

Evaluation and Prioritization of Erosion Protection Measures along the Coast of Avlida

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Abstract

A detailed investigation of the erosion phenomenon taking place in the coastal front (coastline) from Avlida beach to Vathi region in the Municipality of Chalkida is presented. Based on the assessment of existing erosion problems and an evaluation of short/medium-term effects on the terrestrial and marine environment, a prioritization of immediate actions - measures will be proposed to ensure protection of the existing infrastructure. Emphasis will be given to analyze the evolution of erosion phenomenon under climate change scenarios due to high tourist value of the region.

Keywords: Coastal erosion, Coastal zone, Coastal Erosion,

1. Characterization of the area under study

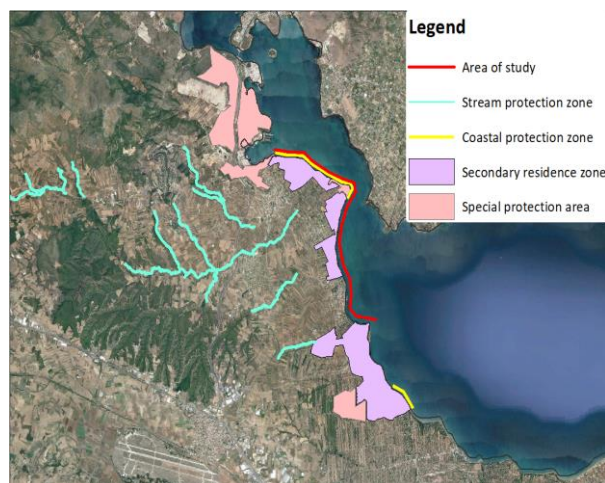
The area under study is located in Chalkida Municipality and in particular at the municipal districts of Avlida and Bathy.

The coastal zone of the area under study in approximately 6.5 km long surrounded by Avlida Gulf and it is mainly characterized as secondary residence zone (Map 1).

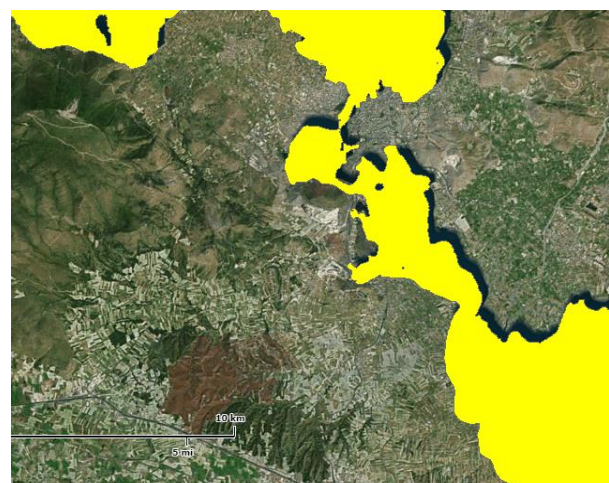
The ecological status (Map 2) of marine water is characterized as moderate (marked in yellow) (www.eea.europa.eu). The environmental pressures that affect the ecological status of the area are mainly related to the industrial and agricultural activities occurred in the greater region.

Protected areas shown in Figure 1 are imposed to special building restrictions to protect natural landscapes, archaeological sites and forests. Stream protection zones are also established for the protection of riparian ecosystems and for flood prevention.

Two coastal zones are included in the protection areas to first maintain the natural landscape and then prevent instability problems.



Map 1. Area of Study and land Uses



Map 2. Ecological status of Avlida Gulf
(www.eea.europa.eu)



Figure 1. Evidence of erosion along the coastal front of the area under study

2. Observations of erosion conditions in the research area

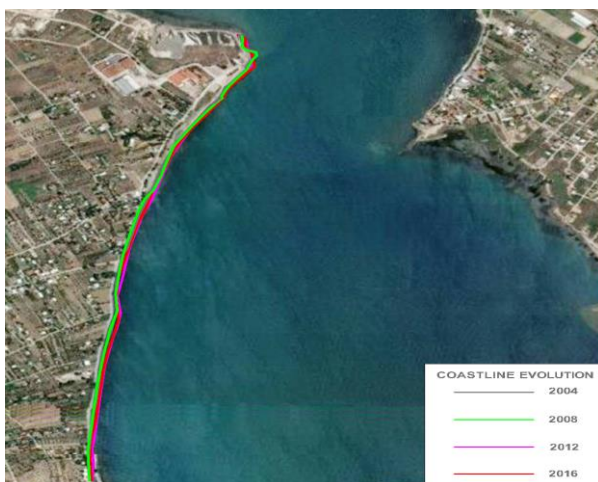
The area under study has changed dramatically in the 1990s due to the rapid urbanization. In June 2001, the coastal area of Oropos was affected by an extensive fire resulting in the loss of vegetation (Bathrellos et al., 2010). This fact, combined with the susceptibility to erosion of the postprandial formations of the area, accelerates corrosion processes after intense rainfalls but also due to the action of the waves (Gournelos et al., 2002).

The analysis of historical aerial photographs from 2004 to 2016 (Map 3) proved the evolution of erosion

phenomenon along the coast. Besides, due to the residential development and the construction of a coastal road, erosion phenomena were evident, as shown in Figure 1.

The coastal protection works built, most of them arbitrarily, have failed both constructionally and functionally (Figures 2).

The entire area of interest is subdivided into 3 distinctive individual areas, each one with special features, depending on erosion conditions as well as on land uses and the priority of the necessary mitigation measures of erosion that should be taken (Map 4).



Map 3. Erosion analysis based on aerial photos



Map 4. Sub division of the Area of Study

3. Preliminary remarks and conclusions

National Technical University of Athens (NTUA) has been commissioned by the Ministry of Infrastructure, Transport and Networks to review the coastal processes and determine the parameters that cause erosion and potential flood risk at the Avlida Coastal Zone. An analysis of “extreme events” is being completed to determine the volumes of wave overtopping of the defenses for different return period events under existing

conditions and allowing for 100 years of climate change starting from 2018.

Improvements in the defenses and flood risk assessment are required to first reduce the threat of coastal flood and erosion risk and then support existing and future amenity and regeneration in Avlida Coastal Area. The proposed schemes will enhance natural, historic, and built environment, whilst maintaining marine activities in the most affordable and sustainable manner.

Next step is to propose and examine alternative schemes of the coastal defense structures.



Figure 2. Evidence of damage to the coastal road due to erosion

References

Bathrellos, Skilodimou, and Chousianitis (2010), Soil Erosion assessment in Southern Evia Island Using USLE and GIS. Bulletin of the Geological Society of Greece, **43**, 1572-1581.

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