Maritime spatial planning in the Black Sea
ISBN 978-973-614-977-1 | 199-204

The Impact of the New Coastal Works' Implementation in Eforie Area

Elena VLASCEANU1,2, Madalina ROSCA1,2, Razvan MATEESCU1*
1 National Institute for Marine Research and Development "Grigore Antipa", 300 Mamaia Blvd., RO-900581, Constanta, Romania
[2]Constanta Maritime University, 104 Mircea cel Batran Street, RO-900663, Constanta, Romania

ABSTRACT. The new Masterplan for coastal protection was extended in 2011. Since them all steps of coastal works implementation were properly considered the impact of executions phase on the adjacent sectors, including area of operations. The works 'impact was related to the turbulence fields in the area of the nourished beach areas. After execution, in 2015, the new-artificial beaches of Eforie north touristic resorts were modified on a different geo-morphologic profile, despite its were designed as single-slopes beaches, not exceed 1.5 m, in continuation of the cliffs. However, the modified hydrological conditions turn as continuous adjustment factor, especially within could season, with strong impact on navigation facilities existent in the area.

KEYWORDS. Coastal protection works; EIA; GIS; remote sensing; MSP.

I. INTRODUCTION

The coast section between Constanta – Agigea port to Turcu Cape is composed of clayey rocks (clay, loess, loam) with small beaches at the basis and a marine sand belt, making the separation between sea and the Techirghiol Lake. Because the port development in 80's, locally the beaches were disappeared, despite a series of coastal works extensions. After the beach nourishments in 2015, the shoreline was strong displaced seaward in Eforie north areas, being protected by a series of three groins, two parallel submerged breakwaters and Belona port jetties.
The specific features of new touristic beach areas are subject of a constant erosion due to the incident and reflected wave fields, which produce an intense displacement of shoreline due to erosion of the underwater slopes with gradients from 0.011 to 0.028, thus being the subject of a continuous decompensation.

Even beaches are commonly pocket beach type due to the configuration in the shadowed area of Constanta port, its provide a strong effect on adjacent shore areas.

II. METHODOLOGY

The common methodology applied for the present work was connected to Geographic Information System (GIS), spatial analysis remote sensing data in ERDAS Professional and maritime spatial planning expert opinions. Collecting information describing the configuration beach areas in close disposal with a Marina were required indicators that are relevant for MSP documents, considering land-sea interactions.

* razvan_doru@yahoo.com

The impact of the coastal works implementation is emphasized by remote sensing data. Thus, the multispectral data from DEIMOS2 satellite (70cm spatial resolution) provide the extension of turbulence fields, together with the image of the correctitude of technological steps followed in the beach nourishment.

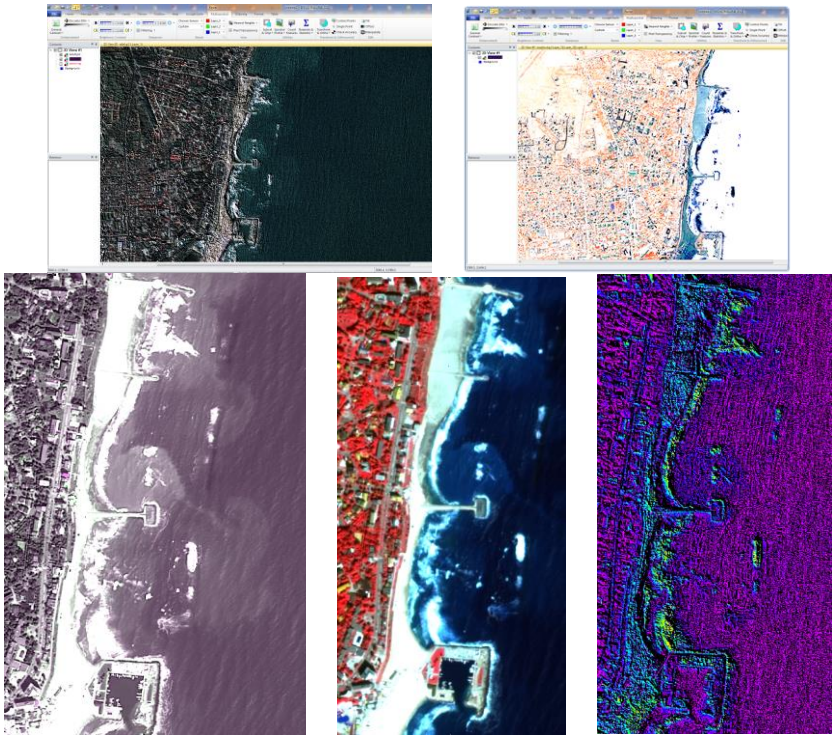

Fig. 1. a, b, c, d, e The coastal protection works extensions at Eforie Nord (RS data of beach extension in construction phase through sand nourishment –September 2015)

If on the horizontal, the imagery is very useful to make certain determinations, on vertical in the case of lack of LIDAR and topograhocal data, the topograpical measurement were required.

III. RESULTS AND DISCUSSIONS

The topographical measurements from 21st of September 2015, together with aerial photography, reveal after completion, the preferred beach profile, which permit an extension of wave run-up processes on 40% of the total widht of the beach.

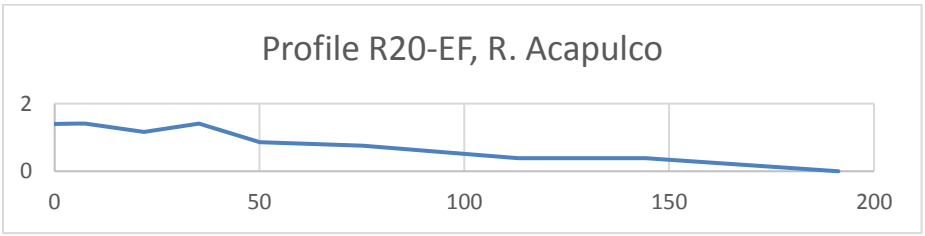

Fig. 2. Beach profile for the landmark of R. Acapulco (September 2015)

Fig. 3. The waves run-up limit on the beach profile

Fig. 4. The inundation of the Eforie north beach area after a storm event (January 2018)

For the Eforie North's sand nourishments, the profile analysis shows the rates of the annual decompensations of sediments deposits placed on the beach, now extended with 190m (in the section of R. Acapulco).

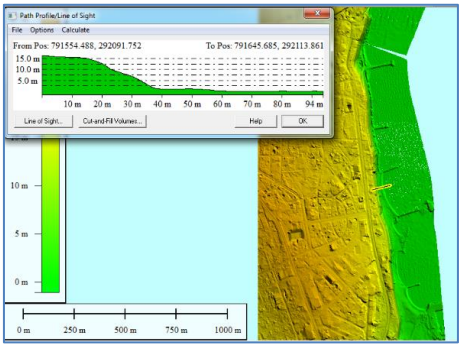

Fig. 5. The situatuation of eforie beach in September 2012, three years before nourishments

Even if the nourishment was done and the surface is extended at desired surface limits, the beaches are inundated at winter storms with averaged intensities, which shows a relative instability of the coastal protection, together with the neccesity of the instalations od the complementary solutions against erosion, including the nourishment of decompensated sediment by replacement of sediment deposits resulted from Belona Marina's dredgings.

IV. CONCLUSIONS

The erosion in Eforie sector is differentiated by the presence of the Constanta Port jetties, hydrotechnical works and the abiotic resources of the coastal system. On the units of the sector, the erosion is extending differentiate by the presence of sand belt/closed barrier island of Techirghiol lake.

Because the sand belt of the Techirghiol Lake is substantially eroded, despite of implementation of small underwater longitudinal breakwater, with magnitude of tens of meters, and the both, Eforie North and Eforie South protected shores are more stable, due to presence of hydrotechnical constructions.

The impact of erosion on beach tourism is apparent for coastal navigations and touristic activities due to the beach surfaces retreat, but in the same time, activities such as infrastructure for maritime port, ruttier and railway transport, surface/water management works are considering it the magnitude of it, in the context of climate changes. The statistic distributions show for the return periods notable modifications for above mentioned infrastructure design.

ACKNOWLEDGEMENT

This work was carried out in the framework of the project STAR ROSA/RO-CEO, (Romania Cluster for Earth Observation), no 109/2016 and project ACCWA (Assessment of the Climate Change effects on the Wave conditions in the Black Sea), supported by the Romanian Executive Agency for Higher Education, Research, Development and Innovation Funding - UEFISCDI, grant number PN-III-P4-IDPCE-2016-0028. This work has been supported by the European Commission through the European Maritime and Fisheries Fund, grand No. EASME/EMFF/2014/1.2.1.5/2/SI2.707672 MSP LOT 1 /BLACK SEA/MARSPLAN-BS.

REFERENCES

[1] Rusu E (2009), Wave energy assessments in the Black Sea, J Mar Sci Technology 14:359–372.

[2] Rusu E. (2010), Modeling of wave-current interactions at the Danube's mouths. Journal of Marine Science and Technology 15 (2): 143–159.

[3] Rusu, L., (2015), Assessment of the Wave Energy in the Black Sea, based on a 15-Year Hindcast with Data Assimilation, Energies, 8 (9), 10370-10388.

[4] C. Gasparotti, E. Rusu "Methods for the risk assessment in maritime transportation in the Black Sea basin", 2012, Journal of Environmental Protection and Ecology 13 (3-A), 1751-1759;

[5] Omer, I., Mateescu, R., Rusu, L., Niculescu, D. and Vlăsceanu, E. (2015), "Coastal works extensions on the Romanian touristic littoral, its ecological impacts on the nearshore bathing areas", Journal of Environmental Protection and Ecology, 16(2), 417-424.

Elena Vlasceanu: is PhD student of Constanta Maritime University, in the field of Marine Hydrodynamics, technician at the National Institute for Marine Research and Development, "Grigore Antipa", department of Oceanography, Marine and Coastal engineering.

Madalina Rosca: is MSc student in Constanta Maritime University, and in the same time a young RA at the National Institute for Marine Research and Development, "Grigore Antipa", department of MSP.

Razvan Mateescu: is working in the field of Environmental Coastal Engineering at the National Institute for Marine Research and Development, "Grigore Antipa", department of Oceanography, Marine and Coastal engineering.