



Multitemporal analysis of the beach-dune system of Circeo National Park (Italy)

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There is general agreement across the scientific communities about an unmet need for a high-resolution, coastal dune multitemporal analysis. It has not been possible to construct such approach from long-time existing sources. Identification and mapping of coastal dunes in geomorphology are based on geomorphological survey and interpretation of topographic maps and aerial photos. Considerable enhancement for morphometric dune system evolution can be obtained through generation of a hierarchical approach, by means of the integration of different spectral and spatial data. This research deals with the development of a hierarchical approach to study the changes occurred in the beach-dune system of Circeo National Park (Italy) within approximately 30 years (1977 - 2005) in order to (1) identify the correlation between beach and dune evolutionary trends and (2) to assess the current natural condition of the dune system, with special attention to a high vulnerable coastal stretch. The evolution of the physiographic unit has been detected through the acquisition of significant parameters: morphology of beach (width) and dune (width, length, % of length on physiographic unit length, blowouts, breaches in seaward face), dynamics (evolutionary trend of shoreline, dune frontal change, dune vegetation cover change), anthropogenic impact (anthropic areas, roads and paths on dune, beach touristic use), vegetation (% of vegetated dune surface, typology of dune vegetation). The analysis was carried out using aerial photographs (1977-1999) and QuickBird images (2005).

As a final result the relation between classification characteristics and the spatial and temporal hierarchy of dune system components is discussed. Results show that the correlation between the different parameters detected allowed the identification of the main factors acting between beach and dune system. Within the results we present and argue a framework for hierarchical dunes ecosystem classification, evolution and mapping, exemplifying that the approach is particularly valuable as a comprehensive tool for scientific analyses on behalf of environmental policy.