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Resilience against coastal hazards due to SLR and extreme wave events forNea Chora, Crete Greece

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Coastal regions are already suffering the effects of the increasing meteorological intensity of coastal storms and sea level rise. These can lead to accelerated coastal erosion, flooding, unwanted sea water intrusion into coastal fresh water reserves, and infrastructure damage, depending on the effects of local tectonic and geological processes. Coastal regions already highly vulnerable to natural disasters are becoming even more so, raising questions as to their medium term vulnerability and resilience.

Due to its geographical position, Crete, Greece is affected by extreme wave events and will likely be strongly impacted by changes in sea level in the near future. With the exception of Synolakis et al (2008), there are no published studies on the effects of anthropogenic impacts or coastal erosion. We aim to assess coastal resilience of the Nea Chora community in Chania, based on the analyses of Ewing and Synolakis (2012) and Ewing (2015). Their methodology was used to estimate the resilience of Ocean Beach, San Francisco, California, considering the direct economic, environmental and social/cultural benefits of natural and structural shore protection features, along with secondary benefits resulting from protection of shoreline. Once quantified, the above were incorporated in a coastal community hazard protection resilience index (CCHRP).

Using this method, the existing protection elements at the Nea Chora beach were recorded, in order to assess the coastal resilience potential of the area against predicted sea level rise, meteorological tides and storm surges. Coastal erosion of the beach from 2003 to 2017 was evaluated through satellite imagery courtesy of Google Earth. In addition to observed natural alterations, substantial anthropogenic infrastructure changes were noted along the coastline. Based on sea bed slope measurements, quantification of coastal erosion (applying Bruun model), the coastal flooding that could possibly occur on the coastal zone of the study area was evaluated under 1 m and 2 m sea level change scenarios. Coastal inundation from 5m, 6m and 8m extreme offshore wave height scenarios was evaluated. The cumulative coastal impacts in Nea Chora were evaluated in relationship to coastal protection, then summarized as CCHRP values, so as to assist future coastal management efforts.

Synolakis, C.E., Kalligeris, N., Foteinis, S., Voukouvalas, V., 2008, The plight of the beaches of Crete, Solutions to Coastal Disasters, Proc. ASCE.
Ewing, L. C. and Synolakis, C.E., 2012 Resilience to Extreme Events, Coastal Engineering 2012, Proc. ASCE.
Ewing L. C 2015, Resilience from coastal protection, Phil. Trans. R. Soc. A., volume 373, issue 2053.