

COASTAL EROSION

NEW OPPORTUNITIES FOR UNDERSTANDING THE CYPRIOT COASTSCAPE



Cornell University

Georgia M. Andreou
Department of Classics, Cornell University
gma58@cornell.edu



Supporting Maritime
Archaeology in the
Eastern Mediterranean

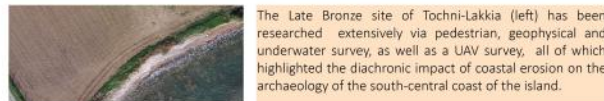
Coastal sites are a longstanding theme in archaeological scholarship, particularly in the Mediterranean, which has lent itself exceptionally well to the study of maritime connectivity, trade and interaction.



The generally relatively benign Mediterranean Sea regime (modest tides and wave action) has allowed many directly coastal sites through history, but also contributed to their incremental exposure and erosion.

Despite recent theoretical and methodological advances in coastal archaeology, ongoing erosion remains a serious predicament both in the preservation and interpretation of coastal sites.

Coastal erosion often leads to irreparable loss of information used in the identification of maritime structures and activities. The Mediterranean, then, is both a hotspot of opportunity but also concern.



The Late Bronze site of Tochni-Lakkia (left) has been researched extensively via pedestrian, geophysical and underwater survey, as well as a UAV survey, all of which highlighted the diachronic impact of coastal erosion on the archaeology of the south-central coast of the island.



Late Bronze Age wall exposed at Tochni-Lakkia, south-central Cyprus. Since June 2014, when the picture of this wall was taken, the feature has eroded almost completely.

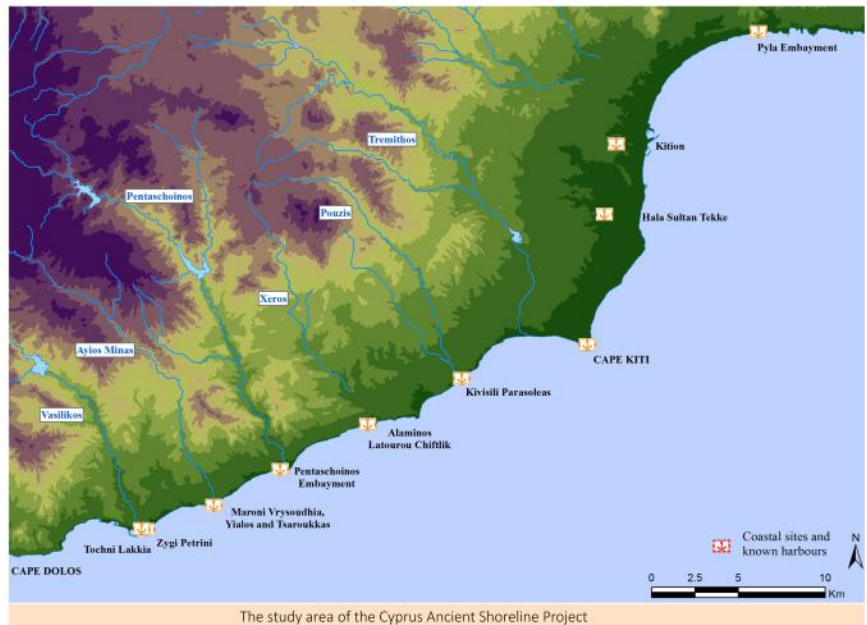


Stone-line feature filled with with a clay-line substance photographed between 2012 (left), 2013 (middle) and 2014 (right). Coastal erosion has lead to significant exposure and damage.

Cited References
- ANDREOU, G.M., R. OPITZ, S.W. MANNING, K.D. FISHER, D.A. SEWELL, A. GEORGIOU & T. URBAN. 2017. Integrated methods for understanding and monitoring the loss of coastal archaeological sites: the case of Tochni-Lakkia, Cyprus. *Journal of Archaeological Science Reports* 12: 197-208.
- THIELER, E.R., E.A. HIMMELSTOSS, J.L. ZICHICHI & E. AVHAN. 2009. Digital Shoreline Analysis System (DSAS) version 4.0 – An ArcGIS extension for calculating shoreline change: U.S. Geological Survey Open-File Report 2008-1278.

Funded by the Honor Frost Foundation, the Cyprus Ancient Shoreline Project (CASP) developed a classification scheme with the aim to augment strategic planning for sustainable monitoring of continuously exposed archaeological features.

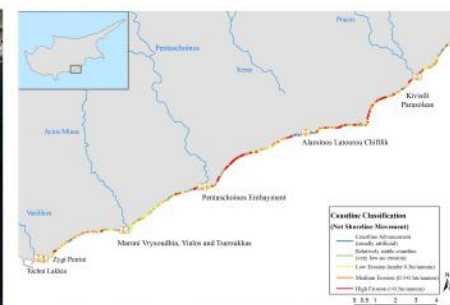
CASP focuses on the island of Cyprus, the role of which in the international trade networks of the Eastern Mediterranean since the 2nd millennium BCE has received considerable attention. This preliminary analysis examines 20km along the south-central coast of Cyprus, extending from Cape Dolos to Cape Kiti. This area is known for its high rates of coastal erosion, which is monitored annually by the Coastal section of the Department of Public Works, Republic of Cyprus.



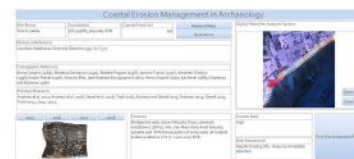
To classify the severity of coastal erosion in segments of 20m, CASP used the **Digital Shoreline Analysis System (DSAS)**, a toolbar for ArcGIS that allows a detailed analysis of diachronic changes in the coastline (Thieler et al. 2009). The classification process compares the location of existing digitised historical shorelines (Andreou et al. 2017), through the generation of perpendicular transects with customised length and intermittent distance.



Left: Transects perpendicular to the 1963, 1993 and 2008 coastlines (produced in DSAS based on data provide by the Dept. of Lands and Surveys). Right: Net shoreline analysis movement. The results are visualised in different colours. Red indicates areas that are experiencing the highest rates of coastal erosion.



This classification is stored along with photographs, illustrations, historical references, aerial photos and quantifiable photogrammetric models. The combination of these data forms the core for coastal archaeological risk assessment, which in turn can inform strategies for coastal monitoring by directing endeavours to the most vulnerable areas. The results of this project enable a prioritisation process for monitoring sites and can provide directions for the recovery of otherwise unknown sites. While DSAS highlights areas that are more vulnerable to coastal erosion, it also demonstrates the large number of locales that have potentially lost visible evidence for past maritime interaction.



Database that stores all information relevant to coastal archaeological sites subjected to erosion, including 3D models of exposed sections, cartographic references and DSAS analyses.

Acknowledgements

I wish to thank the Department of Antiquities for permission to carry out this work and the Department of Lands and Surveys (DLS) for permission to use geographical information, including base maps and digital coastlines. This research was funded by the Honor Frost Foundation and the Council of British Research in the Levant.



Scan QR Code to read the report of the Cyprus Ancient Shoreline Project