Geophysical Research Abstracts
Vol. 14, EGU2012-9917-1, 2012
EGU General Assembly 2012

Coastal vulnerability and the implications of sea level rise between the cities of Pescara and Ortona (Adriatic Sea - Central Italy)

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Geomorphic processes induce rapid environmental changes especially along the coast that is highly susceptible to them. In addiction, the effects of storm or wave may be amplified by the expected relative sea level rise. In a context, like Italian coast, where the almost part of coast is densely populated and many infrastructures are presents, it is very important to have adequate tools to urban planning like the coastal vulnerability map.
In this study the preliminary results of the ongoing SECOA project (Solution for Environmental contrasts in COastal Areas; 7th Framework Program) are presented, with reference to the Adriatic coast between Pescara and Ortona cities, in the Abruzzo region.
In this work the same analytical model applied in the Venice Lagoon has been employed (Fontolan, 2001; 2005) involving the evaluation of the effective vulnerability (Ve). Ve is calculated as the difference between the potential vulnerability (Vp) and the defence elements present along the coast (D).
(Ve = Vp - D)
The data used to measure quantitative features are: high-resolution DEM (LiDAR), satellite images, aero photos, bathymetric profiles and topographic maps. The variables that contribute to the evaluation are: beach amplitude, berm height, seafloor gradient, seafloor evolution, recent and historical shorelines evolution for Vp; height, slope, vegetation cover, presence of passages, incipient dunes and windbreak barriers for the dune and anthropic barriers height.
In this context, the potential vulnerability results from the sum of each variable (Vn) per the relative efficacy coefficient (Kn): Vp = V1K1+V2K2+ . . . VnKn
In the same way the defences result from the sum of each kind of defence per the relative efficacy coefficient: D = D1K1+ . . . . DnKn
The coastal area between Pescara and Ortona cities has been segmented in different sectors characterized by homogeneous values of the considered variables and for each of these the Ve values have been calculated and referred to one of the five corresponding standard vulnerability classes.
In long-term vulnerability analyses (year 2100) the following aspects have been taken into account: sea level rise expected according to the IPCC and Rahmstorf hypothesis, local tectonic movement (compaction and sedimentary load) and local vertical movement due to isostasy. The height of defences have been decreased of relative sea level rise value and the efficacy coefficients have been modified according to the different long-term weight of morphological and morphodynamics variables.
A coastal vulnerability map has been drawn both for the short-term (present day) and long-term; the vulnerability classes values have been represented by different colours from green to red respectively from lowest to highest values.
In conclusion, the short-term results show Ve values belonging to the lowest class due to the considerable presence of the defence works, even if Vp values falling in the medium and medium-low classes.
Similar results are obtained from the long-term analysis in the case of both the IPCC and Rahmstorf hypothesis, further evidencing the overwhelming employment of defence structures.