



Understanding relationships between morphology and ecosystem structure in a shallow tidal basins of Venice lagoon

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Coastal wetlands represent complex ecosystems prone to continue fluctuation of their internal equilibrium. They are valuable natural resources characterized by the continue interactions between geomorphological and biological components. Their adaptation to changing conditions is highly dependent on the rate and extent of spatial and temporal processes and their responses are still poorly understood. According to this, the vulnerability assessment to natural and human made hazard have become fundamental to analyse the resilience of these areas, their ability to cope with the impacts from externally driven forces or the efforts needed to minimize the impacts (Gitay et al., 2011). The objective of this research is to develop a comprehensive and replicable method through the application of Multi-Source data analysis, based on the integration of Earth Observation data and field survey, to analyse a shallow tidal basin of salt marshes, located in the northern part of the Venice lagoon. The study site is characterised by relatively elevated areas colonized by halophytic vegetation, and tidal flats, with not vegetated areas, characterized by lower elevations. Sub-pixel processing techniques (Spectral Mixing Analysis – SMA) were used to analyse the spatial distribution of both vegetation and sediments typology. Furthermore the classifications were assayed in terms of spatial (Power law) and temporal (Empirical Orthogonal Functions) patterns, in order to find the main characteristics of the aforementioned spatial trends and their variation over time. The principal aim is to study the spatio-temporal evolution of this coastal wetland area, in order to indentify tipping points, namely thresholds, beyond which the system reaches critical state and the main climatic, hydrodynamic and morphological variables that may influence and increase this behaviour. This research represents a new approach to study the geomorphological processes and to improve the management and conservation planning for coastal areas.

Reference:

Gitay H., Finlayson C.M. and Davidson N.(2011) - A Framework for assessing the vulnerability of wetlands to climate change, Ramsar Technical Report No. 5, 1-18.