



## **Sediment budget variation at watershed scale due to anthropogenic pressures, and its relationship to coastal erosion**

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The transfer of sediments from hydrographic basins towards the coast is a significant pathway of material transfer on Earth. In sedimentary environment, the main portion of sediment that enters the coastal areas is derived originally from erosion in the coastal watersheds. Extensive anthropogenic pressures carried out within coastal basins have long shown negative impacts on littoral environments. In fluvial systems, sediments trapped behind dams and in-stream gravel mining cause the reduction in sediment supply to the coast.

Along the *Jonian* littoral of the Basilicata Region (southern Italy), natural coastal processes have been severely disrupted since the second half of the 20<sup>th</sup> century as a result of riverbed sand and gravel mining and dam construction, when economic advantages were measured in terms of the development of infrastructure, water storage, and hydropower production for the agricultural, industrial and socio-economic development of the area. Particularly, the large numbers of dams and impoundments that have been built in the hydrographic basins have led a significant reduction on river sediment loads. As a result, the *Jonian* littoral is experiencing a catalysed erosion phenomenon.

In order to increase understanding of the morpho-dynamics of the *Jonian* littoral environment and more fully appreciate the amount of coastal erosion, an evaluation of the sediment budget change due to dam construction within the hydrographic basins of the Basilicata Region needs to be explored. Since quantitative data on decadal trends in river sediment supply before and after dam construction are lacking, as well as updated dam silting values, river basin assessment of the spatial patterns and estimated amount of sediment erosion and deposition are important in evaluating changes in the sediment budget. As coastal areas are being affected by an increasing number of population and socio-economic activities, the amount of sediment deficit at the littoral can permit to forecast coastline fluctuations caused by such anthropogenic interventions. These are valuable information for both the management of and development of future plans for coastal environments and for reducing exposure risk to coastal erosion.

The purpose of this study was to compare and to evaluate the suitability of the RUSLE (Revised Universal Soil Loss Equation), RUSLE 3D and USPED (Unit Stream Power-based Erosion Deposition) models in assessing the sediment budget variation at watershed scale. In order to assess the rate of net soil erosion, the three models were applied to the Bradano river basin and to the sub-basin subtended by the San Giuliano Dam. To this end, digital terrain model, products derived from satellite remote sensing (multi-temporal Landsat imagery), soil texture maps and ancillary data were integrated and processed in a GIS. To test the models, the computed soil erosion rates were integrated over the San Giuliano sub-basin surface, and compared with the dam silting value provided by an interregional authority responsible for its management. The three models have proven to be effective in quantifying the soil erosion at watershed scale.