



Sensitivity of Black Sea Coasts to Erosion and Flooding: an Index Based Approach

Florin Tatui (1,2), Marius Pirvan (1), Mădălina Popa (1,7), Burak Aydoğan (3), Berna Ayat Aydoğan (4), Tahsin Görmüş (4), Dmitry Korzinin (5), Florin Zăinescu (1,2), Alfred Vespremeanu-Stroe (1,2), Sergey Kuznetsov (5), Nataşa Văidianu (6,7), Luminița Preoteasa (2,8), Margarita Shtremel (5), and Yana Saprykina (5)

(1) University of Bucharest, Faculty of Geography, Bucharest, Romania (florin.tatui@geo.unibuc.ro), (2) Research Institute of the University of Bucharest (ICUB), GEODAR, Bucharest, Romania, (3) Gebze Technical University, Department of Civil Engineering, Gebze/Kocaeli, Turkey, (4) Yildiz Technical University, Department of Civil Engineering, Esenler/Istanbul, Turkey, (5) P.P.Shirshov Institute of Oceanology of Russian Academy of Sciences, Moscow, Russia, (6) Ovidius University of Constanta, Faculty of Natural Sciences and Agricultural Sciences, Constanta, Romania, (7) University of Bucharest, Interdisciplinary Centre for Advanced Research on Territorial Dynamics (CICADIT), Bucharest, Romania, (8) University of Bucharest, Faculty of Geography, Sfântu Gheorghe Marine and Fluvial Research Station, Romania

The Black Sea basin is a unique and very complex environment in the World Ocean as a result of its evolution, location and history. This is the reason why in the last years there is an increasing scientific interest in deciphering the complex processes and mechanisms governing this area. Besides the well-known environmental problems of the basin related to pollution, eutrophication, overfishing and loss of biodiversity, erosion and flooding (as a result of storminess and sea level rise) are affecting many coasts around the Black Sea.

The aim of our study is to evaluate the erosion and flooding hazards along the Black Sea coasts through an in-depth and well-grounded scientific analysis of a comprehensive database of multiple sources. For this endeavour, we have computed a Coastal Sensitivity Index (CSI) at 1-km spatial scale for more than 4300 sectors around the Black Sea, taking into consideration geological–geomorphological and physical characteristics of each sector through the following parameters: type of coast (coastal geomorphology and lithology), coastal slope (from shoreline to 20 m depth), shoreline changes in the last 30 years, wave incidence (the angle between the shoreline and the dominant storm waves), significant wave height during storm conditions and relative sea level rise.

The results for each parameter are detailed and statistically presented and are finally aggregated into CSI. The most sensitive sectors to erosion and flooding cover almost one quarter of the entire Black Sea coastline and are superposed on the low-lying sandy beaches from deltas and coastal barriers situated mainly in the NW basin (Danube Delta, Dniester and Dniiper limans, barriers and spits from Tendrovskaya and Dzharlygachskiy areas), and also in the deltaic areas of Turkey and Georgia or in the area of the Kerch Strait.

Implications of CSI distribution for the coastal erosion management in different countries are also discussed in close connection with the different coastal legislation in each country, the impact of EU regulations and directives and the lack of specific regulations in the non-EU countries.