

Coastal-marine environment dynamics simulation in controlled microcosms: the case study of the Emilia-Romagna urbanized coast

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Introduction: Coastal engineering structures strongly influence the environmental quality of the coastal ecosystem [1]. Ecological assessments and the environmental and ecological implications of coastal defence structures have only recently started to be considered [2, 3]. The present work was performed in December 2012 as a result of the previous studies carried out by ENI and ARPA ER in October 2006 – January 2007 and October – November 2010 in 40 transects, from Cattolica to the Po Delta, from 0 to 10 m depth. The study was aimed at investigating sediment physico-chemical and chemical characteristics in the littoral area with a special focus on the areas inside and outside erosion beach protection barriers along the Emilia Romagna coast.

Methods: In December 2012, the 3 main representative areas of Emilia-Romagna coast were recognized taking into account the spatial differences (North/South, inshore/offshore), river inputs and the influences of the defence infrastructures (breakwaters, groynes, etc.). In each area a microcosm test at the sediment-water interface was performed in order to study the bottom sediment influences on the environmental quality and define sediment behaviour under different conditions / pressures (dredging, nourishment, etc.). By means of RISE Incubator tests can be carried out under different conditions (temperature, pressure, time, light, current velocity and sediment resuspension) in the same study area. The incubator system was developed by Gruppo C.S.A. Research Institute of Rimini in the framework of the RISE Project, co-financed by ROP-ERDF 2007-2013 (Regional Operational Programme of the European Regional Development Found).

Results: In each area winter and summer conditions and sediment resuspension events were simulated. In winter, nutrient fluxes from the water column to the bottom sediments were observed. Summer conditions (28 °C) encouraged sediment organic matter degradation, with both higher oxygen consumption in the sediment and a release of nitrate compounds and

iron hydroxides in the water column. The resuspension events (up to 2 cm of the bottom layer) increase the accumulation of dissolved substances in the sediment.

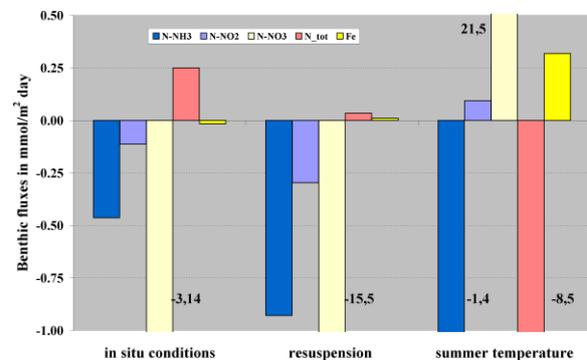


Fig. 1: Benthic fluxes at different environmental conditions.

Discussion: Through the incubator system, local environmental information useful in the monitoring protocols (as reported by the WFD 2000/60/EC and 152/2006 law), especially for the Public Administrations and private operators working in fishing, aquaculture, hotels and tourism, can be acquired. This leads to both understand the processes developing in the aquatic systems and prevent hazards for the ecosystems through an integrated management of the environment (as defined by the European Community).

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References: [1] Airoidi et al. (2005) *Mar Ecol Prog Ser* **299**: 55–66; [2] Lamberti et al. (2005) *Coast Eng* **52**: 841–866; [3] Armaroli et al. (2009) *J Coast Res* **S156**: 1612–1616.