Geophysical Research Abstracts,
Vol. 11, EGU2009-11524-1, 2009
EGU General Assembly 2009

Volumetric changes of the coastal dunes in the area of Niechorze and Pogorzelica (Western Polish coast) from 1989 to 2002

F.C. Pascoletti (1), K. Furmanczyk (2), L. Disperati (1), and J. Dudzinska-Nowak (2)

(1) University of Siena, Centre for GeoTechnologies and Earth Sciences Department, San Giovanni Valdarno, Italy (pascoletti@unisi.it), (2) Szczecin University, Institute of Marine Sciences, Szczecin, Poland

With its N-NW exposure, the western part of the Polish coast, between Niechorze and Swinoujscie, is subjected, like a whole Polish coast, to the action of the storm surges. In this area two types of coast may be distinguished: Pleistocene cliff coast made-up of clay and sand and a barrier dune coast built of Holocene sands.
In particular, our study area (the coastal dune section of Pogorzelica) is located at the transition between these two types of coast. For that reason this section is a very dynamic area not only due to the storm action but also for the link-side effect started after the construction of a seawall in the cliff part, built for the protection of the Niechorze lighthouse.
Several works based on detailed photointerpretation provided the description of coastal changes that occurred in this area between 1951 and 1996. In these works both the dune baseline and the shoreline were chosen for comparison, assuming changes in their location to be indicative of the general trend in coast development.
In this work we employed topographic maps at the scale of 1:1,000 and 1:2,000 with 1 m contour lines interval, related to 1989 and 2002, provided by the Maritime Office in Szczecin, in order to obtain the first spatio-temporal volumetric evaluation of the coastal changes in this area. 3D models of the sand dunes have been built by linear interpolation of vector contour lines and spot heights digitised from the topographic maps, as well as spot heights collected from the geodetic triangulation network.
Considering the contour lines interval we can expect a vertical accuracy of approximately better than 1 m for the 3D models. This assumption has been positively checked in those areas where no morphologic change occurred from 1989-2002 (i.e. back dune area).
Taking into account the above assumption, the comparison between the 3D models (1989-2002) points out loss of material in the front dune along the whole 3 km coast section under study. The results are presented also as a map of spatial distribution of the changes. The estimated amount of removed material is about 50,000 m3, corresponding to about 1.6 m3 of loss per meter of coast length per year, as an average. Field evidences and limit equilibrium slope stability analysis suggest coupling of sea-waves erosion and gravitative instability phenomena as main processes causing the dune retreat.