Effect of soil properties on the determination of riverbank erosion probability

George Karatzas and Emmanouil Varouchakis

Technical University of Crete, School of Environmental Engineering, Chania, Greece (karatzas@mred.tuc.gr)

Riverbank erosion is a natural geomorphological process that affects the fluvial environment. The most important issue concerning riverbank erosion is the identification of the vulnerable locations. An alternative to the common hydrodynamic models to predict vulnerable locations is to quantify the probability of erosion occurrence. This can be achieved by identifying the underlying relations between riverbank erosion and the riverbank soil properties. Thus, riverbank erosion can be determined by a statistical methodology using independent variables that are considered to affect the erosion process. The impact of such variables may vary spatially, therefore, a non-stationary regression model is preferred instead of a stationary equivalent. Locally Weighted Logistic Regression (LWLR) is applied to predict the probability of presence or absence of erosion at the riverbanks of a river section. The erosion occurrence probability can be calculated in conjunction with the model deviance regarding the independent variables tested. The developed statistical model is applied to the Koiliaris River Basin on the island of Crete, Greece. The proposed statistical model is a useful tool that quantifies the erosion probability along the riverbanks and can be used to assist managing erosion and flooding events.