



Natural and human-induced driving factors in the evolution of tidal channels: case studies in the Venice Lagoon (Italy).

Federica Rizzetto

Institute of Marine Sciences, National Research Council, Venice, Italy (federica.rizzetto@ismar.cnr.it)

Coastal wetlands are largely affected by a complex variety of both natural and anthropogenic factors, which induce evident, often irreversible, geomorphological transformations. In particular, this research focuses on the main processes that influence the evolution of tidal channels in salt marshes and shows the results derived from the analysis of some case studies in the Venice Lagoon (northwestern Adriatic Sea, Italy). Here tidal network has been recognized as significantly sensitive to sea-level rise and tide oscillations (Rizzetto and Tosi, 2011; Rizzetto and Tosi, 2012), but it is also vulnerable to human impact. The sites were selected in areas characterized by low anthropogenic pressure to prevent strong human interferences from completely masking the effects of natural forces. The interpretation of a large number of high-resolution aerial photographs, taken since the mid 1930s, allowed identifying in detail tidal channel evolution, both in the long- and in the short-term. The observation of historical and recent topographic maps completed the study and provided other important data to define the modifications occurred in the past two centuries. The channel planform changes were determined through the morphometric analysis of the tidal network, carried out using a Geographic Information System software. These modifications were interpreted in the light of sea-level oscillations (i.e. relative sea-level rise and strength/frequency of high tides, which are increasing owing to climate changes), variations of sediment supply, and human activities occurred in the past century. The joint analysis of all the data allowed distinguishing the changes induced by both relative sea-level rise and high tides on planform pattern and evolution of tidal channels, and identifying the effects of human interferences, which magnified the impact of natural factors (e.g. groundwater exploitation responsible for high subsidence rates between 1950 and 1970 and, consequently, for an increase of relative sea-level rise in the same period) and/or produced other hydrodynamic, morphological, sedimentological modifications in the salt marshes, often resulting in erosion.

References

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