



A GIS approach for investigation of beach dynamics - Asparuhovo beach case study, Bulgarian Black Sea coast

M. Stancheva, H. Stanchev and A. Palazov

Institute of Oceanology, BAS, Bulgaria

(stancheva@io-bas.bg; palazov@io-bas.bg / phone: +359 052 370 484)

Investigations of shoreline areas require integrating of all environmental aspects, including physical, chemical, geological, biological and even socio-economical. The sandy beaches as most dynamical interface between inland and seaward react very sensibly to variations of natural conditions along time and space thus changing beach profiles and coastline configuration. In addition various coast-protecting works and other human activities are constantly performed in the littoral, which cause significant shoreline modifications. All over the world sandy beaches are not only the valued recreational resources and crucial factor for tourist industry, but as well the effective and sure defense against accelerated erosion of the coasts. Therefore it is exceptionally important to study and understand dynamical beach processes and how the sandy coasts respond to altered wave conditions in result of climate changes, to reduced sediment supply and to technogenous impacts. Each of these natural and anthropogenic factors must be considered, but it is very difficult to balance the complex variables into one system. Nowadays the Geographic Information System (GIS) is ultimately the solution to solve this problem and is the integral part of assessment and monitoring of beach dynamics. Collecting of modern high quality data and combining with historical datasets in GIS allow complex survey of shoreline changes over time scale. As coastal populations continue to grow, and community infrastructures are threatened by erosion, there is increased demand for accurate information regarding rates of shoreline displacements and consequently the beach monitoring is an essential part of coastal zone management.

This paper presents a GIS approach for investigation of short- and long-term beach

dynamics using various types of shoreline position data: the primary ones, digitized from topographical maps in scale 1:5000 and the secondary ones, derived from detailed tachometry survey carried out by the Institute of Oceanology, BAS. The analyses, mapping and estimation of beach modifications are implemented with ArcView 9.1. As an example the characterization of dynamics of Asparuhovo beach, in Varna bay, North Bulgarian Black Sea coast is presented, based on the analyses of previous studies and results obtained from the application of GIS. The assessment of human intervention (including hydraulic constructions and dredging works) on the beach evolution since the beginning of the XX century up to now is done. The concluding remarks of study findings show that the development of Asparuhovo beach has been mainly determined by the urbanization processes and implemented coastal activities. Both negative and positive consequences for considered beach system under technogenous interference could be recognized.