EGU26-10576, updated on 12 Jun 2026
https://doi.org/10.5194/egusphere-egu26-10576
EGU General Assembly 2026

Analysis of anthropogenic coastline changes in the Gulf of Trieste (NE Adriatic Sea) over the last 200 years in GIS environment

Mariangela Pagano[1,2] and Martina Busetti[2]
[1]Department of Mathematics and Geosciences, University of Trieste – via Weiss 2, 34128 - Trieste, Italy (mpagano@ogs.it)
[2]National Institute of Oceanography and Applied Geophysics - OGS, Borgo Grotta Gigante 42/c, 34010, Sgonico - Trieste, Italy (mbusetti@ogs.it)

Coasts are land–ocean interfaces of high environmental and economic value. They are among the areas most affected by urbanisation and economic activities. Increasing anthropogenic pressure has significantly altered ecosystem structure and services, reducing the quality and quantity of natural resources, causing habitat and biodiversity loss, and transforming coastal landscapes from natural to anthropogenic.

The Italian coastal area is highly anthropised, with 34% of the population permanently residing in coastal cities. The Italian coastline is approximately 8,300 km long, 13% of which is occupied by artificial structures, with an increase in coastal artificialisation of over 100 km in the last 20 years.

The study area is in the Gulf of Trieste, a shallow semi-enclosed sea of about 500 km² in the north-eastern Adriatic Sea, in the Italian region of Friuli Venezia Giulia (FVG). The FVG coastline extends for 111 km, of which 55.4% is highly anthropised.

The south-eastern coasts of the gulf, from Grignano to Muggia, have been extensively built up and modified by human activities, particularly near Trieste, where both the natural coastline and the seabed have been heavily altered.

The aim of the study is to evaluate and quantify the evolution and changes (advances and retreats) of the predominantly rocky coastline of the eastern Gulf of Trieste, caused by anthropogenic activities over the last 200 years.

To conduct the analysis, a series of historical and modern charts of the study area from the last 200 years were collected. After georeferencing the charts, past coastlines were digitised and compared with each other and with the current one using a Geographic Information System (GIS).

Polygons were generated to represent coastline advances and retreats, and the respective areas were calculated. Histograms were produced to illustrate the temporal distribution and extent of coastal changes over the study period. To assess the type of human pressure, each coastline change was analysed in relation to its cause and the intended land and sea use at the time it occurred.

The analysis showed that in some areas, advances caused by human activity reached several hundred metres, mainly due to the construction of infrastructure, ports, and industrial settlements.