



Role of vegetation on erosion processes: experimental investigation

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Investigations on soil-system ecology are ever more oriented toward quantitative information based on the study of the linkages between physical processes and ecological response in rivers. As it is known, in presence of vegetation, the hydrodynamics characteristics of flow are principally determined by the mutual interrelation between the flow velocity field and the hydraulic behavior (completely submerged or emergent) of the vegetation elements. Much effort has been made toward identifying the theoretical law to interpret the vertical profile of flow longitudinal velocity in vegetated channels. Many theoretical and experimental studies in laboratory channels have been carried out and especially the case of submerged flexible vegetation has been examined (Termini, 2012). The effects of vegetation on flow velocity are significant and of crucial importance for stabilizing sediments and reducing erosion. Vegetation has a complex effect on walls roughness and the study of the hydrodynamic conditions of flow is difficult.

Although most studies based on the “boundary layer” scheme so that the hydrodynamic conditions inside and above the vegetated layer are considered separately, some authors (Ghisalberti and Nepft, 2002; Carollo et al., 2008) claim that the “mixing layer” scheme is more appropriate to define the velocity profile both inside and outside the vegetated layer.

Experimental program has been recently carried out in two laboratory flumes constructed at the laboratory of Dipartimento di Ingegneria Civile, Ambientale, Aerospaziale, dei Materiali – University of Palermo (Italy) with real and flexible vegetation on the bed. In this paper, attention is paid to the influence of vegetation on the erosion processes both on the bed and on the channel banks. The structure of the detailed flow velocity field is analyzed and compared with that obtained in absence of vegetation. Attention is then devoted to the analysis of soil erosion mechanism.

Carollo F.G., Ferro V., Termini D. (2008). Flow velocity profile and turbulence characteristics in a vegetated straight flume. International Congress Riverflow 2008- Cesme - Izmir (Turkey) 3-5 September

Ghisalberti, M. & Nepf, H. M. 2002. Mixing layer and coherent structures in vegetated aquatic flows. *Journal of Geophysical Research* 107(2).

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