

Science for Environment Policy

New beach database could help protect Black Sea shorelines

The damaging effects of sea-level rise on Black Sea beaches have been estimated in a new study. Diminishing river sediment supply caused by river dams is also an erosion threat. These new results suggest that erosion could cause over 90% of these beaches to retreat by at least 20% of their width. A publicly available database created by the researchers could be useful for developing coastal protection schemes.

In the latest Intergovernmental Panel on Climate Change (IPCC) report, climate change experts estimated that sea levels would rise by 0.26–0.82 m by the beginning of the next century, compared with levels during 1985–2005. Any rise could have a serious impact on shorelines, causing beaches to retreat due to erosion.

The study, part-funded by the EU's [enviroGRIDS](#) and [PEGASO](#) projects¹, used publicly available, online satellite images to identify all 1228 beaches on the Black Sea coast. The researchers then compiled a database which recorded key features of each beach, including dunes, cliffs and coastal defences.

This database covers over 2000 km of shoreline, made up mostly of small beaches, and is the first complete record of Black Sea beaches, according to the researchers. It is now freely available for policymakers and other scientists to use².

Combining the results from several different models, the researchers tested the impact of sea-level rise on Black Sea beaches. One of the scenarios they tested was a high sea-level rise of 0.82 m. In this scenario, their models predicted that erosion would cause Black Sea beaches to retreat by 7–32 m.

For a 1 m rise (the largest rise projected in 2100 by the IPCC report), beaches could retreat further, by 9–37 m. A maximum of 51% of beaches would retreat by a distance equal to their full width.

However, if sea-level rise could be limited to just 0.5 m — in the middle of the IPCC's predicted range — Black Sea beaches would only retreat by 4–21 m. A maximum of 21% would retreat by a distance equal to their full width under this scenario.

In the IPCC's scenario of a 0.82 m sea-level rise, the researchers' calculations suggest that maximum erosion would cause 41% of all Black Sea beaches to retreat by a distance equal to their full width. In all three scenarios of sea-level rise, erosion could cause more than 90% of beaches to retreat by 20% of their width.

The authors warn that their study provides a rapid rather than detailed assessment of Black Sea beaches and that the results may, therefore, underestimate the impacts of sea-level rise. However, it demonstrates a first application of their database, which they suggest could help coastal managers and policymakers to identify the beaches most at risk from erosion. It could also provide data to help assess different beach protection schemes.

More broadly, the database could be used in integrated coastal zone management (ICZM). ICZM, which is a multi-disciplinary approach towards coastal management, is a key element of the [Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean](#) (the Barcelona Convention).



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1.enviroGRIDS and PEGASO are supported by the European Commission under the Seventh Framework Programme. See: www.envirogrids.net and www.pegasoproject.eu

2.Link for direct download in shapefile zipped format http://129.194.231.213:8080/geoserver/eg_BSbeaches/wfs?type=eg_BSbeaches:BlackSea_beaches&outputFormat=SHAPE-ZIP&request=GetFeature&service=WFS&version=1.0.0;http://envirogrids.grid.unep.ch:8080/geoserver/eg_BSbeaches/BlackSea_beaches/ows?service=WFS&request=GetCapabilities