

Spatial data integration for analyzing the dynamics of Albanian Adriatic shoreline

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Shoreline mapping and shoreline change detection are critical subjects for coastal resource management, coastal environmental protection and sustainable coastal development and planning. Coastal changes are attracting more focus since they are important environmental indicators that directly impact coastal economic development and land management. Changes in the shape of shoreline may essentially affect the environment of the coastal zone. These may be caused by natural processes and human activities.

The undertaken work focuses on analyzing the Adriatic shoreline dynamics, using spatial temporal data, by taking advantage of Geographic Information System (GIS) and Remote Sensing (RS). Shoreline mapping focuses on some specific issues such as mapping methods used to acquire shoreline data, models and database design used to represent shoreline in the spatial database and shoreline -change analysis methods. The study area extends from the mouth of Buna River in the north to Vlora Bay in the south covering a total length of about 220 km.

Detection and future assessment of Albanian Adriatic shoreline spatial position is carried out through integration of multi scale resolution of spatial temporal data and different processing methods. We have combined topographic maps at different scales (1:75 000, 1918; 1:50 000, 1937; 1:25 000, 1960, 1986 and 1:10 000, 1995), digital aerial photographs of 2007 year, satellite images of Landsat TM, Landsat ETM+ and field observed GIS data. Generation of spatial data is carried out through vectorization process and image processing.

Monitoring the dynamics of shoreline position change requires understanding the coastal processes as well as coastal mapping methods. The net rates of variations in the position of the shoreline are calculated according to transects disposed perpendicularly to the baseline and spaced equally along the coast. Analysis of the relative impact of the natural factors and human activities, it is fundamental process for shoreline changes monitoring and future assessment.

Albanian Adriatic coastline has an intensive dynamics. Old and present data indicate shoreline movements from 0.5-1 m/year up to 7-8 m/year, during the period from 1918 up to 2014. In 1990, 56% of Albanian Adriatic littoral was in accumulative process and 44% was in abrasion process, meanwhile in 2014, 41% of Albanian Adriatic littoral was in accumulative process and 59% was in abrasion process. In Albanian Adriatic littoral, about 55% of beaches are in abrasion process (13 % of these are in emphatic abrasion) and 45% was in accumulative process (30% from these are in emphatic accumulative process).

Keywords: coastal erosion, shoreline monitoring, spatial data integration, image processing, shoreline position assessment.