



MPhil Research Study on  
Protection against the scouring effect at downstream,  
of an irrigation structure with modular gabion lining

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### Abstract of the ongoing research study

Canal erosion often happens in unlined canals due to high velocity water flows, finally result to change the topography of the canals in long-term. Canal lining is the method adopted to prevent canal erosions and gabion lining is becoming a modern trend in using for canal lining over the other preventive materials available at present.

To make the gabion lining method so effective, economical and feasible in canal lining applications, the surface roughness or the Manning's coefficient ( $n$ ) value of gabion linings needs to be experimentally determined first, as this value is unknown at present in literature and as well as, will be useful for the scientists and engineers in designing stages later on to decide the length of lining to be provided to overcome the downstream canal erosion.

A 0.3m x 0.3m rectangular field channel was modelled dimensionally in a laboratory hydraulic flume of size 0.25m x 0.45 m x 10m satisfying similitudes. The Manning's formula, which applies to uniform flow conditions in an open channel flow was used to determine "n" experimentally. Dimensional analysis used to determine the field Manning's coefficient considering dynamic similitudes under Froude's number.

Finally, to develop a relationship to design a stable canal using gabion lining by considering the Energy dissipation methods and non-dimensional relationships while satisfying the basic condition for the stability of a canal, i.e. the soil grains that forms the canal bed and bank should satisfy  $\tau_0 \leq \tau_{Cr}$  at downstream of the lining.



Figure 1. extensively eroded downstream canal banks just after a hydraulic structure in one of the Walawe right bank canal.

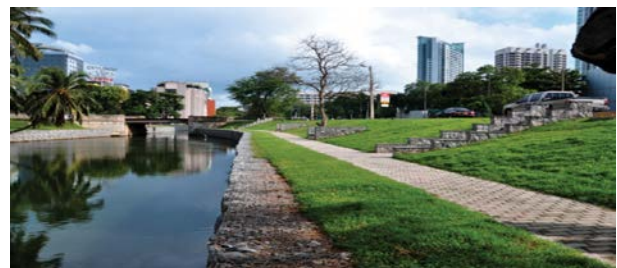


Figure 2. Gabions filled with rocks used to protect canal network in Colombo city.

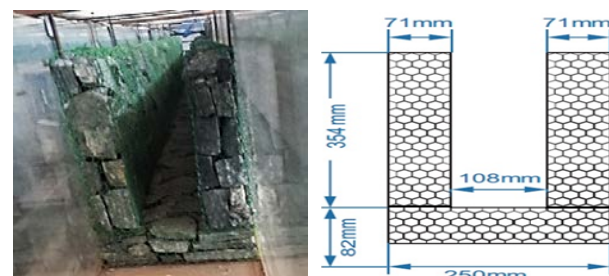


Figure 3. Experimental set up modelled in laboratory flume using dimensional similitudes and analysis.