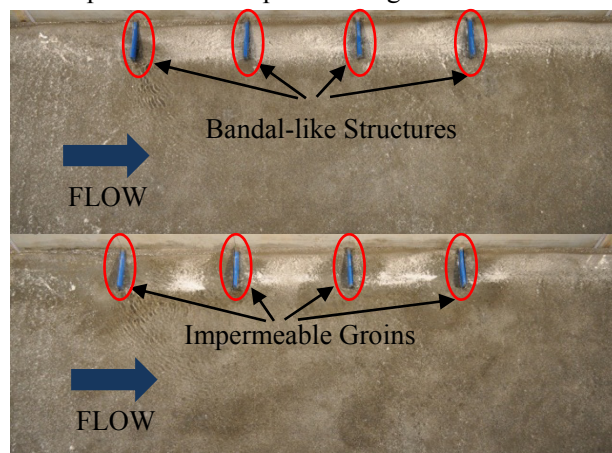
Study of the effects of hydraulic structures on suspended sediment deposition/erosion process is an important issue for riverbank protection and navigational channel formation in alluvial rivers. The present investigation focuses on the influence of bandal-like structures on suspended sediment distribution. Bandals are commonly used in Indian Sub-continent to maintain the navigability of the alluvial rivers such as Jamuna River (Bangladesh). The sediment in Jamuna River is dominated by silt and clay, with 15-20% of the total discharge being fine (177 $\mu$ m) to very fine (62.5 $\mu$ m) sand. The suspended load of the river carries the majority of the sediment, while bed-load transport accounts for approximately 10% of the suspended load. Due to the fragile composition of the riverbank, which is mainly constructed by these local available fine material, hydraulic structures such as groins and/or revetments are used to protect the riverbank from erosion, and to maintain the navigability of the river channel. However, construction and maintenance of these structures has high cost from the economic point of view. Thus, bandal-like structures which are made of naturally available materials such as bamboo and wood can be used as an inexpensive method. It is characterized by an upper blocked portion to obstruct high velocity flow near water surface diverting it to the main channel direction and an opening below to allow the low velocity flow to pass near the bed which increases the deposition of sediment at downstream.

### 2. Methodology

Laboratory experiments are carried out to verify the effectiveness of bandal-like structures in the deposition/erosion process of suspended sediment around them. A series of 4 (four) structures were positioned at the left side of a straight flume with fixed bed condition and an inclined riverbank with a slope of 1V:2H to represent a situation close to the real condition. Measurements of the velocity field, suspended concentration and water level variation were made to analyze the flow patterns which affect the suspended sediment distribution around structures.

### 3. Results and Discussions

The effectiveness of the Bandal-like structures to control the suspended sediment distribution was verified through the laboratory experiments (**Fig.1**). The deposition of suspended sediment observed at downstream of all structures can be emphasized as one of the main advantages of bandal-like structures in comparison with impermeable groins.



**Fig.1** Suspended sediment deposition around bandal-like structures (top) and impermeable groins (bottom) after one hour running in the laboratory experiments for each case.