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Title: Evaluation of Environmental and Hydraulic Performance of Bio-Composite Revetment Blocks

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Abstract: It is necessary to develop a concrete revetment block which can cater for environment and at the same time it will be effective in protecting river banks (stabilize the slope of banks) from scouring during flood. In the present study, the environmental and hydraulic performance of the proposed revetment block was evaluated through laboratory and field tests. The tested revetment block is called bio-composite because it is composed of concrete, plastic mesh and biological material (coconut husk). The dimensions of the bio-composite revetment block are 400 mm x 400 mm x 100 mm (length x width x thickness) and has a central opening with a dimensions of 280 mm x 140 mm that has a 10 mm layer of coconut husks protected by two layers of plastic mesh. The coconut husk was selected based on laboratory experiments. The experiments showed that the coconut husk is a good media for grass growth and it allows faster growth of grass compared with other tested types of biological wastes (sugar cane husk and oil palm husk). Field tests were conducted on a selected stream which is located at the Universiti Putra Malaysia, Selangor, Malaysia. The stream banks were protected from scouring by using the bio-composite blocks and monitoring after installation revealed that rate of grass growth was 15% per week. However, it was found that the rate of grass growth is depends on the slope of stream banks. This confirms that the proposed bio-composite block is friendly to the environment and can give a good aesthetic appearance. For a given water depth, hydraulic tests showed that the value of Manning coefficient of roughness for the bio-composite revetment blocks depends mainly on the rate of grass growth. The values of Manning coefficient roughness for the stream were found to range from 0.031 to 0.055.