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# **ABSTRACT**

In this study an attempt is made in order to determine the palaeogeographic evolution of Alykes lagoon, located along the microtidal coast of Pieria Prefecture in northern Greece. For this purpose, sedimentological, micro and macropalaeontological and granulometric analyses have been carried out on sediments that have been collected from two drill cores.

The total area of Alykes lagoon is 10.78 km2 while the length of the coastline is 11.4 km with a maximum width of 320 m, not exceeding an elevation of 1m. The lagoon in its present form does not seem to be filling up by terrestrialfluvial action. The only human activity in the study area is the saltworks in the northern part of the lagoon.

Four zones have been recognized according to their microfossil content corresponding to different palaeoenvironments of deposition. During the Holocene, the sea invaded this lowland area and created a shallow open marine environment which at times was disturbed by multiple terrestrial inputs induced by fluvial sediment influx and longshore drift. The prevailing drift is from South to North and has contributed to the formation of a barrier spit which extended towards the NNE and finally confined the lagoon in the northwest. The spit has advanced to the east by forming three generations of beach ridges having a different orientation.

Based on a radiocarbon date at -4.2 m below sea level obtained from the southern part of the lagoon, it is assumed that the coastline was already at that location by the end of the seventh millennium BP. Given that the drill core Is located only about twenty meters from the terrestrial outcrops (Neogene formations) we presume that this was the location of the oldest coastline during the Holocene. Therefore, the genesis of the lagoon can be safely put around the sixth millennium BP.



# Methodology

This paper attempts to reconstruct the recent (late Holocene) evolution of Alykes lagoon, and determine the recent coastal changes in the area. For this purpose, two shallow boreholes were drilled and detailed sedimentological and microfossil analysis was performed on the borehole samples, combined with radiocarbon dating of selected samples (shells). In addition, geomorphological mapping was carried out to locate and map coastal landforms. The shallow stratigraphy of the study area is dominated by clastic sediments, with surficial silts and clays present in sheltered lagoonal (back-barrier) areas, underlain by sands and gravels. The geomorphological, stratigraphic, microfossil, and radiometric data are used to examine the recent evolution of, and sedimentation rates in, the lagoon, and their relation to regional sea-level changes.



on 80cm		Elevation 25 cm	
nates N:40°21′53.82″		Coordinates N:40 $^{\circ}$ 20′38.04″	
E : 2 2 ° 3 9 ′ 1 3 .8 ″		E : 2 2 ° 3 7 ′ 5 1 .4 8 ″	
(cm)	D e scription	Depth (cm)	D e s c r i p t i o n
3	Brown medium sand with clay. Presence of some roots. Disperse organic matter.	0 - 9 8	Brown silty clay with root fragments, hairlike carbonate nodules, common around 20cm depth
35	Tufa/Grey-white medium sand indurated	98-243	Compact grey-blue silty clay, brown and black staining around degraded root material
43	Gray medium sand, shell fragments and large poorly humified roots.	243-268	Grey silt with fine sand with common intact shells and shell fragments
190	Grey medium sand with common shell fragments (comminuted)	268-275	Olive brown silty clay
		275-341	Grey fine and medium sand with rich comminuted shell fragments which are about 1mm.
		341-415	Grey fine and medium sand with rich comminuted shell fragments and larger shell fragments
		4 1 5 - 4 5 0	Coarser sand and distinct sulfidic smell.at 430 cm depth, very commonmica flakes (muscovita)

# Micropalaeontological analysis

Alykes 1 The largest part of the Alykes 1 is characterized by the presence of microfauna that corresponds to brackish mesohaline conditions with high accumulation. The sequence displays brackish mesohaline conditions marked by the intense presence of Ammonia parkinsoniana or Cyprideis torosa and fragments of Abra alba. At the top of the core, the absence of the shells indicates a coastal environment.

### Alykes 2

The lower part of the sequence is featured by marine gastropods (Rissoidae). This evidence indicates this unit as shallow marine. In the following interval Ammonia beccarii, Elphidium spp. and marine Miliolids are associated with Abra alba community and Ctena decussata, indicating a very shallow

marine high energy environment. At 380-390cm brackish mesohaline conditions are supported by the presence of small Ammonia parkinsoniana and Cyprideis torosa. From this interval to 258-268cm, brackish environment is supported by the dominance of taxa as Hidrobiidae, Abra alba Cerastoderma glaucum, Cyprideis torosa and small Ammonia parkinsoniana. At 268-275cm a fluctuation

between brackish and marine environment is also marked as brackish ostracods are associated with marine ostracods and gastropods. Towards the top of the core, mesohaline to oligohaline

conditions prevailed as Iliocypris among other ostracods and the monospecific occurrence of Aubignyna perlucida indicate

At the top, the plant remnants, the absence of shells and the oxidized layers indicate a coastal environment

Four zones have been recognized according to their microfossil content corresponding to different palaeoenvironments of deposition, a coastal-shallow marine, a lagoonal, a mesohaline to oligohaline and a

During the Holocene, the sea invaded this lowland area and created a shallow open marine environment which at times was disturbed by multiple terrestrial inputs induced by fluvial sediment influx and longshore

The prevailing drift (S-N) has contributed to the formation of a barrier spit which extended towards the NNE and finally confined the lagoon in the northwest. The spit has advanced eastwards. The combined action of two longshore drifts (N-S and S-N) lead to the formation of two generations of beach ridges having

Based on the radiocarbon date of the shell at -4.2 m bsl at Alykes 2, it is assumed that the coastline was already at that location by the end of the seventh millennium BP. Moreover based on this date a

Given that the drill core is located only about twenty meters from the terrestrial outcrops (Neogene formations) we presume that this was the location of the oldest coastline during the Holocene. Therefore, the genesis of the lagoon can be safely put around the sixth millennium BP.

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