Geophysical Research Abstracts
Vol. 15, EGU2013-2110, 2013
EGU General Assembly 2013

Human Effects on Varna-Beloslav Lake Complex and Detection of Long-Term Changes

Atanas Palazov, Hristo Stanchev, and Margarita Stancheva
Institute of Oceanology, Varna, Bulgaria (palazov@io-bas.bg)

There are several larger lakes at the 412 km long Bulgarian Black Sea coastline, as each distinguishes with a specific hydrological regime and parameters. The deepest and the largest is the Varna Lake, located west from the Bay of Varna at the North Bulgarian coast. The lake is a firth formation at the river valley under a rising sea level during the Holocene, when it was divided from the sea by a large sandy spit. In 1900s with construction of Varna Port a navigational channel between Varna Lake and the sea was built, while in 1920s it was artificially connected to the inland Beloslav Lake by other navigational channel. Since the beginning of the past century the both lakes have been subject of many direct human impacts, such as: digging of three navigational channels; situating a number of ports with different functions; constantly performed dredging activities etc.
The aim of this study was to trace the long-term changes to the lakes of Varna and Beloslav mostly related to human activities over a 100-year period. Two types of data were used: historical topographic map from 1910 in scale 1:200 000 and nautical maps in scale 1:10 000 from 1994. The data were processed and analysed with support of GIS and modelling in order to quantify the changes of areas and volumes of the lakes, as well as of the navigational channel between them.
The findings from the study clearly reveal significant alterations of the two lakes that have been caused by increased anthropogenic impacts over the whole past century. Irreversible changes and modifications of the lakes features and coastal section around, as well as alterations of the areas and hydrological regime of the whole lake system were identified. In order to evaluate the anthropogenic impacts a coastline segmentation of the study area was performed as the lengths of natural and armoured coasts were determined. This in turn allowed finding the extent of technogenous occupation of the coast: 11107 m or about 24% from the total 46112 m long lakes coastline were armoured. Adding also two navigational channels having a total length of 8500 m, then the length of the technogenous coast has reached up to 42 %. In relation with required maintenance of the safe shipping depth and following permanent dredging works, it is suggests the examined Varna-Beloslav Lake system would experience continuative impacts and negative effects. At present, a new project for replacement of the Varna Port East to the northernmost part of the Varna Lake has been operating and this would suppose additional dredging activities leading to new changes of the coastline and bottom features of both lakes.