

Puglia 2003 - Final Conference Project IGCP 437

Coastal Environmental Change During Sea-Level Highstands: A Global Synthesis with implications for management of future coastal change

Otranto / Taranto - Puglia (Italy) 22-28 September 2003 Quaternary coastal morphology and sea level changes



Project 437

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Coastal geomorphology and human interference along the eastern shores of Attica, Greece

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Keywords: Coastal geomorphology, human interference, East Attica, Greece, Late Holocene

Abstract

The study area is located along the eastern coastal at the peninsula of Attica and has undergone major changes during the last decades



Figure 1. Coastal geomorphological map of East Attica, between Daskalio and Porto Rafti.

which have modified completely the coastal environment in lowland areas. The aim of this study was to determine the changes that have taken place in the coastal natural environment by human interference following the intensive development of summer residence.

The southern most part of the peninsula of Attica presents a complex geotectonic structure. The autochthonous Jurassic system composed mainly of marbles with intercalations of schists is overthrust by the allochthonous upper Cretaceous system of limestones schists with phyllites and again limestones. In addition to these we have Quaternary terrestrial and fluvialterrestrial deposits and Holocene coastal sediments.

The coastal geomorphology of the study area is characterized by medium to steep slopes with several pocket beaches of a few tens of meters to more than a kilometer (Prassa Bay, Daskalio) (Fig. 1). The steepest coasts are encountered in areas where the limestones reach the sea and are intensely eroded. Schist and phyllite coasts are usually less steep. The predominant coastal sediment particle size is shingle with some sandy beaches at wind-protected bays (Avlaki). At some very steep slopes there are many fallen rocks, indicative of active erosion and retreat of coastline. An extensive part of Prassa Bay is lined by two beachrocks, an older semisubmerged one detached from the present coastline and a more recent on the shore.

In most cases the study area is eroding today but retreat rates vary significantly depending on the material that the coast is composed of (limestones vs. unconsolidated materials). A few caves have formed in some steep limestone coasts where erosion is more intense.



Figure 2. Airphotos of 1960 (left) and 2001 (right) of Daskalio Bay area

Indications of former sea levels in the form of marine terraces, notches, raised beachrocks or platforms are absent. On the contrary, remains of aeolianites partly eroding in the sea denote recent relative sea level rise.

The airphotos depict the coastal area at Daskalio Bay (Fig. 2). The left one was taken in 1960 and is almost devoid of any human structures except for a dirt road. The right picture of 2001 shows clearly that humans have taken over and are creating an artificial landscape. More than 230 cottages and other buildings have been constructed in the last forty years, some of them with swimming pools. On the side of the natural environment, one should note the impending formation of a tombolo, which is used as a breakwater for the boats visible in the recent photo. Particularly significant is the widening of the beach at two pocket beaches. These are not artificially filled in but are made of transported sediments from the torrents, which were activated in recent years following heavy rains. Heavy land clearings in the upper sections of their drainage basins may be the cause of increased sediment supply to the torrents' discharge.

In the lowland areas human intervention in the coastal environment is particularly intense in recent decades. All kinds of coastal structures have been built interfering with the natural processes affecting the evolution of the coastal environment. The construction of wharfs, jetties, piers, marinas, breakwaters, landfills and sewers especially in Porto Rafti and Prassa bays have altered significantly the coastal environment which has become stagnant and artificial.

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