

EVIDENCE OF DECADEAL-SCALE ANTHROPOGENIC SEDIMENTOLOGICAL CHANGES IN THE AREA OF NATIONAL INTEREST WITHIN THE LAGOON OF VENICE

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The sedimentological characterization of sedimentary *facies* in coastal environments is of major importance in the management and planning of human activities. Apitz et. al. (2007) emphasized that knowledge of the spatial and temporal distribution of sediments was fundamental to settling management issues in estuarine and transitional basins. The Lagoon of Venice has experienced intense and varied human impacts over the last few centuries. The substantial morphological changes that have taken place during its history result from a combination of natural processes, human activities, and sedimentological responses to those activities.

The present study was conducted in the Lagoon of Venice, specifically inside the Italian Area of National Interest (*Sito di Interesse Nazionale* - SIN) lying between the industrial zone of Porto Marghera to the west and the city of Venice to the east. The study area is one of 50 areas given “SIN” status by the Ministry of Environment and has very high levels of pollutants in soils, marine sediments, surface and ground waters. The study focused on the textural properties, organic matter and total organic carbon content and bathymetry of subtidal flat sediments as sampled in the Lagoon of Venice in two distinct campaigns, one in 1976-78 and another in 2008. The SIN is part of the Lido sub-basin (the “urban lagoon”, as identified in Molinaroli et al. 2009), most of which (35 km²) is affected by moderate erosion, with an average deepening in the last 30 years of ~13 cm (Sarretta et al., in press). The city of Venice divides the Lido sub-basin into two parts: a southern area which is mostly affected by erosion and a more complex area to the north. Stable and depositional areas (26% and 24%) are located on the landward side, near the industrial area and around Tessera airport. The area affected by erosion is characterised by significant variation in sand/silt/clay content, with a considerable increase between 1978 and 2008 of ~26% in the sandy class (> 63µm) and a decrease of 7% and 20% in the silt and clay (< 2µm) content respectively. The depositional-stable areas saw little change in sand content between the two samplings, but there was an increase of 5% in the silt fraction, associated with a decrease of 8% in clay, indicating a coarsening of the finer fractions. The cumulative distribution curves also show a significant increases in the coarser sediment classes. The total organic carbon (TOC) of the area affected by erosion shows a significant decrease, from 1.1% in the 1970s to 0.7 % in the more recent samples,

whilst no differences in TOC content were found in the stable-depositional part, which was ~1% in both periods. The results suggest that the southern part of the study area underwent an increase in the strength of hydrodynamic factors (currents and wind patterns) in response to anthropogenic modifications, mainly those resulting from the excavation of the Malamocco–Marghera shipping channel (Molinaroli et al., 2009; Saretta et al., in press). Variations in hydrodynamic energy were also validated by applying the Flemming classification to the textural variables. Most of the 2008 sediment samples were richer in sand and silt (very silty sandy mud, and slightly clayey silt). The observed data demonstrate the results of environmental modifications to the lagoon's morpho-bathymetric complexity and the importance of continuous monitoring.

Apitz et. al. (2007)

Molinaroli E., Guerzoni S., Saretta A., Masiol M., Pistolato M. (2009). Thirty-year changes (1970 to 2000) in bathymetry and sediment texture recorded in the Lagoon of Venice sub-basins, Italy. *Marine Geology* 258, 115-125.

Saretta A., Pillon S., Molinaroli E., Guerzoni S., Fontolan G. Sediment budget in the Lagoon of Venice, Italy. *Continental Shelf Research*, in press.