UNIVERSITY OF CYPRUS

Shipwrecks and navigation as components of the MCL: the case of the Western Pagasetic Gulf during the Late Roman and Byzantine periods

Elpida Agapitou

12/5/2023

Thesis supervisor: Stella Demesticha

Table of Contents

1. Introduction

1.1 Components of the Maritime Cultural Landscape

C. Westerdahl (1992: 5) established an archaeological concept that would encompass *"the remains of maritime culture on land as well as underwater"*. This is how the term Maritime Cultural Landscape (MCL) was born. As a notion in archaeology, it is comprised of a large number of different components that denote the relationship between the man and the sea and the subsequent utilization of it. A large part of the MCL has to do with the material remains, the ones that are included in the archaeological context, such as shipwrecks, coastal settlements and ports, land and sea routes, but also structures that pertain to maritime activities such as shipsheds. Another part has to do with the intangible remains and, most importantly, the role of humans. Thus, Westerdahl (1992: 5-6; 2011: 337-340) also included in his research the "*cognitive landscapes*", i.e. the landscapes that stem from human memory and experience, such as toponyms connected with sailing and navigation and also the oral traditions, in stories that pass down from generation to generation.

Besides "*cognitive landscapes*", Westerdahl (2011: 339) further discussed more components of MCL, such as the "*transport landscape*s" that encompass mostly shipwrecks and harbours, but also transit points where the "vessel or transportation methods change" (Westerdahl, 1992: 2). A wide array of individual features can have an impact on transportation methods and the connectivity between the hubs of maritime activity. Such features are inland waterways or road networks, which connect the mainland with the coastline. There are also the "*ritual landscapes*" that include the ritualistic aspects of the land that highlight the importance of certain aspects of the landscape in the eyes of the people, like for instance, rocks or promontories, and resources such as fish, which take on a more ritualistic role in the context of hunting, as an activity that includedentire communities (Westerdahl, 2011: 337-338). The "*resource landscape*",concerningship and boat building as well as the materials used for this task, can extend further inland and away from the sea. The "*resource landscapes*" can be further divided into the "*outer resource*" that includes the supplying materials and the possible connection between neighboring hubs of activity and the "*inner resource*" which concerns the study of the local materialsthat were used in trade and were exported by ships. Finally, a major aspect is the "*economic landscape*", which is the trade itself along with the associated maritime activities. All these different aspects of the landscape cross the divide between land and sea and should be examined as a unit. In this respect,the differentiation between the land and the sea is practically non-existent (Duncan & Gibbs, 2015: 9).

The intangible aspectsof MCL concern the ways humans perceived and utilized the landscape. It combines existing archaeological material with anthropological and ethnographic studies, making it a very compelling area of research. It unifies people's perception and understanding of their landscape with the local archaeological remains, thus helping researchers better understand these same remains and the reasons behind their possible location and existence (Westerdahl, 2011: 337). Westerdahl (1992) employed this analytical approach in the landscapes of northern Europe, bringing to light new aspects of the maritime activities that took place in the area. And here lies the importance of this analytical approach, which demonstrated howto regard the archaeological material not as a singular unit but as an integral part of the place where it was discovered, as it is most often firmly connected with its environment and the people that live in it. Thus, the MCL, in an attempt to study the landscape through the human population inhabiting it, manages to bring archaeology together with other disciplines such as ethnography, to gain knowledge from the

modern communities before drawing conclusions for the archaeological material. This approach was taken even further by researchers such as Thomas F. Tartaron (2018) who applied itto the Bronze Age Saronic gulf and connectivity patterns in the area. This raises a point, that when the human factor and its perception of the landscape becomes the center of archaeological research, new elements are assimilated to the study, leading to a more complete understanding of the archaeological material.

1.2 Merchant Ships

Transport and resources, hence ships and cargoes, are key components of MCL. For this reason, it is important to examine the ships that sailed on the seas during the Late Roman and Byzantine periods.

Merchant vessels present a large variety of types (Casson, 1971: 157-168). Their main feature was their ability to carry cargo, thus they were sturdy, voluminous vessels that were able to travel with relative speed. Recent research has greatly enriched the shipwreck database, especially in the Eastern Mediterranean (Leidwanger, 2020: 38), providing the researchers with the ability to discern whether a ship was built for longer, open-water voyages, or for trips close to the coastline and calmer waters. Thanks to the increasing archaeological evidence (Leidwanger, 2020: 41; Makris, 2002: 93-94; Kocabas, 2018: 357), it is possible to reconstruct a more realistic picture of the byzantine merchant ships than the one presented in the textual evidence, which were, as Leidwanger notes (2020: 41-42), somewhat removed from the reality of seafaring. For example, two common types according to ancient sources are the "*akatoi*" ("*actuaria"* in Latin), which were oar-driven galleys and were also used as warships in emergencies. They were of average size and could be used to transport cargo both on rivers and on the open sea. Their use is attested at least until the 8th century CE (Middle Byzantine period)(Casson, 1971: 159-160). Another type of merchant vessel utilized during the Byzantine period was the so-called "*lembos*" ("*lembus*"); an oared vessel used as an auxiliary ship in naval battles and also for carrying cargo both on rivers and on the open sea. The size of this ship is attested to have been slightly bigger than the "*akatos*".

Of course, recent excavations have provided more concrete evidence on the ships and their carrying capacity.The so-called "flat-bottomed" ships (Leidwanger, 2020: 46-47) probably took their inspiration from the river barges and allowed for priority in the cargo space, rather than speed. While the existence of larger grain carriers can be attested (Casson 1971), recent excavations have shown that most ships were medium-to-small in size. According toHorden& Purcell (2000: 145), "the norm is the little boat of the *caboteur*". Thisputs into perspective the common type of trade of the period, which was the cabotage, meaning the practice of ships stopping in consecutive ports and anchorages and performing shorter journeys alongside the coast to load and unload cargo, rather that traveling longer distances. Makris (2002: 94) also attests to the existence and wide-spread distribution of medium and smaller-sized merchant vessels, stating that they were "much more suited to the trade of the period". Two 9th century CE ships such, theYeniKapi 12 (Kocabas, 2018: 385-387) andBozburun(Harpster, 2005: 2, 77-79), are good examples of medium-sized merchantmen, measuring 7-8m in length and 2-3m in width. As for the carrying capacity of these vessels, it is often cited that ships of these sizes would have a carrying capacity of 70 tons (Arnaud, 2011: 73-74), but Leidwanger (2020: 53) notes, with more plausible arguments, that ships of these sizes would rarely reach the amount of 70 tons and it was possible that many of them would also fall below the 20-50 tons carrying capacity. This is not to say that larger merchantmen did not exist,

especially during the Late Roman period (see, for instance the shipwrecks that have been discovered in deep waters in the Aegean: Brennan et al., 2020: 291-330). It is that the shipwreck record thus far shows a clear tendency for medium-sized carriers during the periods under consideration.

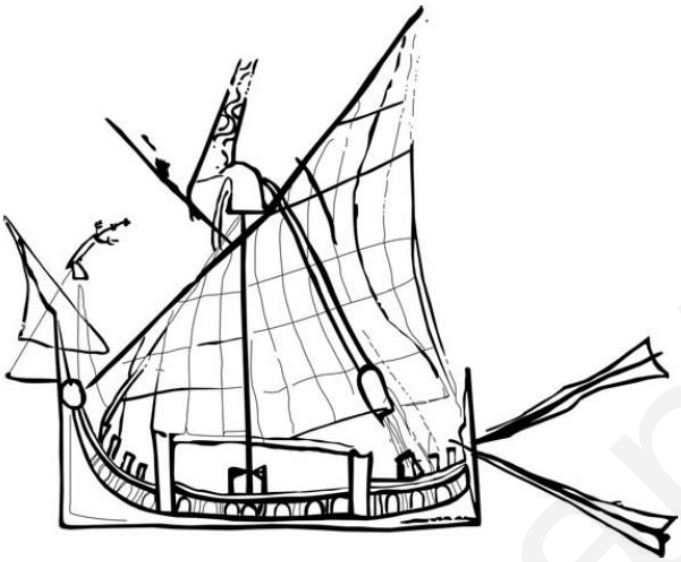

Figure 1: Two-masted, lateen-rigged ship, in a painting from Kellia, Egypt, ca 600-630, used here as an example of the lateen sailing rig (Pryor & Jeffreys, 2008; 160, fig. 17)

Sails were the commonest means of propulsion of merchantmen. Most of the available information on the sailing rigs comes from iconographic sources, and not the archaeological record. Late Roman and Byzantine ships were equipped with three basic types of rigging.The "Mediterranean square sail" and its variations with was the most common type (Pryor, 1988: 27, Whitewright, 2011: 100 and 2018: 31-32)employed since the Bronze Age (Whitewright, 2018: 31). From the middle of the 1st millennium BCE a smaller foresail called the "*artemon*" was added to the square-sail to help with the balance of the hull and better maneuverability (Whitewight, 2018: 32).The "lateen/settee" fore-and-aft sails (Pryor, 1988: 27-28, Whitewright, 2011: 10-13 and 2018: 35-37)were a later technological development that has been attested in the sources and the iconographic evidence since Late Antiquity. They were triangular (lateen) (**Fig. 1)** or quadrilateral (settee) (**Fig. 2)** (Whitewright, 2009: 98; Pryor, 1988: 27-28). The "sprit-sails" are attested from the 2nd century BCE onwards (Whitewright, 2018: 35-36). From iconographic sources it can be seen that the ships bearing a lateen/settee rig were often equipped with a "hook-shaped" masthead (Whitewright, 2009: 100;Beltrame&Medas, 2021: 34-44)

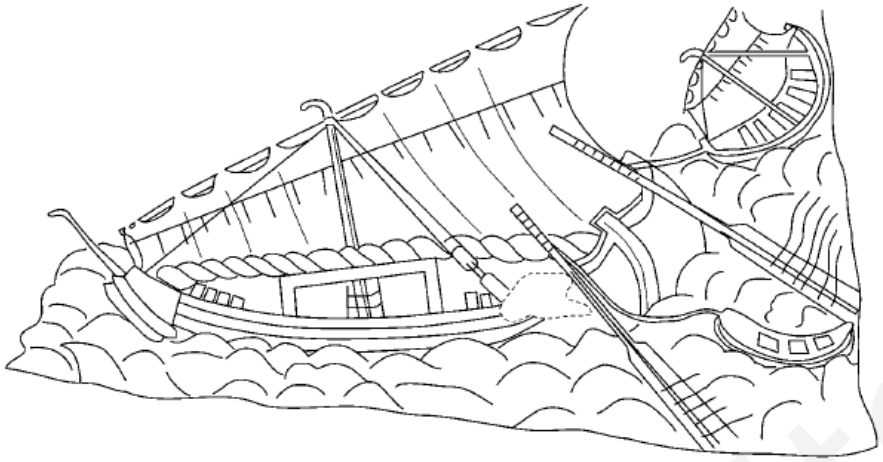

Figure 2: The 6th c CE Kelenderis ship and boats depicted with a settee sailing rig (Friedman &Zoroglou, 2006: Fig. 3)

As Whitewright (2018: 38-39) suggests, the addition of the *artemon* sail to the loose-footed, square sails to help with the overall balance of the ship, points to what he refers to as "specialized sailing". Ship technologies had begun to take into account the need to travel in crosswind or upwind conditions and also the need to maintain a 90 degrees angle to the wind, which was the optimal wind condition for a ship to travel. The square-sail had the least maneuverability and was not well-suited for traveling in the conditions mentioned above, thus the *artemon*was added to aid having more control over upwind and crosswind courses. The "sprit-sail" and the "lateen/settee" sail were introduced not to improve the sailing conditions of upwind and crosswind travels, since the continuous use of the square-sail points to the fact that it could live up to the traveling conditions. Rather, it points to a need for refinement and improvement of sailing under difficult conditions. In the cases of both these rigs, the maneuverability of the sails made it easier for the sailors to adapt to the wind conditions and take advantage, even when traveling against the wind, to maintain the optimal sail angle -90 degrees to the wind.

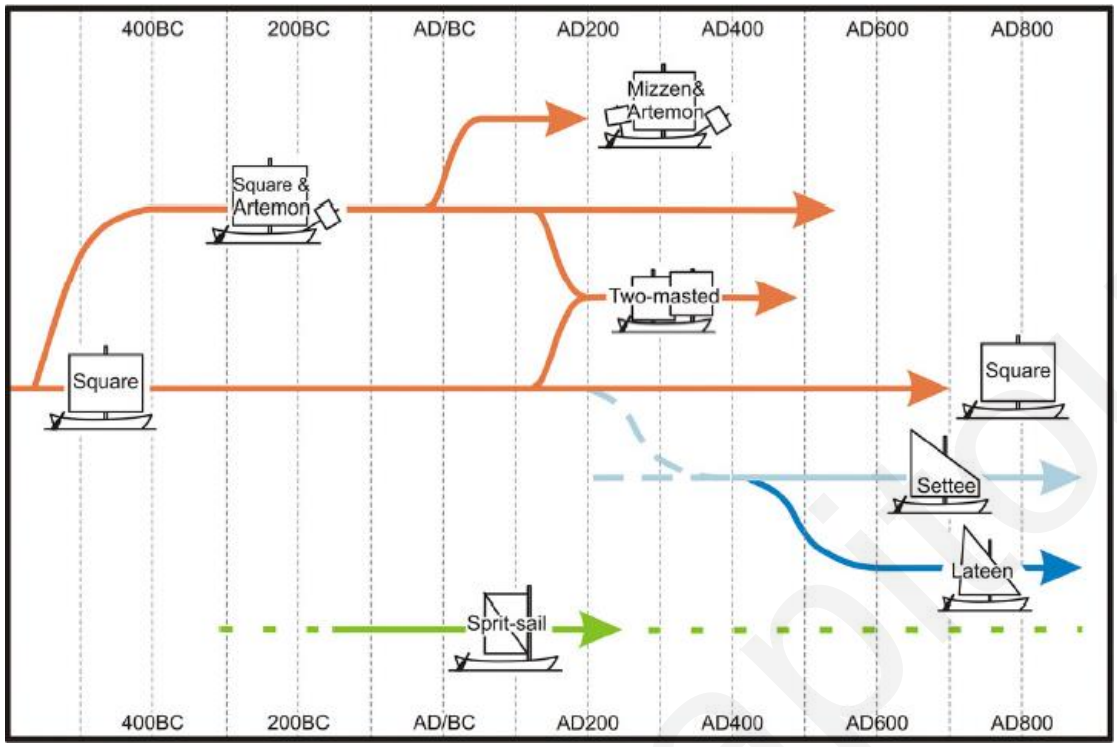

Figure 3: The different types of sailing rigs that co-existed during the Late Roman and Byzantine periods (Whitewright, 2017, fig. 5)

In conclusion, the merchant ships of the Late Roman and Byzantine periods presented a variety both in ship types as well as in equipment and sailing rigs (**Fig. 3)**.Thesmaller crafts, around 7-8m long, were the best suited for the cabotage type of trade that was prevalent during these periods. The sailing technology of the period has developed to accommodate the needs of trade and also the navigational knowledge of the seamen that would take advantage of the weather.

1.3 Ports and Harbours

Ports and harbours are a major aspect of MCL studies, since they are the essential nodes where most maritime activities took place and they functioned as connecting points between man and sea. In this thesis, the term "*port"* is used for the urban, manmade harbours, while the smaller, secondary anchorages, will be characterized as "*harbours*".

According to the American Heritage Dictionary (https://ahdictionary.com/word/search.html?q=port) a port is "a place on the waterway with facilities for loading and unloading ships" and/or "a city or a town on a waterway with such facilities". From this definition it can be seen that "port", at least in the modern sense of the word, is associated with the existence of man-madeinstallations for the loading and unloading of cargoes. However, the word "port" has been used in a different context in archaeological literature as well. An interesting use of the term is employed by Leidwanger (2013: 223-224) who introduces the term "opportunistic ports" as spaces of exchange during the Late Roman period in Cyprus, where people would take advantage of any accessible strip on the shore, thus making the need for any installations unnecessary. So, here "port" is used in a broadersense. A similar use is echoed in an earlier article by Houston (1988: 560), whoalso notes that Roman trade would have happened in small, coastal sites with minimal facilities or no facilities at all. It can thus be seen, that while the term "port" can include the

existence of installations, the installations themselves are not necessary for an area to be defined as a port in literature.
A harbour is “a sheltered part of a body of water deep enough to provide anchorage for ships”, according tothe American Heritage Dictionaryof the English Language (https://www.ahdictionary.com/word/search.html?id=H505950). Harbours can be classified as both natural and artificial, each one with its own characteristics. Most often, depending on the availability of the coastline, bays would take on the role of natural harbours (Morton, 2001: 19), since they were indentations in the coastline that could provide adequate shelter for ships, while having enough depth to prevent the ships from running aground. Also, it would have been easier for smaller vessels to unload their cargo directly on the beach, without the need for any type of harbourworks or installations (Blackman, 1982: 80). Most natural harbours would have access further inland through a beach, thus facilitating trade and requiring minimal installations.Artificial harbours were constructed in places where there were no (or not adequate) natural affordances in the coastline that could offer shelter. They consist of a number of installations, including breakwaters, moles, quays and others (Ginalis, 2014: 17) that facilitated larger merchantmen to moor and unload their cargo, rather than risk going too close to the beach and run aground (Blackman, 1982: 90).

1.4 Sailing and Navigation

1.4.1 Headlands as Landmarksand Navigational Hazards

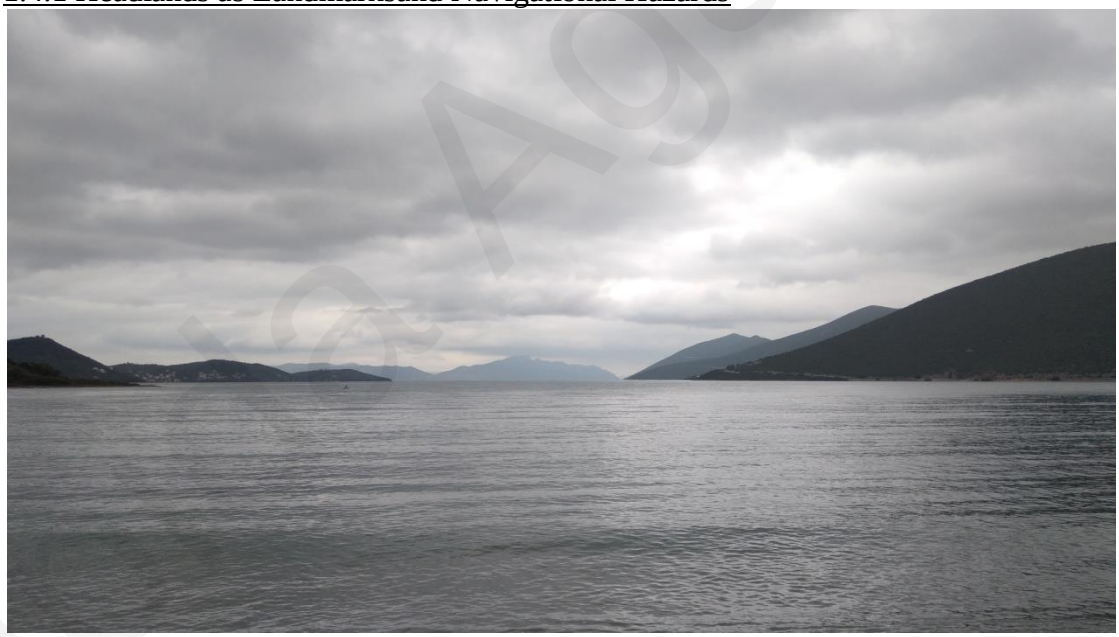

Figure 4:The entrance of the Bay of Nies, viewed from the land. On the right side, the headland of Glaros promontory which is hugging the bay and further beyond there is also a view of the promontories that stretch on the eastern face of Glaros (Photo was taken from the beach at Nies, within the Bay, by ElpidaAgapitou).

The topography of the coast has played a major role in sailing and navigation. Ancient sailors would have to rely on landmarks, i.e. topographical features of the coastline to orientate themselves and calculate their position in the sea during their voyage, and thereforesailing in sight of the coastline was preferable (Agouridis, 1997: 15-16). Promontories and their headlands (**Fig. 4)**,mentioned in ancient texts(Morton 2001: 67-68), are land features of a certain stature that project further into the open sea, and thus are easily distinguishable from a distance (Morton 2001: 186-187; Mc Grail 1991; Beresford 2013: 183 ff). Due to the morphology of the Greek coastline,

promontories occur frequently and were used as successive landmarks to ascertain the correct course of a ship, even in weather conditions that diminish visibility, or make sailing harder, such as turbulent winds or fog (Morton, 2001: 188-189). However, the promontories and headlands were also a serious navigational hazard for sailors, due to the tumultuous environment around them (**Fig. 5**).

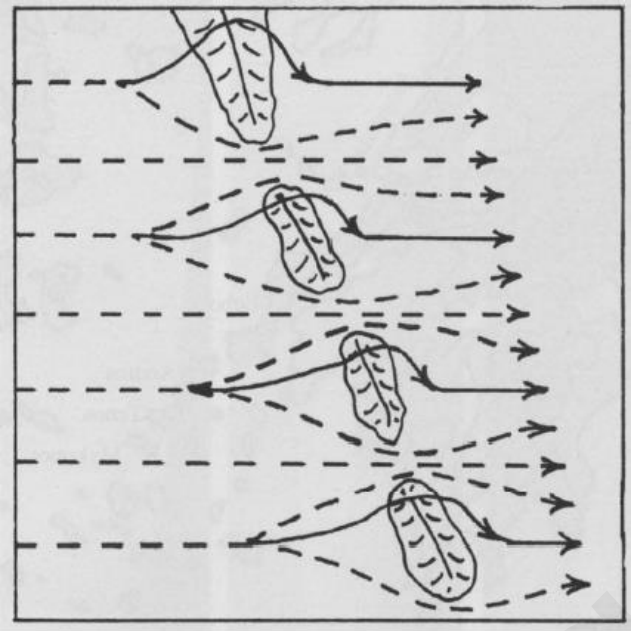

Figure 5: Wind displacement around headland and island chain (Morton, 2001; fig. 28)

Before moving on to explain the potential hazards that the promontories and headlands caused for navigation, it is important to properly make the distinction between those two terms. Morton (2001: 68) defines the promontories as projections of the land towards the sea and the headlands as the point that these promontories terminate. One more important distinction to be noted is the fact that while the promontories themselves could be of relatively small height, the headlands can be higher, steeper and generally more prominent features of the coastline.

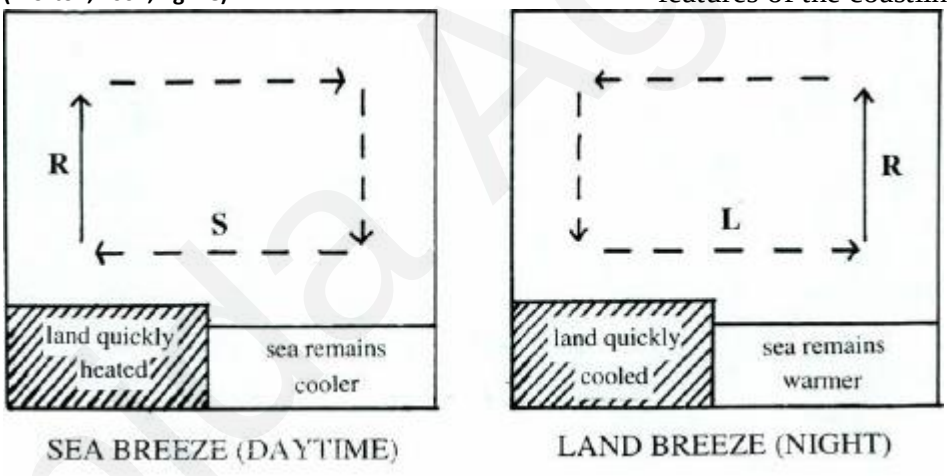

Figure 6: Land and sea breeze cycles (Morton, 2001; fig. 26)

Due to their nature, promontorieshave a major impact on the meteorological conditions surrounding them (Morton, 2001: 76-79). More specifically, the winds that would impact upon the rise of these promontories would meet the land at full force. Furthermore, most headlands of promontories constitute the meeting point of winds blowing from different directions. This is due to the fact that the winds blowing from the sea and also the various local land breezes and the inland winds collide at headlands, making the navigation around them very difficult. The leeside of a promontory can sometimes also present navigational problems, since the winds that hit the exposed side are redirected vertically moving downwards in an unpredictable way. All the above suggest that navigating around a promontory can be quite challenging (Morton, 2001: 76-77). The favorable winds that would help seamen

navigate towards the lee side could also be of the same intensity that would blow the ships off their course and onto the rocks, at the exposed side of the promontory. In the same way, ships that would round the headland to come out to the open sea would have to sail with the winds against them until they managed to move further away to the sea. The situation is further complicated by the local land and sea breezes (Morton, 2001: 51-53). These were localized wind cycles, very common and frequent in the Greek coastline, especially during summer and in calm conditions. They derive from the alternating heating and cooling of the land and sea surface. These winds often reinforce the stronger ones that blow across the open sea and come to head around promontories, making the meteorological conditions around these landmarks especially difficult.

However, the dangers that the promontories held for ancient sailors did not only result from the complicated wind conditions that existed around them. Their very nature was a danger to ancient mariners; as most promontories were formed by submerged mountain ridges, the seabed surrounding them can rise unpredictably, following the sloping sides of those mountain ridges. In such cases, the uneven seabed with shallow submerged areas poses a serious threat to ships (Morton, 2001: 68-69).

Furthermore, mainly due to the topography of the promontories themselves, and especially their headlands, the wave motion and height would be elevated around them. Because the promontories usually go further into the sea, this means that the waves break further from the coast.

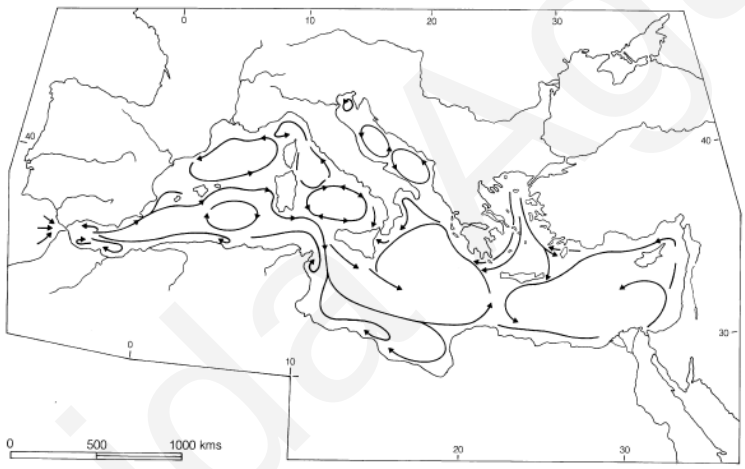

Figure 7: Currents in the Mediterranean (Agouridis, 1997; fig. 1)

Also, the currents around promontories and headlands can add to the danger in navigation. While the currents in the Mediterranean (**Fig. 7**) run at a variety of speeds, averaging at about 6 knots near the Straits of Gibraltar in the western Mediterranean, which in turn drops to about 3-4 knots the closer they get to the eastern part of the Mediterranean (Agouridis, 1997: 3).

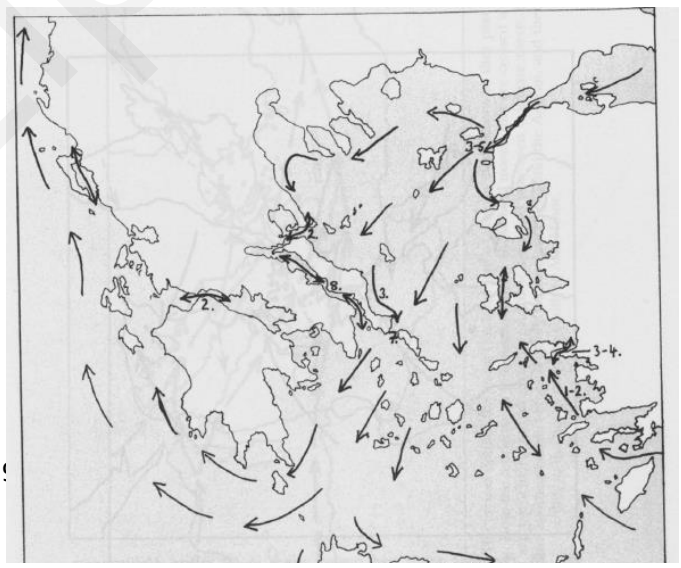

Figure 8: Currents in the Aegean (Morton, 2001; fig. 22)

The situation is different close to the coastline, where the land masses and the winds are more dominant over the currents. The Aegean Sea, with its plethora of islands and narrow straits, further complicates the movement of the currents, enhanced by surface currents that are created by the winds (Agouridis, 1997: 3) (**Fig. 8**). Also, due to the wave motion

and refraction, a shallow-water current is created, called “nearshore” current (Morton, 2001: 39). This current runs along the coast until it reaches a point where the water gets deeper, where it dissipates in favor of the predominant deep-sea currents. Headlands, as a feature of the coast that protrudes into the sea, are a natural obstacle to the path of the nearshore currents, thus making their impact stronger, due to the accumulated water that has to go around a headland (Morton, 2001: 39-41). Adding this to the fact that because they project into the sea it is possible that the promontories meet the deep-sea currents, then the surrounding environment of the promontories and their headlands becomes a focal point where different currents meet.

From the above, the dual nature of promontories for seamen can be understood. On the one hand, promontories could signifyprotection and a safe haven for the ships (**Fig. 9**). Since they protrude further into the open sea than any other topographical land feature, they can be considered as one of the main links ancient mariners had with the coastline. Their height makes them easily recognizable from a distance and thus, they were used as a landmark from the sea. Therefore, they were usually named after animals or other distinguishable features that help them remain in the memory of sailors (for example, if the shape of the promontory is reminiscent of an animal, it is common for it to be known as the animal it represents, also, in recent years, promontories are named after the churches or the local saints). Also, promontories break the force of the winds, thus providing shelter for ships in their lee side under adverse conditions for sailing. However, the conditions around the promontories can also be extremely difficult for navigation, since both the topography and the meteorological occurrences create an environment that requires exceptional navigational skills to avoid an accident.

Figure 9: Tainaron headlands in the fog; an example of the protection and danger these landmarks can represent (Morton, 2001; fig. 60ii)

1.4.2 Straits as Sailing Hazards

Figure 10: The Samian strait (Morton, 2001; fig. 64i)

Since Antiquity, particular attention was paid to straits as topographical features due to their environmental conditions and the effect they had on currents (**Fig. 10**) (Morton, 2001: 85). The morphology of straits, i.e. the small expanse of sea, flanked on both sides by land, strengthened the sea currents, making navigation through them challenging. The situation was complicated even further when wind was involved, due to the fact that winds can influence the movement of the currents that go through

straits, and also winds themselves are reinforced when they pass through a narrow strait (Morton, 2001: 86).

Morton (2001: 90) notes that the strengthened currents would make it almost impossible for ships to navigate in a course other than the one that the current leads them to. Since the winds also influence the currents that pass through straits, and they themselves are strengthened as they pass through these narrow channels, they were a common problem for ships sailing through. Furthermore sometimes the winds through straits may turn unpredictable, especially when it comes to winds that come rapidly down from heights; these are the so called 'katabatic' winds or winds coming down from the lee side of the land that rises over to the sides of the straits (Morton, 2001: 101-102). All of these, combined with the force and unpredictability of the winds through the straits, made navigation quite difficult in this environment.

1.4.3 The Sailing season

The discussion around the concept of the "sailing season" and which months should be deemed appropriate to be included in it has been a long one in the literature. Due to the meteorological conditions that prevailed over the Mediterranean, the weather was generally divided into two main seasons: summer, with generally steady winds and winter, with unpredictable conditions and storms. Following this, authors such as L. Casson (1959: 39), J. Rouge (1981: 15-16) and J. Pryor (1988: 87) determined that the sailing season of Antiquity must have been during the 'summer' months, i.e. from mid-March to mid-October, when the winds were relatively stable,while during the 'winter' months the Mediterranean remained "closed", with almost no sailing happening. However, recent research has steered away from this division. Morton (2001: 258-260) explains that the Mediterranean during wintertime was not as "closed" and devoid of sailing as was previously thought, sincethere were many sailors and merchants willing to brave the unpredictable seas; sailing was happening albeit with more caution exercised. Beresford (2013: 9-31) examinedthree "sailing calendars":*Works and Days* by Hesiod (around 700 BCE); the *Epitoma rei militarys*by Vegetius (4th or 5th century CE) and an edict of the Emperor Gratian (380 CE)in the *Codex Theodosianus*. Vegetius's work (Beresford, 2013: 14-16) seems to be more relevant to Late Roman warships, i.e. big ships, and hard to maneuver, as opposed to the merchant ships, which would have less problems to deal with the difficult and unpredictable winter conditions. Similar limitations can be observed in the edict of the Emperor Gratian (Beresford, 2013: 23-24) where the parameters of the sailing season are more clearly defined from 13 April to 15 October. This is one of the first textual evidence of a governmental decision that enforces a ban on maritime activities for a certain period of time. However, the edict itself appears to apply only to a certain type of cargo shipments, mainly the ships that were carrying grain, with the rest of the maritime traffic being relatively free to act without limitations.

It thus becomes clear that there cannot be an objective understanding of the sailing season, since numerousvariables should be taken into account. The human factor plays an important role, since merchants, in the face of profit, would not hesitate to set sail during winter months(Beresford, 2013: 40-43; Morton, 2001: 258-259). The rules and precautions concerning sailing during wintertime also depended on the region (Beresford, 2013: 16-22) since voyaging during wintertime would possibly have been easier in shorter maritime routes that would not have been affected by the unpredictable weather.

In conclusion, the sailing season is a complex concept, based primarily on the weather but also varied depending on the human and regional factors. Thus, an examination of local weather conditions is necessary in order to better understand the possible sailing season(s) that the sailors would take advantage of.

1.5 Connectivity, Coastscapes and Maritime "Small Worlds"

The notion of "connectivity" was introduced in the archaeological studies by Horden and Purcell (2000: 123-125); more specifically introducing the notion of"Lines of Sound and Lines of Sight"between various micro-regions that relied on people and their fields of perception. Within the context of the MCL, the notion of connectivity does not contain itself only on certain maritime routes, or with mobilityenabled by several ways, most prominent among which are the ships (Leidwanger&Knappet, 2018: 1-2). Connectivity, far more than the simple connection of different end points or dots, is the diverse waysthrough which different unities, such as micro-regions, interact with one another (Horden& Purcell, 2020: 192-194). And in this particular case, while the interpretation of "lines of sight" can be quite clear, to the point that communication in between micro-regionsrely heavily upon visual confirmation and the nature of the landscape, the "lines of sound" were of a more abstract nature. In their writings, Horden and Purcell (2000: 124) refer to them as the "acoustic element in the development of the network", explaining them as human interactions that travel as far as sound can reach the two nodes that are to be connected and can help in establishing networks. In the context of ports, this can be translated as the vocal communication people coming inside the port would have with the people that inhabited it. Since connectivity has to do with movement and mobility, "time" is of the essence, since it affects the movement andtravelling.

Both the notions of "connectivity" and "mobility" can be studied in the same context, because both can offer more holistic insights into the cultural landscape; connectivity as the potential and the opportunity of connection and mobility as the realization of this potential (Leidwanger&Knappet 2018: 4). Thus, maritime networks are not limited only by the geography of the area, but also by the people that are in the heart of them, along with the connection and social relations that are formed in the settlements. However, in order for the Maritime Cultural Landscape to be examined in a specific area, it is important that connectivity patterns are researched, especially when it comes to relations between important social and economic hubs, such as ports and settlements. In historical periods, such as the Late Roman and the Byzantine ones (4^{th} – 12^{th} centuries AD), it is possible to find and explore such connectivity patterns, since there is significant amount of archaeological material available, either in the form of shipwrecks or in the ports and harbours themselves (Tartaron 2018: 69). Although maritime routes may remain the same across historical periods,unless major changes happen, the social and hierarchical status of the settlements or hubs of cultural activity that are connected do change(Tartaron, 2018: 86-89) and affect the connectivity patterns accordingly, to accommodate the emergence of new social and economic powers.

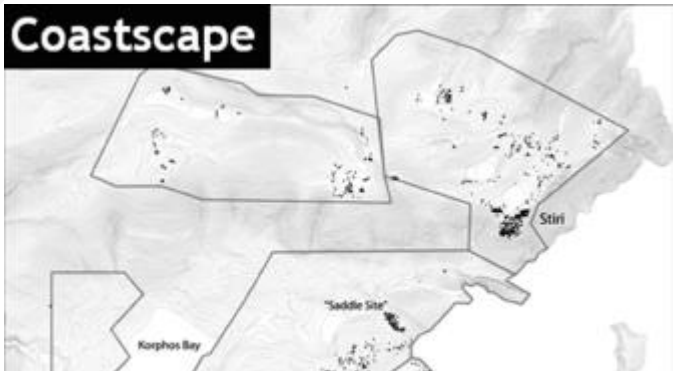

Figure 11: Tartaron's examples of coastscapes in the Saronic gulf, during the Bronze Age (Tartaron, 2018; fig. 4.2a)

Tartaron (2018: 73) introduced the term "coastscape" as a means of categorization of the maritime

interactions in a certain area and he distinguished it from the even larger notion of a "maritime small world" that encompasses different coastscapes (**Fig. 11**). He defined the coastscape as "the coastal zone defined by habitation, interaction, practice and perception". This is the space where the land meets the sea and the maritime activities take place. However, this notion is not limited only to the coastline and its habitation and settlement patterns; instead it also encompasses the inland spaces and openings that connect the coast with the hinterland, and also the cognitive landscape, in the form of the visual landmarks that seamen would often utilize.Besides the physical capabilities of the landscape itself, such as the limits of the mountains or the hills that would have surrounded the cities, the spheres of influence of those hubs would have extended to include also the cognitive limits, the limits of the eyes and the knowledge of the people inhabiting this very same landscape. Acoastscape extends to include the shallow waters of the bays in which the ports reside and also the maritime routes that both start and end in these hubs. The fact that the ports were situatedin sheltered bays, indicates that the sailors knew about the prevailing winds and took advantage not only of the shelter but also of the surrounding area, both for resources and for the distribution of the products of the trade.

Tartaron (2013, 186) adds the temporal parameter in his categorization of coastscapes. Interactions within a coastscapetake a few hours and are part of everyday life. They are the types of journeys people could make with small fishing vessels and merchant crafts, and also journeys that do not require a higher degree of specialization. Thus, the temporal parameter of a coastscape not only includes the communication between coastline and inland settlements –for example making use of the river network in an area- but it can also include everyday journeys either for trade of for maritime activities, such as fishing, that would take no more than a few hours to be completed.

A maritime small world however is a larger unit that Tartaron (2013, 190-198) describes as a "spheres of interaction that form as aggregates of many neighboring coastscapes". The temporal aspect is still prevalent even here, since, outside of the landscape and the social interactions, the "small worlds" are defined by interactions that are habitual and would take no more than a few days to complete.

1.6 Research Questions and the scope of this thesis

Despite itsrich archaeological record, the Pagasetic gulf has not been examined through the lensof the MCL, thus far.The purpose of this thesis is to do soat the south-western side of the Pagasetic gulf during the Late Roman and Byzantine periods,with a focus on the components of transport landscapes: shipwrecks, ports and anchorages. The main research questions of this thesis tackled the notion of connectivity between major ports of the gulf, such as Demetrias, Thessalian Thebes and Almyros, ports which all peaked at different times during the periods under consideration, and also smaller harbours that were integral parts of the coastal maritime routes, like the Bay of Nies and the Bay of Amaliapolis. Due to its geomorphology, the western coast of the gulf is riddled with small bays, which could have functionedasrural anchorages.

However, only the bays of Amaliapolis and Nies, have yielded concrete evidence of maritime activities, thus far, in the form of the shipwrecks.

In this discussion, the issue of time was also taken into consideration, informed bya short ethnographic research and also byestimated voyage durations of ancient ships, such as the Keryneia II (Cariolou, 1997).The general winds, waves and currents of the gulf were examined, in an effort to understand the environmental parameters of ship mobility within the gulf, which were the adverse wind conditions, such as storms and sudden squalls and when would those impact the gulf.

The shipwrecks were examined, based on the existing bibliography and then were placed within the general context of the Maritime Cultural Landscape of the gulf. In an attempt to see how theyrelate with the winds that dominate the gulf and the environment around promontories they were analyzed in accordance with the meteorological data that were collected. This informed conclusions about the seasonal traveling inside the gulf and how sailors took advantage of the winds and the currents whilesailinginside the gulf.

One more important question that occurred during this research, is whether it would be possible, after examining the shipwrecks and the nodes of maritime activity, to refer to the Pagasetic gulf as a Late Roman and Byzantine "maritime small world" that includes spheres of interaction between different coastscapes, following Tartaron's (2013; 2018) work on with the Mycenaean Saronic gulf. Given the fact that a major aspect of the MCL is the notion of "connectivity" it was deemed important to try and understand how it could be applied to a certain area such as the Pagasetic. In this respect, the major ports that flourished in the gulf during the periods under consideration were examined. They were situated on the western side of the gulfand they were established as centers of maritime activities that functioned as gateways of the Thessalian plain to the Pagasetic gulf and the Aegean. Therefore, there was an attempt to place them as the centers of possiblecoastscapes, and thus as centers of communication within the model of the "maritime small world" that would fit the Pagasetic gulf during the periods examined.

1.7 Methodology

To better answer the aforementioned questions a combination of research methods used.
In order to understand better maritime connectivity between the ports, information was gathered concerning the distances between the major ports of the gulf and the time it would take for a sailing ship to travel between them, using the recorded average speed of the Keryneia II, as a basis for the calculation of the trip durations (Cariolou, 1997).

Since wind plays a major role in sailing and navigation, data about wind speed and direction, provided by the Hellenic Meteorological Service, were collected from stations both within the gulf –Volos, NeaAnchialos- and outside of it, namely the islands of Skiathos and Skopelos. The data spanned over a period of twenty years and they provided an accurate image of the winds that impact the gulf. The raw data provided by the Meteorological Service were processed using an algorithm, to create "bins" –i.e. groups- that were then turned into percentages that demonstratethe

frequency of the wind direction.They were then processed further so as to construct diagrams (wind roses) that showcase the direction and speed of the winds, both on a monthly basis and on a seasonal one. The study of the meteorological conditions of the gulf was used for the examination of the movement and transportation that took place inside it. Concepts such as the "sailing season" and the "favorable" and "adverse" winds for sailing inside of the gulf provide a picture of the possible connectivity patterns between the major ports of the gulf, but also answers pertaining to the time it would take to travel between them.

In order to better understand the "connectivity" and "movement" between specific sites in the Pagasetic, the available bibliography, both concerning the area and also the various maritime activities that took place in it, were examined. The gulf has been a substantial trade and maritime center diachronically, as it is evident from the excavations in port-cities such as Thessalian Thebes that brought to light an urban network which points to a substantial development from the 4th century up until at least the 7th century CE (Karagiorgou, 2001).During the Byzantine period, ports like Almyros came to prominence and took over control of their surrounding area, as excavations by Giannopoulos (1904) and Reinders (2007) have demonstrated. Contemporary and historical sources have helped further to establish this continuity in habitation, such as the chronicles of the journeys of rabbi Benjamin of Tudela (Asher, 1840), who visited the area in the 12th century and recorded the sites he passed through.

In order also to have a better understanding of the connectivity patterns that existed in the gulf and also to gather more information on small-scale journeys that would have taken place inside the gulf, comparative material was used, such as journals printed in the city of Volos in the beginning of the 20th century, whererelated matters are discussed, such as the connection between the local population with the seaand also ways of traversing the gulfin the most recent past. To that end, a small-scale ethnographic research took place in the area, with a focus on seamen that knew the local winds and seasons, such as fishermen and sailors. Their input was important to put the local meteorological phenomena into the maritime archaeological context described above. It also provided insights into the way the local communities view the sea and the landscape that they inhabit.

Finally, with the use of GIS software, an attempt was made to employ Tartaron's models of the "coastscapes" and the "maritime small worlds" within the area of the Pagasetic gulf. To be able to approach the nature of the possible "coastscapes" that make up the Paraseticmaritime small worldduring those periods, the major ports and anchorages of the gulf –that will be discussed in length in chapter 2.3- were used as the centers of these proposed "coastscapes". Also the "lines of sight" that Horden and Purcell (2000, 2020) propose in their writings formed the basis upon which a visibility analysis took place with the help of GIS to determine the size of these "coastscapes".

2.Navigation along the Western Pagasetic gulf

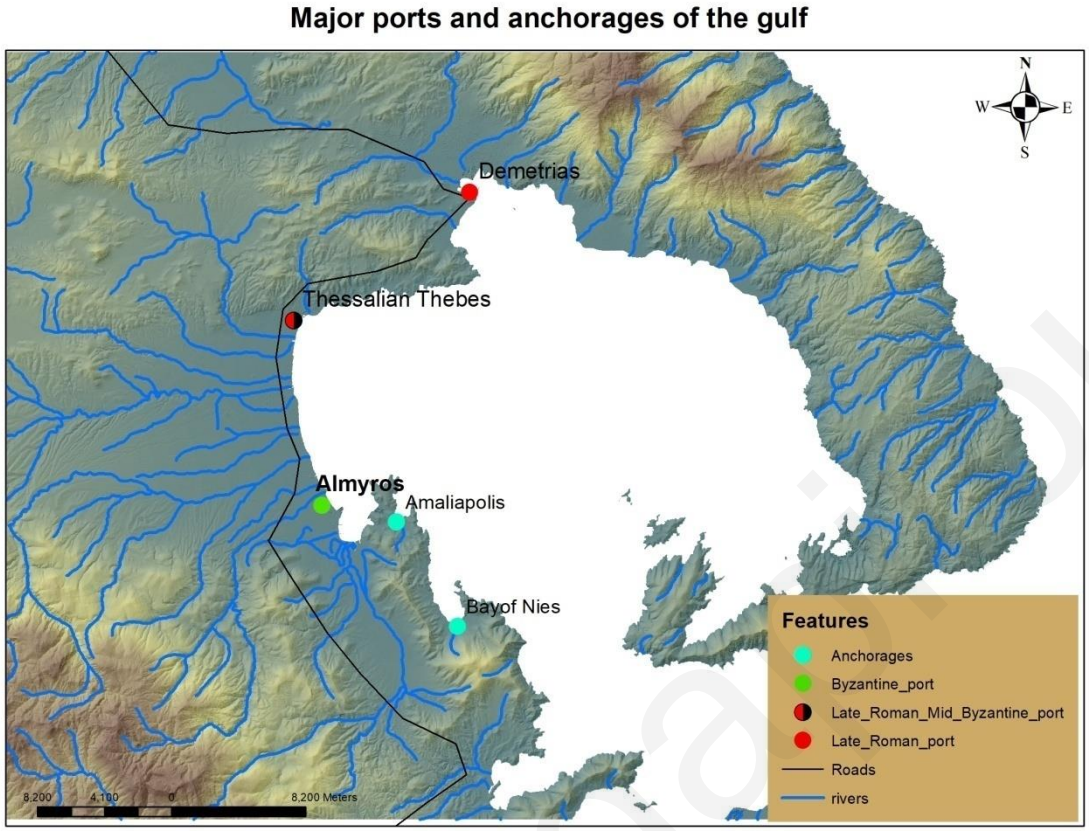

Figure 12: The major ports and anchorages of the gulf discussed in the thesis (map by ElpidaAgapitou)

The Pagasetic gulf was a hub of maritime activity during the Late Roman and Byzantine periods (4th – 12/13th centuries AD) (**Fig. 12**). Its central position on the Greek peninsula, along with the fact that it was the opening of the Thessalian plane towards the Aegean Sea, made it the focal point of trade and commerce for the various powers that dominated the area diachronically. The morphology of its western coastline, with an abundance of bays and natural harbours, has offered many safe havens for ships and its rather mild meteorological conditions, affected by the Pelion peninsula that encloses the gulf from the east, have made it a relatively safe environment for sailing and navigation.

The work of Koulouras (1997: 11-17) offers a large number of details on the geomorphology and the geography of the gulf that shaped and defined the sites of the major port cities, during the periods under consideration. Unlike the eastern coasts of the gulf that do not have great geomorphological variety, the western coastline is riddled with sheltered bays and promontories that the mariners could take advantage of and in fact, did so. To name only a few, starting from the Bay of Volos, north of the gulf, and heading south towards the straits of Trikeri, i.e. the entrance to the gulf, prominent coastal features are the Bays of Almyros, Amaliapolis and Nies, as well as the major promontories of Klimos and Prioni (modern Agios Georgios) (Koulouras, 1997: 16).

2.1. The Straits of Trikeri: The entrance to the gulf

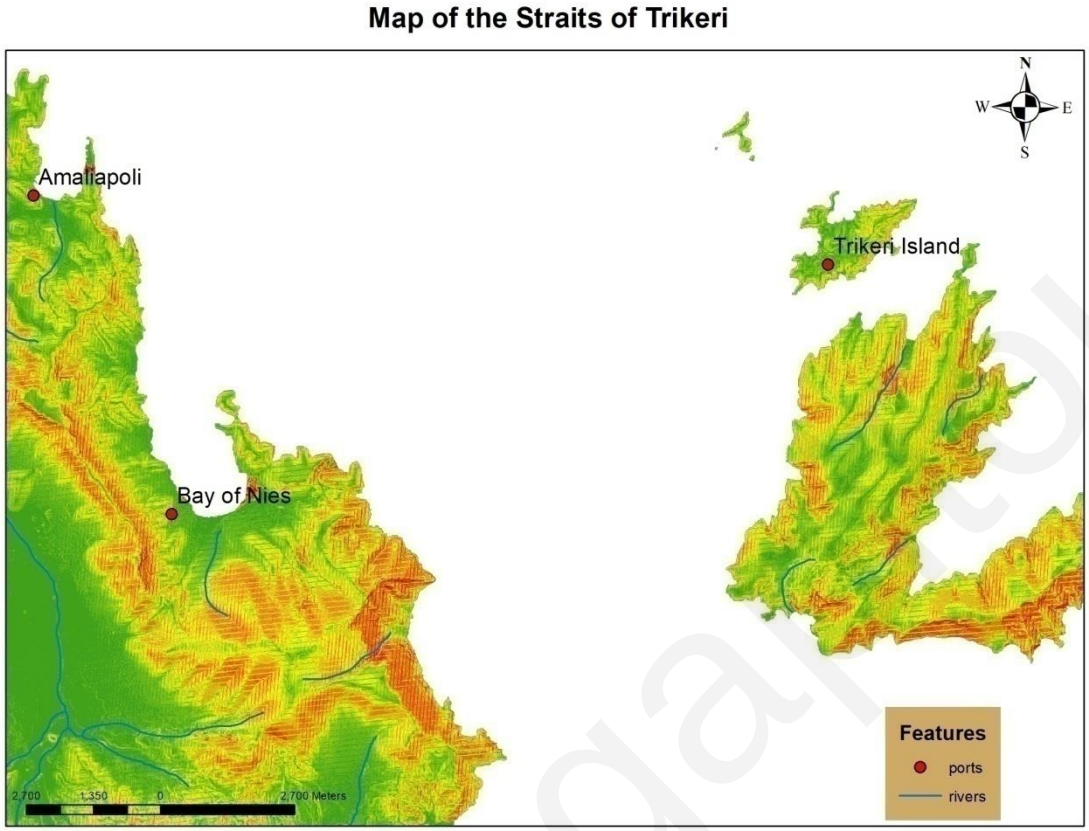

Figure 13: Map of the straits of Trikeri, with the port of Amaliapolis and the Bay of Nies shown in the west (map by ElpidaAgapitou)

A major topographical feature that impacts the environment of the southern Pagasetic gulf is the Straits of Trikeri to the south (**Fig. 13**), where the gulf opens towards the islands of the Sporades, Euboea and the Aegean Sea. The Trikeri Straits is a narrow channel, 5,5 kilometers wide and up to 82 meters deep, that modulates the currents and wave movement of the entire gulf (Petihakis et al., 2012: S34). It is from this point that the water comes out of the gulf towards the gulf of Euboea. In the same way, water from the gulf of Euboea enters the Pagasetic, via mostly the eastern side of the Straits of Trikeri. The constant movement of the waters creates cyclones inside of the Gulf, in the western and eastern areas, which change according to the season (**Fig. 14**). Thus, during the winter and spring two different water movements are observed, one that runs in a clockwise direction on the western part of the Gulf, and a counter-clockwise movement that is observed on the eastern part of the Gulf. In the summer, the dominant movement of the waters runs in a clockwise direction and which is perpetuated for the most part of the autumn as well.

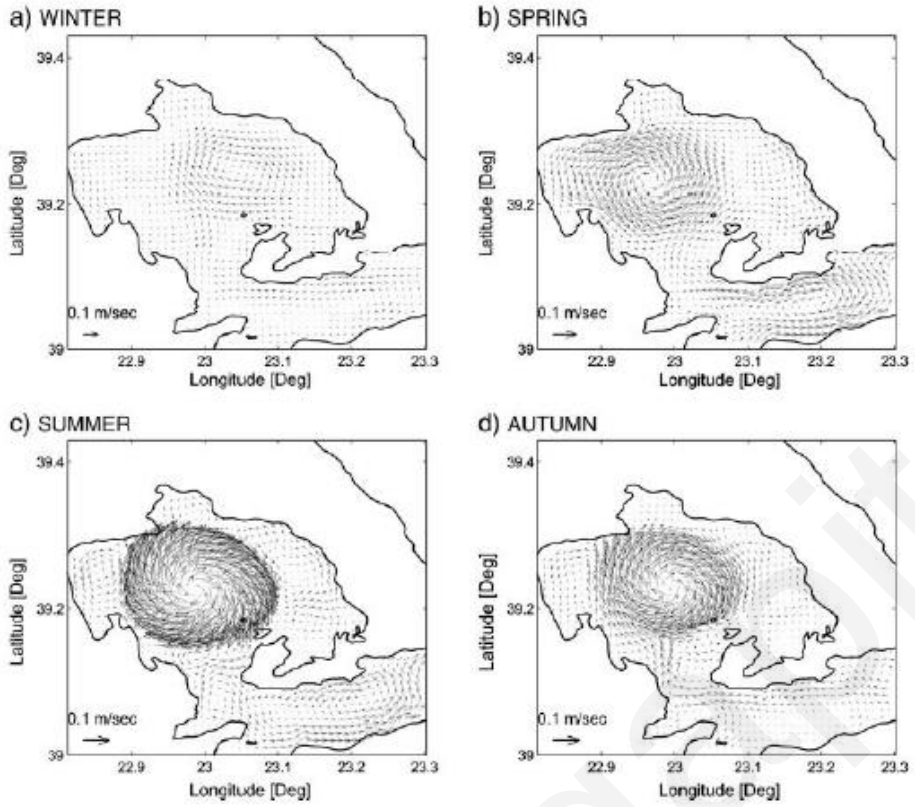

Figure 14: Water movement inside the gulf, at a depth of 10m over a full seasonal cycle (Φιλιππάκης, 2017; εικ. 17)

2.2 Winds of the Pagasetic gulf

Among the few studies about the natural environment of the Pagasetic Gulf the one performed by G. Petihakis and his team (Petihakis et al., 2012) stands out. It has demonstrated that the local microclimate is governed by two, relatively weak, wind systems that form a thermocline; the first one is the Etesians, that blow in a north-west direction, and the other is the southern warm and dry winds (Petihakis et al., 2012: S34).

The gulf itself is a semi enclosed environment with its average depth ranging between 69 and 108 meters – the largest depth located at the eastern part of the Gulf (Petihakis et al., 2012: S34).The Pelion peninsula, orientated on the north-west to south-east axis, embraces the Gulf on the east and functions as a barrier that delegates the northern winds coming from the Aegean, displacing them and greatly depleting the force with which they travelled over the open sea. However, given the general conditions of wind displacement by barriers such as peninsulas, it is not uncommon for stronger winds to be met inside the gulf, especially in cases of strong north-eastern winds that bypass the barrier of the peninsula (Morton, 2001: 57).

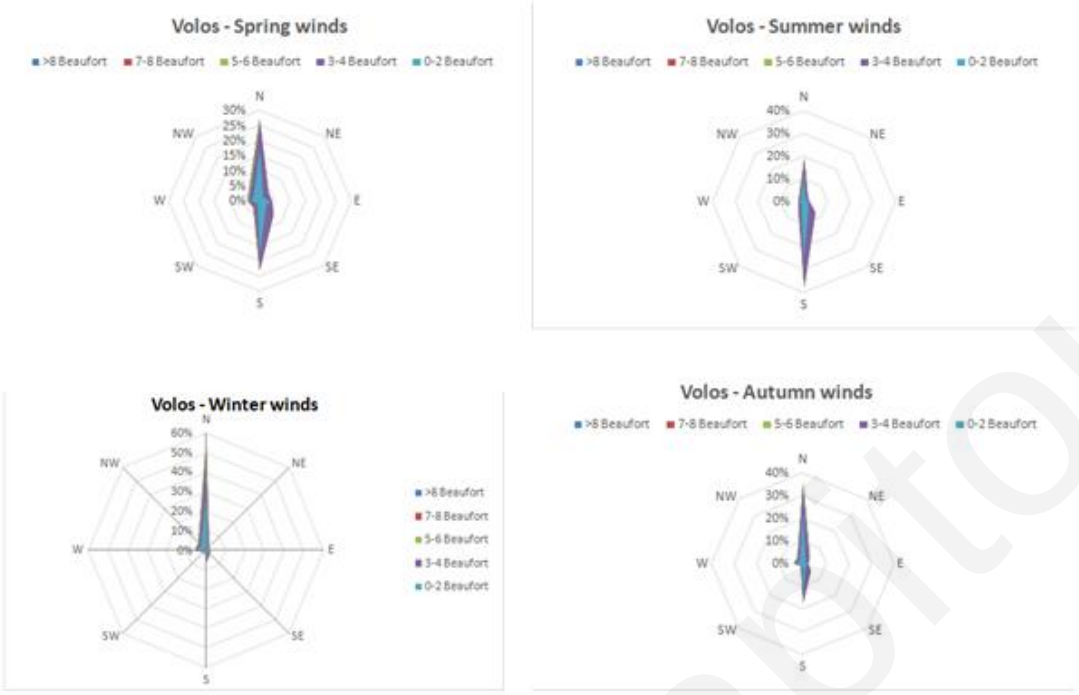

Figure 15: Wind-roses representing a full seasonal cycle of the winds impacting the area of Volos. It is shown that in spring and autumn the winds are changing directions from North to South. During summer the winds are blowing mainly from the south, while in the winter the area is impacted by northern winds (Windroses by Apostolos Sarris and Elpida Agapitou)

To further evaluate the winds that impact the gulf, wind data from local stations spanning a period of at least twenty years were processed and studied (**Fig. 15**). More specifically, monthly wind roses of the speed and direction of the winds were created and further processed to create the seasonal wind roses that provide a better image of the general wind conditions of the area.

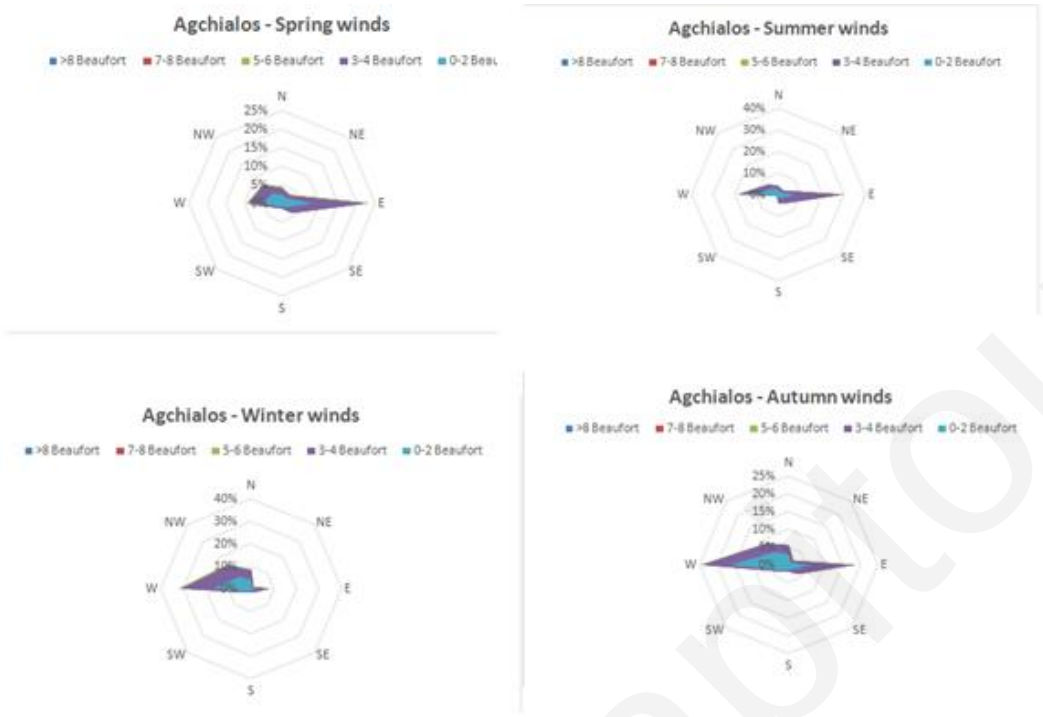

Figure 16: Wind roses representing a full seasonal cycle of the winds in the area of NeaAnchialos. The summer and autumn are transitional periods when the winds change directions from East to West and backwards, while during spring the winds originate mainly from the East and in the winter mainly from the West (Wind roses by Apostolos Sarris and Elpida Agapitou)

Some interesting conclusions can be drawn. The wind speed inside the Gulf rarely goes above 4-5 BFT, as can be seen from the stations at Volos and Nea Anchialos. Further processing of the meteorological data has shown results similar to the observations made by previous researchers concerning the winds that impact the area. The gulf of Volos is impacted by north winds in winter and autumn and south winds in summer and spring, while Nea Anchialos is impacted mostly by west winds during winter and autumn, that turn to east winds in spring and summer (**Fig. 16**). This has mostly to do with the topography of the area, since there are no large land masses to prevent the winds that blow from the mainland and hit Almyros plain in full force. In general, excluding the area of Nea Anchialos, the prevailing winds in the gulf during the spring and summer months are blowing from the south. The western and eastern winds that come from the plane of Almyros, would have a negative impact on ships traveling across the gulf of Nea Anchialos and Almyros, since they would create an environment that would have been difficult for navigation, adding hours to the shorter journeys that would have taken place between ports.

However, the nature of the winds that impact the gulf cannot be solely limited to the general wind directions across the gulf. It has already been seen that the environment around promontories and headlands is tumultuous, with winds and currents affecting navigation. The same can be said for the environment around the areas of interest, i.e. the promontory of Glaros and Cape Telegraphos. As it occurred from both the examination of the local land breezes and also from the local knowledge of sailors, in the early morning until noon, the wind around these areas picks up from the land and blows towards the open sea. Under such conditions, entering the Bay of Nies would have been of extreme difficulty in day time, while it would facilitate the exit from it. In the same way, the wind conditions around Cape Telegraphos would create

difficulties for navigation, in case of turbulent squalls that could happen during the interchange of the land and sea breezes.

2.3 Promontories, Headlands as Landmarks: Cape Glaros, Cape Telegraphos and the Bays of Amaliapolis and Nies

The topography of the southern Pagasetic gulf offers many points of interest in a discussion concerning natural landmarks. The entire west coastline, from the entrance of the gulf to the south, all the way to the northern part is filled with small, natural bays and promontories with their headlands. Amongst those, the two most prominent in the area are Cape Glaros, located on the entrance to the Bay of Nies and Cape Telegraphos a few kilometers to the south. They both present the natural characteristics of promontories, as were discussed in the previous chapter. The Glaros promontory has a north to south orientation, while Cape Telegraphos protrudes more to the north-east (**Fig. 17**). Given the importance of the winds around promontories and their headlands, it can be noted that these two prominent features in the landscape of the gulf host the same wind and water movement that is often noted around such features. With the winds inside the gulf never rising above 5 Beaufort, the land breezes that are featured around those promontories are further strengthened, making the environment around them even more difficult for ships to navigate. More specifically, the predominant south-east winds during spring and summer, upon hitting the faces of both the Glaros promontory and Cape Telegraphos will cause considerable wave movement and refraction. Since Cape Telegraphos, is oriented on the northeast-to-southwest axis, the south-eastern winds hitting upon its southern face would make it hard for ships to find shelter or navigate around it. In the spring and summer, this cape would offer better protection on the lee side that faces to the north, thus cutting the strong force of the winds. The Glaros promontory, on the other hand, oriented on the north-to-south axis, would take the brunt of the south-eastern winds that blow in the spring and summer, and thus, the Bay of Nies would be a significant shelter from those winds. The situation is reversed during autumn and winter, when the winds start blowing from the north-east. At that time, Cape Telegraphos would offer better protection on the side that faces the south, since the wave movement would be considerable.

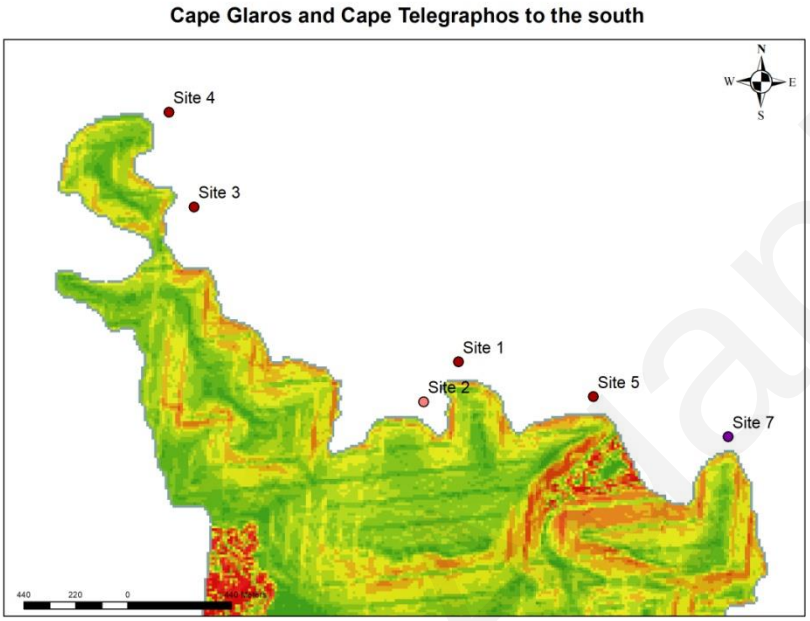

Figure 17: Map of the promontories along the eastern face of Cape Glaros, with Cape Telegraphos on the south-eastern part. Here are also shown the wrecksites alongside the Cape, with site no. 7 located on Cape Telegraphos

Here, it is important to note the impact the currents of the gulf would have on these promontories. As it has already been noted, the water that enters from the Straits of Trikeri at the entrance of the gulf creates cyclones on the inside, one of which is centered on the western front of the gulf. The currents are influenced by the winds, thus it is possible that the cyclone that is formed, is reinforced by the south-eastern winds that dominate the gulf during spring and summer. However, here is where the dangerous nature around the promontories is encountered. Since Cape Telegraphos is oriented on the east-to-west axis, it is possible that, with the currents and water movement inside the gulf, a greater wave refraction is created, thus making the environment around the cape hazardous. In the same way, the Glaros promontory would have greater wave refraction around the headland, which ships had to turn to enter the Bay.

Glaros promontory

Figure 18: Air view of the Glaros promontory from the north (Φιλιππάκης, 2017; εικ. 10)

Cape Glaros (**Fig. 18**), located on the entrance of the Bay of Nies, hugs the bay from the east. It rises to a maximum height of 37.7 meters from the sea surface. Its rise is not steep, rather it is a gradual incline. Its height makes it a sufficient barrier from the eastern and north-eastern winds that impact the area, thus it makes the bay a suitable shelter for incoming ships. However not unlike the nature of all promontories, the environment around it is tumultuous. The winds that originate from the mainland and come down rapidly from the surrounding hills that lie on the west side of the bay merge with the sea breeze, resulting in sudden squalls around the promontory.

Cape Telegraphos

Cape Telegraphos (**Fig. 19**) is located on the eastern front of Glaros promontory. It is a smaller cape, projecting to the east into the sea. It does not have a significant height, but it can be assumed that it played a key role as a landmark, since it was one of the first capes that ships would meet coming inside the gulf. The cape had the same tumultuous environment that

Figure 19: Photo from the archive of HIMA, showing the research on Cape Telegraphos (Photo taken from the HIMA archive)

is met in this kind of features. Despite the conditions of the gulf being generally mild and easy for sailing, squalls and turbulent winds could suddenly impact the cape, making it dangerous for navigation.

The Bays of Amaliapolis and Nies

These two sites play an important role in the present research, especially the Bay of Amaliapolis where the Kikynthos shipwreck lies. As it will be mentioned, the Bay of Amaliapolis is protected by the north-eastern and south-eastern winds by the small island of Kikynthos, while the Bay of Nies is protected by the Glaros promontory that hugs it in the east. These two sites are examined here together as the anchorages that they would have been for sailors in Antiquity and as possible stops in the maritime route that would have existed in the western Pagasetic gulf.

3. Shipwrecks on the western coast of the Pagasetic gulf

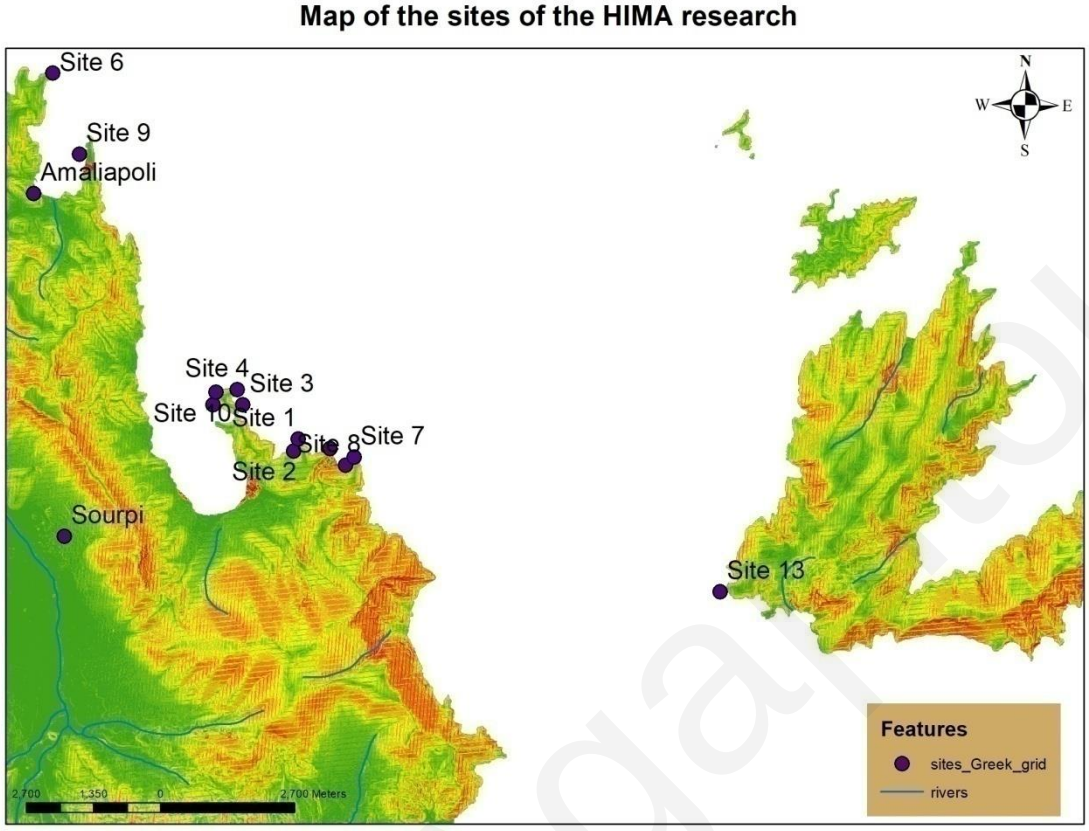

Figure 20: Map of the south-western Pagasetic gulf with the shipwreck sites discussed in the text.Sites 1, 3 and 4: 12th/13th c shipwrecks;Site 2: the 6th c shipwreck; Sites 5 and 8: 12th/13th c shipwrecks; Site 6: the 12th/13th c shipwreck at Cape Periklis;Site 7: the 4th c shipwreck at Cape Telegraphos;Site 9: the 11th/12th c shipwreck at Kikynthos; Sites 10 and 11: the concentrations of Hellenistic, Roman and Byzantine remains at the entrance of the Bay of Nies; Site 13: the 12th/13th c shipwreck at Cape Kavoulia, on the eastern side of the Gulf (Map by ElpidaAgapitou)

A concentration of shipwrecks was located on the western coastline of the Pagasetic gulf by the Hellenic Institute of Maritime Archaeology (HIMA) (**Fig. 20**) (Spondylis& Michalis, 2018: 78). The examination of these sites and a brief overview of their cargo can provide insights into the maritime movement and transport inside the gulf.

The largest concentration of shipwrecks was located on the eastern side of the Glarospromontory, on the outside of the Bay of Nies. Continuing to the north, one more wreck was discovered to the west of the island of Kikynthos, at the entrance to the Bay of Amaliapolis, and one more on the promontory of Perikles, further to the north.

HIMA has conducted survey at the south-western coast of the Pagasetic gulf (Spondylis, 2018: 78), since 2000. In total, 16 archaeological sites have been located, dating from the Early Bronze Age to the early 20thcentury CE, alongside a coastal zone that spans a length of 7 nautical miles, from Cape Periklis to the north to Cape Prionia to the south, including the Bay of Nies. From the 16 sites, 13 are shipwrecks, while architectural remains have been located on three different sites inside the Bay of Nies, dating to the Early Bronze Age, the Middle Bronze Age and the Hellenistic period (Spondylis& Michalis, 2018: 78) (**Fig. 21**).

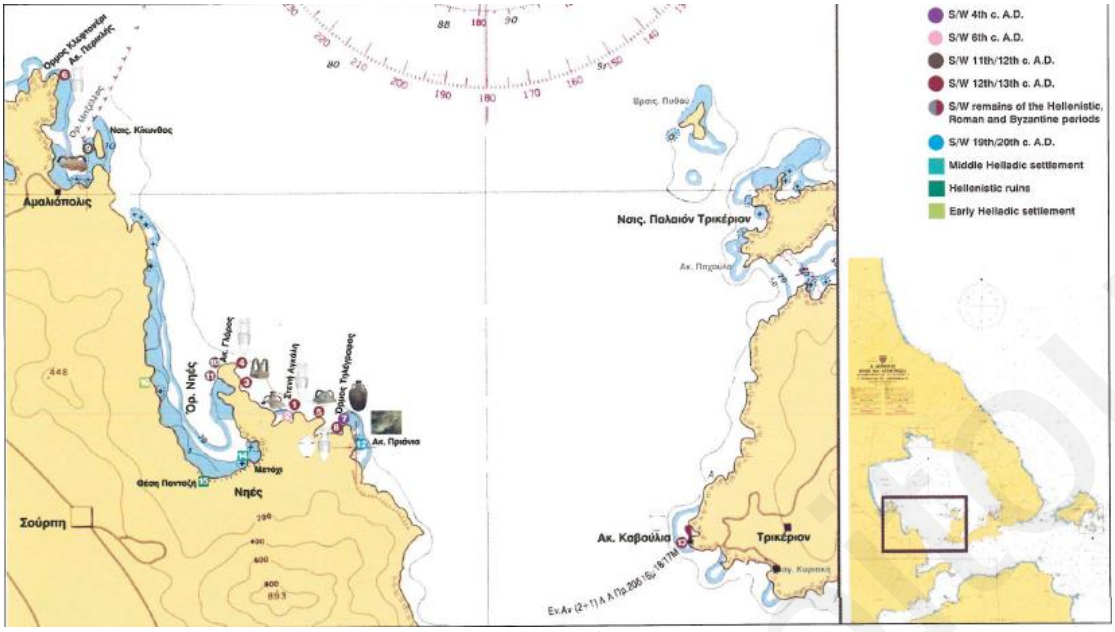

Figure 21: Map of the survey area with the discovered sites (Spondylis& Michalis, 2018; fig. 1)

It is deemed necessary to provide a brief overview of the research before examining the shipwrecks individually. The survey in the first year yielded 8 shipwrecks that date from Late Roman to Byzantine periods (Δεμέστιχα&Σπονδύλης, 2002: 24). Continuing the research in the following years, from 2003 to 2008, the archaeological investigations were focused on the excavation of Shipwreck 7 –number assigned by the research team- which was dated by its cargo to the 4th century AD (Δεμέστιχα&Σπονδύλης, 2004: 24-25; Σπονδύλης, 2017: 18-19). Another shipwreck was located on the western side of the island of Kikynthos while the largest concentration of sites was located on the east face of the Glaros promontory. Two more shipwrecks were located, one on the eastern side of the Gulf, on the Kavoulia promontory of Trikeri, dated to the Middle Byzantine period, and one on Cape Prionia that is dated to the early 20th century (Σπονδύλης, 2017: 22).

The date of the shipwrecks and the concentrations in the Late Roman and Byzantine periods demonstrates the rich maritime movement and activities that took place in the gulf during these periods. Only one of the 13 shipwrecks, wreck no. 7, was systematically excavated, while the rest were sufficiently documented and surveyed. The amphorae that were recovered from the wrecks provide useful evidence concerning the local trade and also raise many questions on the same subject.

3.1 Wreck 7, Cape Telegraphos

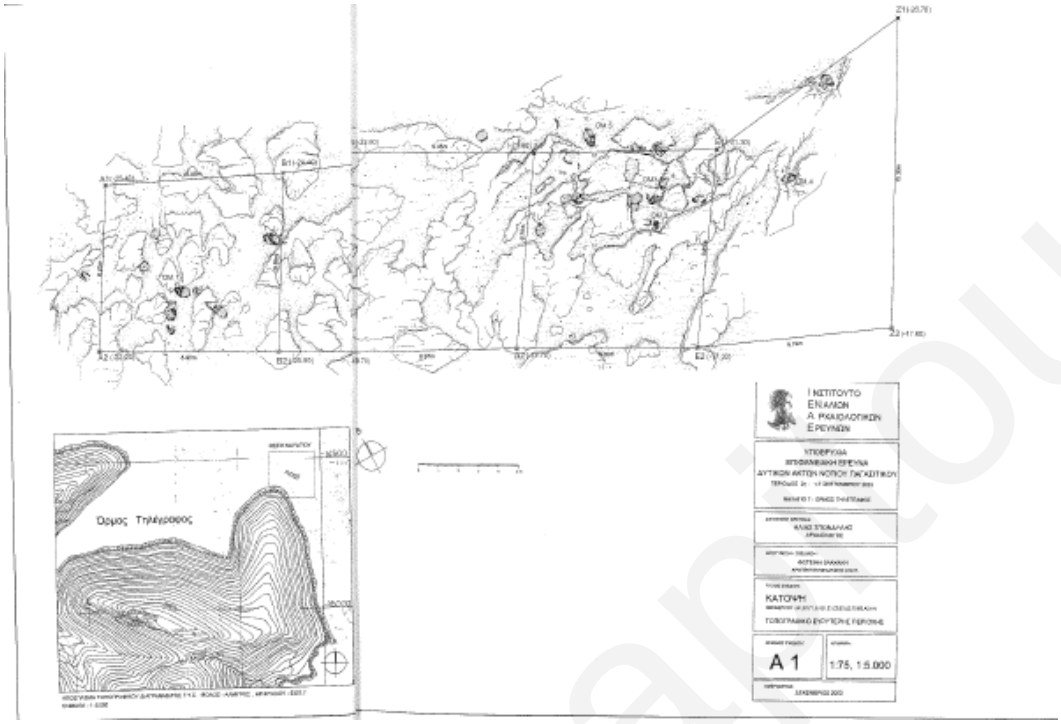

Figure 22: Site plan of shipwreck no. 7 (Σπονδύλης, 2004; εικ. 3)

After its initial discovery in 2000 (Δεμέστιχα&Σπονδύλης, 2002: 27; Demesticha&Spondylis, 2011: 34) the shipwreck was considered suitable for excavation due mainly to its preliminary date to the 4th century CE, but also due its good preservation.This, however, was not the case when the excavation started, since the wreck had been heavily looted since its discovery. Its excavation began in 2003 and finished in 2008 (**Fig. 22**) (Σπονδύλης, 2017: 18). It yielded a number of different types of amphorae, as well as a number of miscellaneous finds (Demesticha&Spondylis, 2011: 34). The amphorae belonged to eight different types, each of them providing important information on the trade of the period. Based on the typology of the amphorae (Demesticha&Spondylis, 2011: 35-38) some conclusions can be drawn (**Table 1**).The provenance of the main cargo amphora types (Types 1, 2 and 3) is probably from the Peloponnese or the southern Greek Mainland and the eastern Aegean. Thus, Demesticha and Spondylis (2011: 38) preliminarily argued that the ship was not leaving the Gulf; rather it was heading towards one of the major ports of the area, transporting wine.

Table 1: Pottery from Shipwreck no. 7

Cargo Amphora	Possible Provenance	Reference
Amphora "Type 1"	Uncertain	Demesticha, 2011: 35; Bottger, 1992: 371, Pl. 100.2
Amphora "Type 2" (LRA2 early variant)	The Peloponnese or Eastern Greek mainland	Demesticha, 2011: 35; Riley, 1979: 219
Amphora "Type 3"	Eastern Aegean	Demesticha, 2011: 35
Amphora "Type 4"	Eastern Aegean or Asia Minor	Demesticha, 2011: 36
Amphora "Type 5"	The Levant	Riley, 1979: 223-224;

Late Roman 5		Demesticha, 2011: 36
Amphora "Type 6"	Possibly Eastern Aegean or Asia Minor	Demesticha, 2011: 36
Amphora "Type 7"	Possibly Corinth	Demesticha, 2011: 36
Amphora "Type 8"	The Aegean	Demesticha, 2011: 36
Dressel 24 – 25		

3.2 Middle Byzantine Shipwreck (no. 9), Kikynthos island

The Bay of Amaliapolis is located on the south-western edge of the gulf of Mitzela, in

Figure 23: The island of Kikynthos at the entrance of the Bay of Amaliapolis, as seen from the port of the modern-day village of Amaliapolis (Photo by Elpida Agapitou).

the south end of the gulf of Almyros. No archaeological investigations have taken place on land and the only evidence of any installations that pertain to maritime activities derive from the unpublished thesis of A. Ginalis (2014: 212), who recognized some possibly ancient elements in the modern port. The noteworthy characteristic of the Bay of Amaliapolis is the small island of Kikynthos (**Fig. 23**)in the entrance of the Bay that functioned as a natural breakwater (Σπονδύλης, 2017: 18-19; 2012: 31-32). The island is separated from the mainland by a narrow strait, around 2,5 meters deep. On the island, close to its coastline, architectural remains and pottery from the Byzantine period have been located, prompting Spondylis (2012:31-32) to suggest that the island could have been used as a temporary shelter during this period.

Table 2: Pottery from shipwreck no. 9

Pottery type	**Date**	**Reference**
Pithoi Type 1-5	9th century CE	Μπακιρτζής, 1989, Πιν. 17, 20; Demesticha, 2011: 37
Amphorae Gunsenin I	11th century CE	Μπακιρτζής, 1989, Πιν. 17, 20; Demesticha, 2011: 37
Amphorae Gunsenin III	11th century CE	Gusenin, 1989: 269-271

On the north-west end of the island of Kikynthos, a large concentration of ceramics was located (Σπονδύλης, 2012: 32-34) (**Table 2**). In their majority they are pithoi

fragments, amongst which some fragments of amphorae were also located. The site was heavily looted but from the remaining fragments, three different types of pithoi were identified, with five different variations in size (**Fig. 24**). They were dated to the Middle Byzantine period and more specifically, to the 11thcentury CE (Σπονδύλης, 2017: 18-19).The provenance of the cargo has not been determined yet.

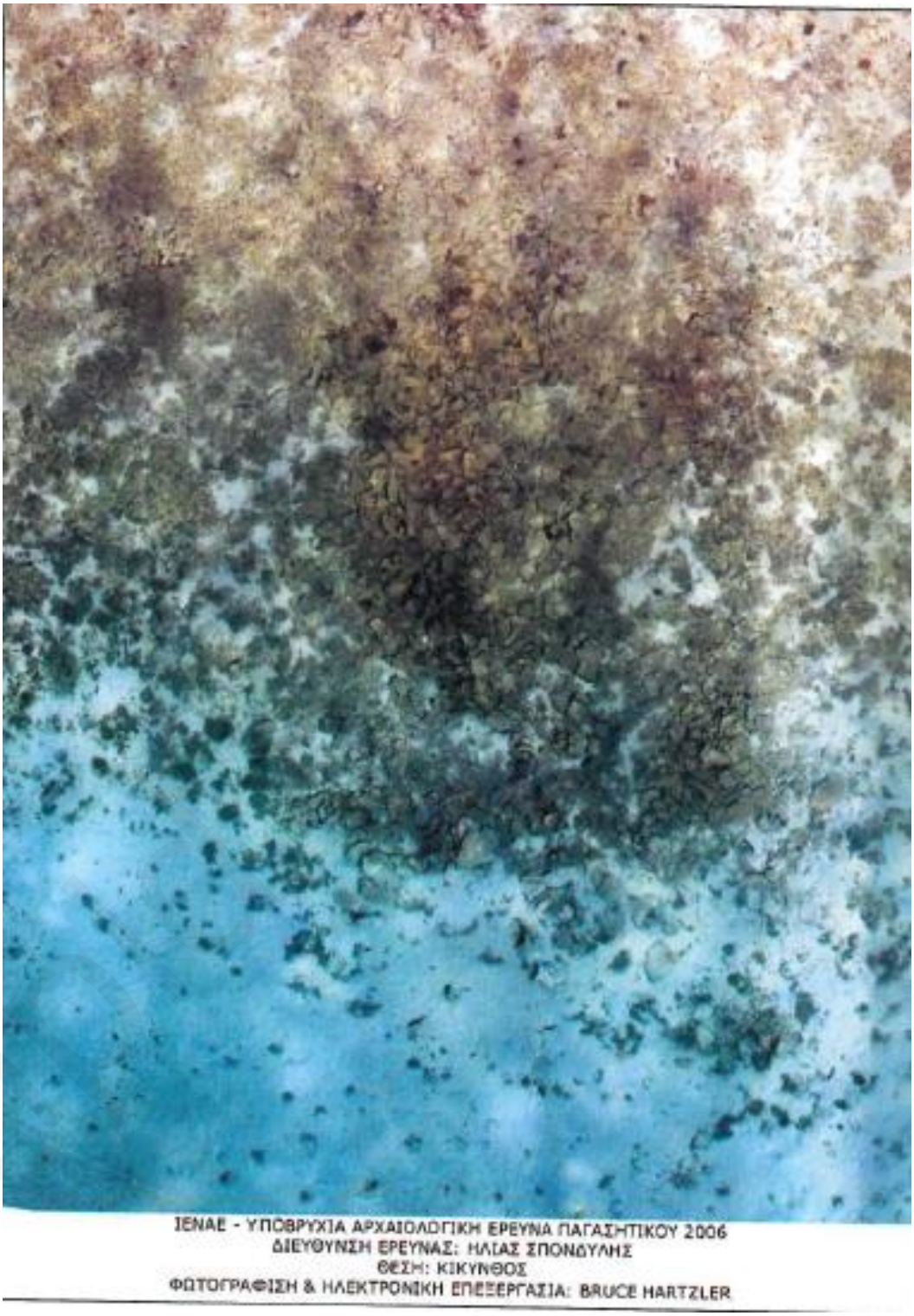

Figure 24: Photogrammetric map of Shipwreck 9, at Kikynthos islet (Σπονδύλης, 2017;εικ. 20)

3.3 Other Middle Byzantine wrecksites (Shipwrecks no 1, 3, 4, 5, 6, 8)

The Bay of Nies is located 5km to the south-east of Amaliapolis. It is a deep-cut bay that covers an area of 340ha (Ginalis, 2014: 213). Same as with Amaliapolis, the area has not been the subject of any archaeological excavations or surveys on land. Ginalis (2014: 214) notes that there are some coastal structures that could be associated with maritime activities. More specifically he located what he suggested to be the remains of quays inside the bay on the Glaros promontory that he dated to the Late Roman period, however once again no further evidence is provided.

The majority of the shipwrecks located during the HIMA survey are dated to the Middle Byzantine period (9^{th} – 12^{th}/13^{th} centuries CE)(Demesticha&Spondylis, 2011: 37; Σπονδύλης, 2017: 19-22). The precise dating of these shipwrecks is still difficult to pin down due to the fact that all the locations have been heavily looted and also the sites were badly preserved. It appears that the predominant type of amphora in all those sites is the so-called "Gunsenin 3/ Sarachane 61" (Gusenin, 1989: 269-271) which was a common type of amphora of this period. The provenance of this type of amphorae and the quantity which was recovered from these sites can possibly point to ships coming to the inside of the gulf to redistribute their cargo, rather than ships going to the outside, something which is an interesting point on the interpretation of the shipwrecks within their environment, which will be discussed later in this paper.

4. Late Roman and Byzantine Ports and Harbours in the Pagasetic gulf

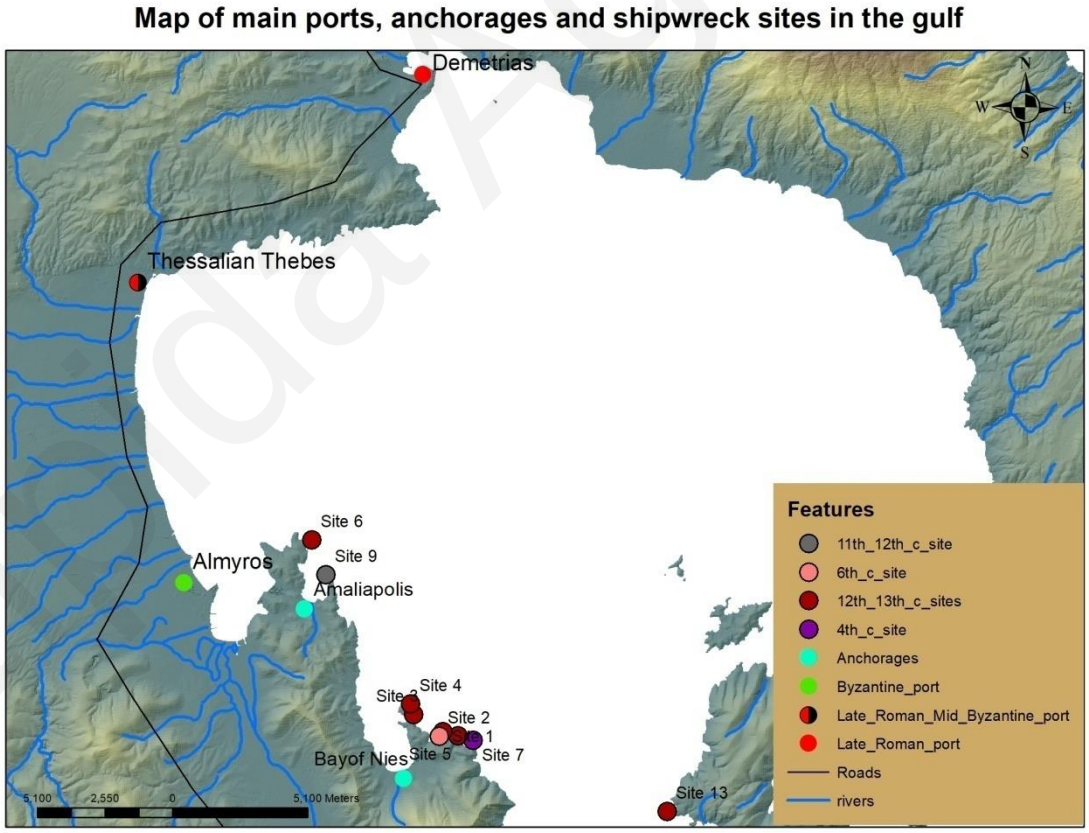

Figure 25: Map withthe main ports, anchorages and shipwreck sites discussed in the thesis (map by ElpidaAgapitou)

The advantageous position of the Pagasetic gulf as a pathway to the Aegean Sea from the Thessalian plane is highlighted through the growthof major trade centers such as the port cities of Demetrias, Almyros and Thessalian Thebes, during the Late Roman and Byzantine periods (4thto 12th century CE)(Karagiorgou, 2001: 185-189;Ginalis, 2014: 196-198) (**Fig. 25**).Thesemajor nodes of maritime activitieshave been the focus of numerous archaeological investigations, which have brought to light many aspects of their history, such as, particularly in the cases of Demetrias and Thessalian Thebes, their urban network, public and ecclesiastical buildings.

4.1 Demetrias

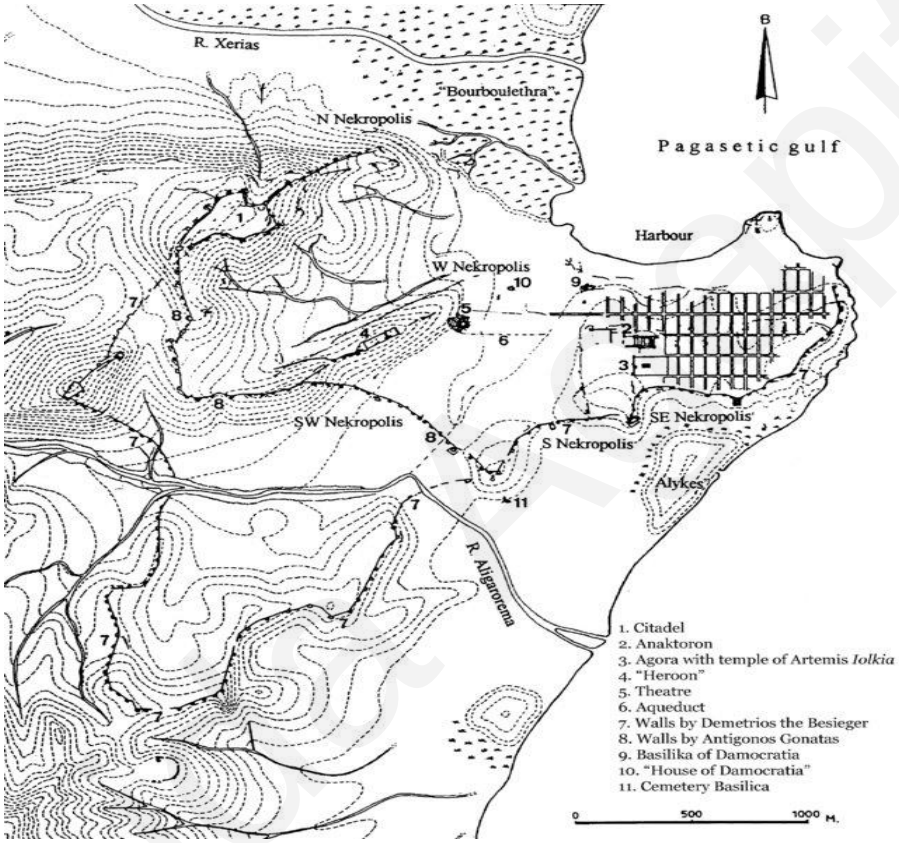

Figure 26: Site-plan of the city of Demetrias (Karagiorgou, 2001; fig. 7)

The port-city of Demetrias is located 1.5 km south of the modern city of Volos, on the southern promontory of the gulf of Volos and between two rivers, Krausidonas (Xerias) to the north and Aligarorema to the south (Karagiorgou, 2001: 62) (**Fig. 26**). Rescue excavations have been carried out by the 13thEphorateof Prehistoric and Classical Antiquities and the 7th Ephorate of Byzantine Antiquities. The site has also been surveyed and excavated by D.Theocharis and a group of German archaeologists from 1967 to 1973(Karagiorgou, 2001: 51; Sarris et al., 2015: 351). The German archaeologists primarily focused on the Hellenistic remains and monuments –such as the Agora- but they also excavated two Late Roman monuments: The Basilica of

Damokratia and the so-called "House of Damokratia". More recent work involves geophysical prospection. This brought to light further monuments that provide a clearer picture of the urban planning of the city, such as the urban area that surrounded the palace of Demetrias, with the discovery of a group of structures to the south of it and the subsequent discovery of structures close to the agora (Sarris et al., 2015: 351-353).

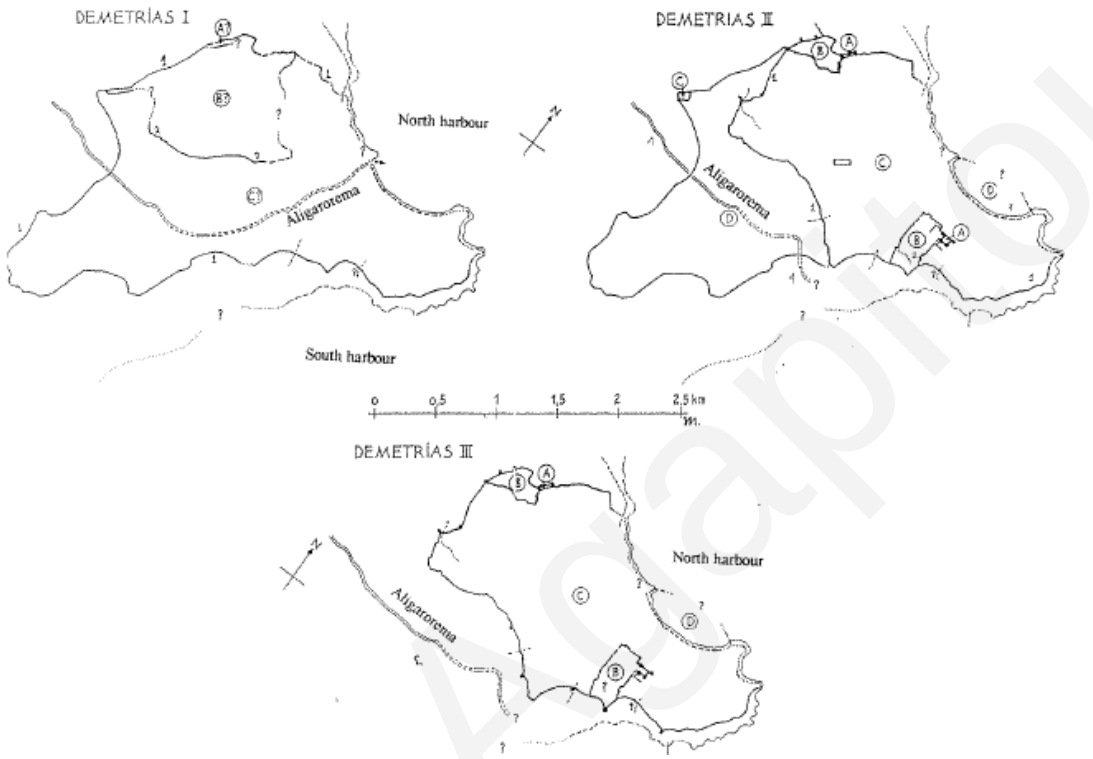

Figure 27: The stages of urban development of the city of Demetrias. 1) Demetrias I: the Hellenistic city 2) Demetrias II: the 3rd c BCE 3) Demetrias III: the end of the 2nd century BCE. The Late Roman city of Demetrias (Demetrias IV) is not shown here because no accurate plan has been published. (Karagiorgou, 2001; fig. 8)

The Hellenistic city was founded by Demetrius I Poliorketes in 294 BCE bringing together populations from the nearby settlements of Iolkos, Pagasai and Goritsa. (Karagiorgou, 2001: 62; Ginalis, 2014: 162-163). The Hellenistic city itself has a long history of settlement (Κουλουράς, 1997: 249-250; Karagiorgou, 2001: 62-63; Ginalis, 2014: 163). Demetrias I occupied an area of about 440 ha (**Fig. 27**) and was divided into two smaller cities at the end of the 3rd century BCE (Demetrias II). It was during this period that the main harbour of the city was constructed on the northern side of the promontory that enclosed the gulf of Volos to the south. By the end of the 2nd century BCE the city gradually started to fall into decline (Demetrias III) and was again revived during the Late Roman period (Demetrias IV).

During this period, the city of Demetrias developed around the northern side of the promontory, which also functioned as its main harbour and a major port of the Pagasetic gulf, until the 6th century, when it underwent a major urban transformation:the population abandoned the port and occupied the hill of Iolkos, located to the west of the modern city of Volos (Karagiorgou, 2001: 66). During the Middle Byzantine period, it is assessed that the city of Demetriasstill occupied the Iolkos hill, but also extended to the south-west, where the Late Roman city used to be (Karagiorgou, 2001: 71). Demetrias continued to be known by this name in the

sources until the 14th century CE, when the toponym "Golos" first appears in texts (Karagiorgou, 2001: 71-72).

4.2 Almyros

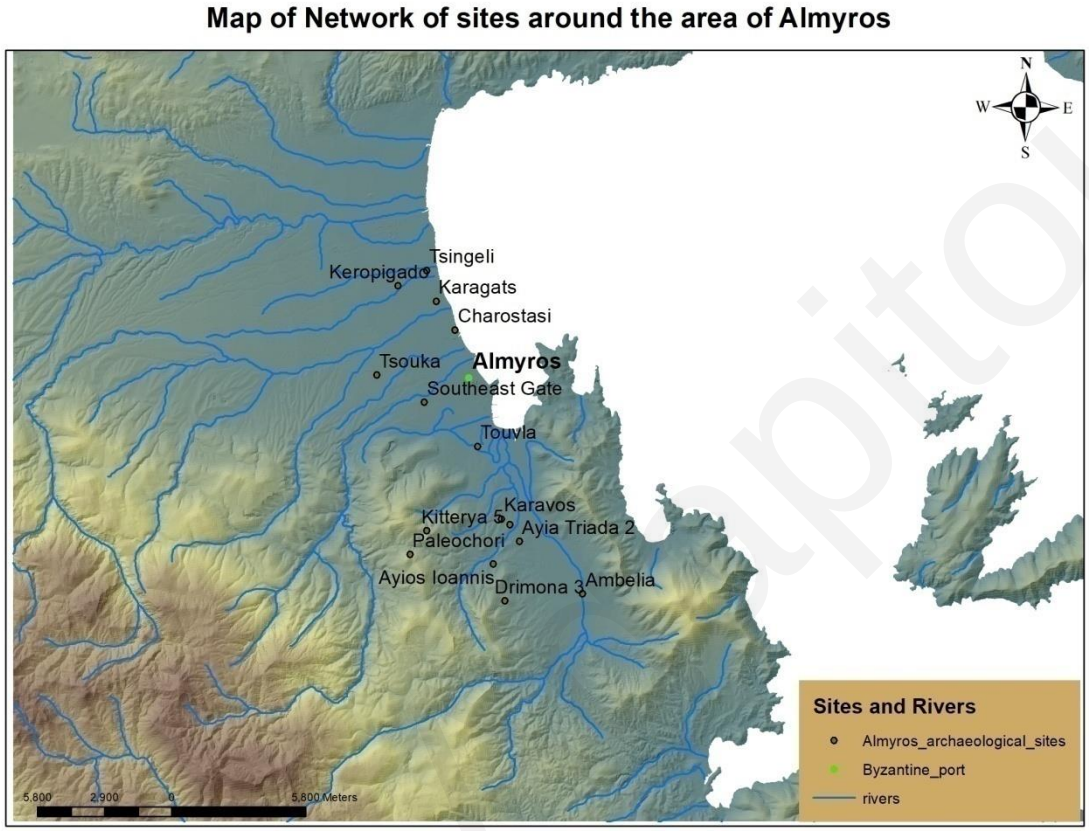

Figure 28: Map of the network of the most prominent sites around the port of Almyros. Towards the north, the sites of Tsingeli and Karagats that are thought to be the two port-cities of Almyros are shown (acc. to Reinders &Aalder, 2007; Map by Elpida Agapitou)

The port of Almyros flourished during the 12th and 13th centuries CE (Reinders, 2001: 467; Αβραμέα, 1974: 166-168; Κουλουράς, 1997: 232-233). Benjamin of Tudela who visited the city in the 12th century speaks of a flourishing community with ties to international trade (Asher, 1840: 49). Since then, the port participated incommerceway into the Ottoman period, albeit with less significant role in the trading activities (Ginalis, 2014: 196).The city was protected by three castles, built around the 11th and 12th centuries (Κουλουράς, 1997: 237). Furthermore, already from the 11th century it appears that two cities of the same name existed on the coastline and both functioned as a unit and nucleus of the port (**Fig. 28**). Archaeological investigations, however, demonstrated that the center of Almyros also exercised control over the hinterland of the Almyros plain. This hypothesis is based on the excavations by Giannopoulos in the area, where he located byzantine remains in the sites of Karagats, Zerelia, Tsingeliand Pournali, all in close proximity of the cities of Almyros(Γιαννόπουλος, 1904: 87; Αβραμέα, 1974: 167; Reinders, 2001: 468).Recent surveys conducted from 1990 to 2006 by Reinders (2007: 48-49) proved the hypothesis put forth by Giannopoulos with the discovery of over 30 Middle and Late Byzantine sites in both the Almyros and the Sourpi plains. These centers would have intercommunication and an economic dependence with each other. When it comes to the location of "*Oi dyoAlmyroi*" that Giannopoulos mentions in his research, Reinders

(2007: 56-57) places their respective locations at the sites of Tsigeli and Karagats, where Byzantine remains have been found and where it would make more sense for a coastal installationto be located, with control over the gulf.

From the researches by Giannopoulos it can be surmised that during its peak, the cities of Almyros could have possible control over a wider network of settlements in the area and could have functioned as a trade center of importance, both for international and local trade (Κουλουράς, 1997: 237-238).Furthermore, Almyros was a port whose position in the Bay provided access to the river networks that ran through the Krokion plain and it would thus have access to the mainland, allowing the imported cargos to be distributed further in the mainland and in the same way. It would be the port that provided access from the mainland to the gulf to supply the bigger ports of the Byzantine empire with products such as grain(Κουλουράς, 1997: 238).

4.3 Thessalian Thebes

The site of the ancient port-city of Thessalian Thebes lies under the town of modern NeaAnchialos, 17 km south -west of the other major port of the gulf, the city of Demetrias (Karagiorgou, 2001: 51; Ginalis, 2014: 179).The city has been the subject of numerous archaeological excavations starting in the end of the 19th century under G. Soteriou. The excavations in the city are still ongoing and they have brought to light, among others, a large part of the circuit walls and a number of public buildings, such as the marketplace, the public baths and nine basilicas both inside and outside the city walls (Karagiorgou, 2001: 52).

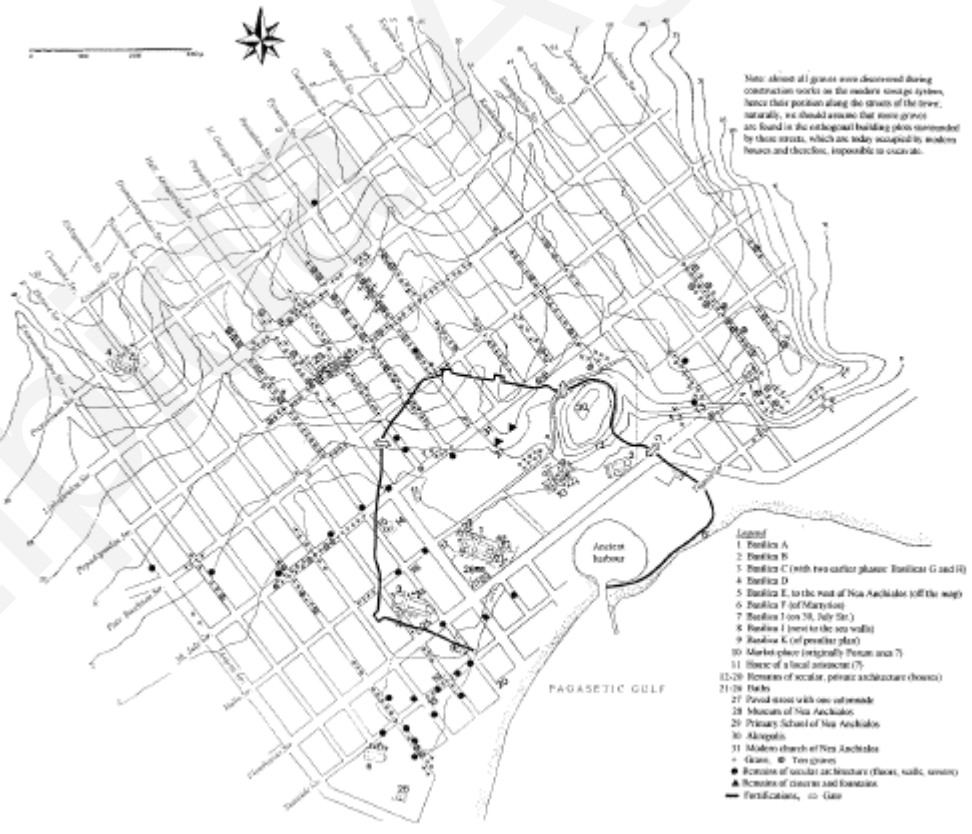

Figure 29: Plan of the excavation of Thessalian Thebes, superimposed on the urban plan of the modern-day city of NeaAnchialos (Karagiorgou, 2001; fig. 2)

Thessalian Thebes succeeded from the 1st century CE the city of Pyrassos that functioned as the port of the Hellenistic and Roman city of Phthiotic Thebes, located further inland (Karagiorgou, 2001: 52; Ginalis, 2014: 179) (**Fig. 29**). The site soon gained in popularity and fully developed into the important city of Thessalian Thebes. After a peak during the 4th and 5th centuries, the city underwent a period of decline from the end of the 6th century to the beginning of the 7th century CE. From that period onwards, it is believed that it continued to function as a port, albeit one of less importance, because the economic centre was shifted to the port of Almyros (Karagorgou, 2001: 52-54).

4.4 Amaliapolis

Amaliapolis (**Fig. 30**) is located in the south-western area of the bay of Sourpi and due to its topography, it is possible that it provided shelter for the passing ships that were traversing the gulf to and from the major ports such as Almyros, Thessalian Thebes and Demetrias.The only recent investigations in the area were done by Ginalis, who identified ancient harbour remains, tentatively dated to the Early Byzantine period (4th to 6th centuryCE) (Ginalis, 2014: 211-212).

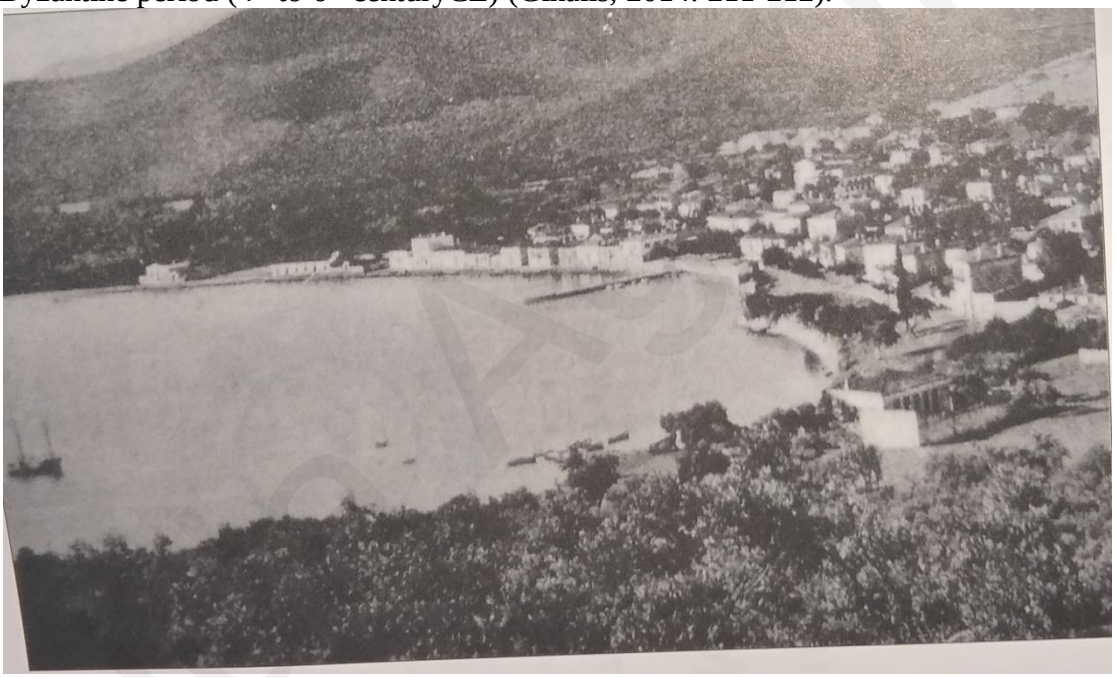

Figure 30: Amaliapolis in the 2nd half of the 20th century (Τσολάκης, 2009; εικ. 1)

It cannot be certain whether Amaliapolis could have been a center of importance during the Late Roman or Byzantine periods without a proper archaeological survey. Spondylis (2012: 31-35) surveyed the area as part of the land surveys conducted by HIMA and located 'Early Byzantine' architectural remains and pottery alongside the coast of the island of Kikynthos (**Fig. 31**). The existence of these remains alongside earlier discoveries by Ch Agouridis of Neolithic pottery, led Spondylis to the conclusion that the small island has known a form of earlier occupation, functioning as a shelter against raids and invasions during the Byzantine period. Furthermore, the existence of the shipwreck off of the same island in the entrance of the bay points to the function of the area as a possible temporary anchorage for ships to escape the squalls that would come from the east. And it is important to note here, that the area had a major role in the nautical history of the Pagasetic gulf during the 19th and 20th centuries. Tsolakis (2009: 369-375) mentions that the majority of the families that resided in the village had fishing as their main occupation.

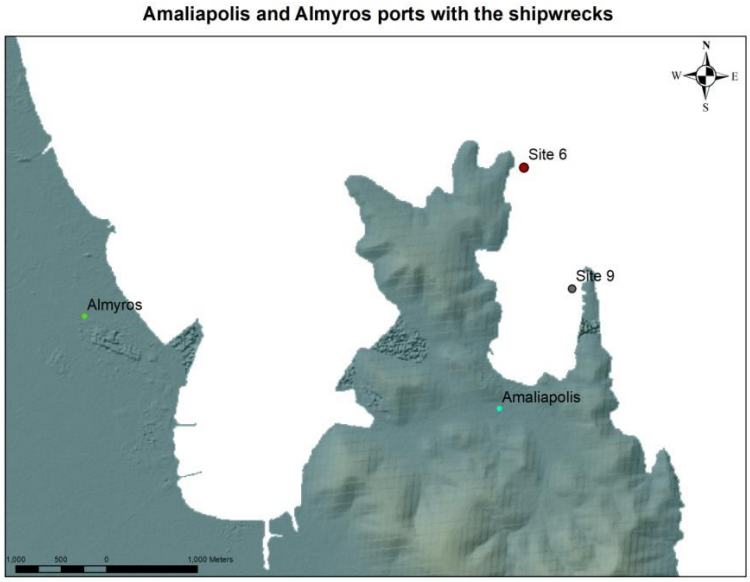

Figure 31: Map of Amaliapolis with the two shipwrecks located inside the Bay (Map by ElpidaAgapitou)

4.5 Bay of Nies

Figure 32: View of the Bay of Nies from the road leading towards the beach (Photo by ElpidaAgapitou)

The Bay of Nies is located about 5km to the south-east of Amaliapolis. It is a deeply cut bay that forms a natural anchorage (**Fig. 32, 33**).
HIMA conducted an underwater survey at Nies, during which a large number of shipwrecks around the Glaros promontory in the entrance of the bay were located. The majority of those shipwrecks is dated to the Middle Byzantine period from their cargo (see above; Spondylis, 2017: 19).

On the small promontory of Metochi the survey brought to light a partially submerged settlement dated to the Middle Bronze Age (2000 BCE to 1550 BCE), as well as two other settlements, one Early Helladic in the western end of the bay and a Hellenistic one on the south-western end of the bay, at the site called Pantazis (Spondylis, 2017: 22-26).

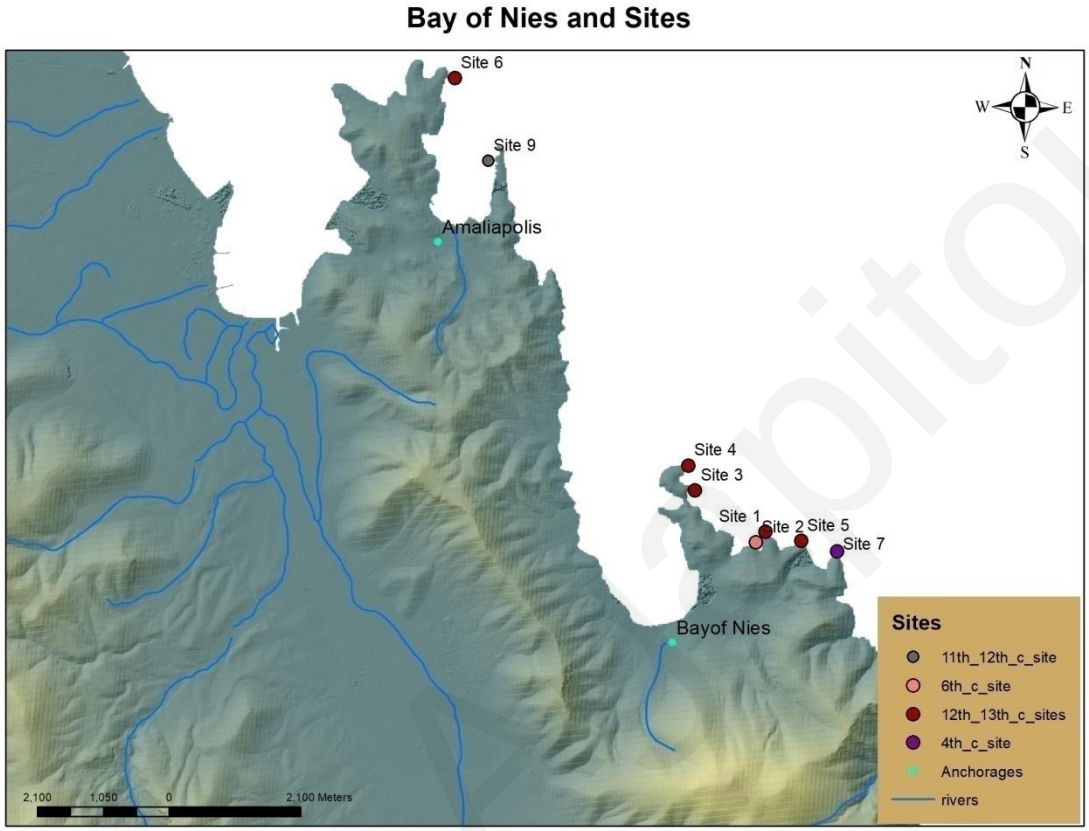

Figure 33: Map of the Bay of Nies and Amaliapolis with the sites featured in this thesis (Map by Elpida Agapitou)

4.6 The Road network of the western Pagasetic gulf

The maritime centers along the western coastline of the gulf were connected with the inland road network (**Fig. 34**). The existence of the latter was confirmed through the study of Roman milestones and also through the accounts of travelers that went through the plain of Thessaly and the ports of the gulf, during the Late Roman period (Asher, 1849). During the Late Roman and Byzantine periods three main roads went through the area of the Pagasetic (Αβραμέα, 1974: 11-113; Κουλουράς, 1997: 18;

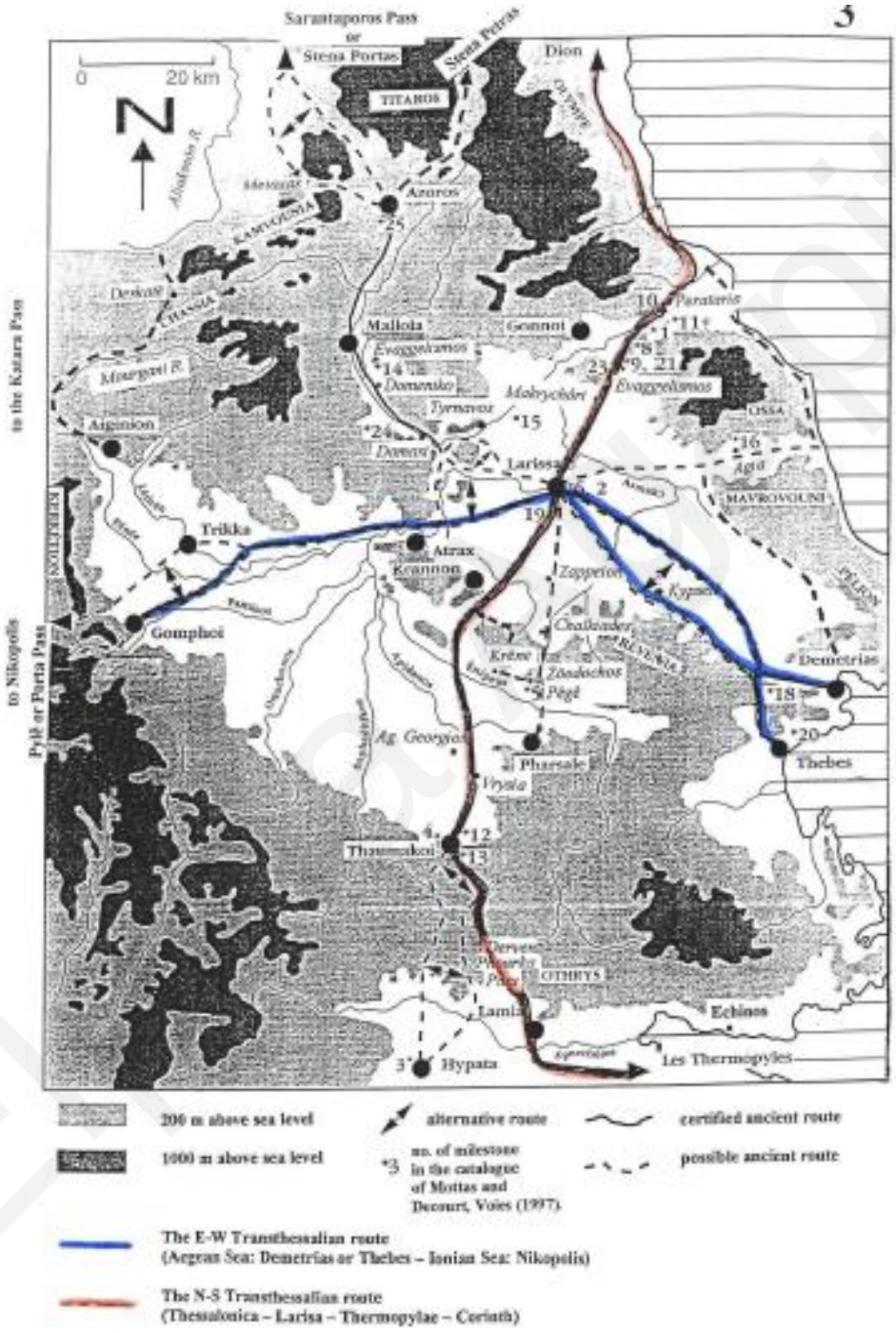

Figure 34: The principal road network of Late Antique Thessaly, after Mottas and Decourt (1997) (Karagiorgou, 2001; fig. 3)

Karagiorgou, 2001: 16).They connected the port-city of Demetrias a major station on the coastline of the Pagasetic gulf,with the city of Larisa. More specifically, the first road was a branch of the main road that traversed the Greek peninsula, starting from Thessaloniki and continuing towards southern Greece and the Peloponnese while passing through Larisa. Starting from Larisa, it branched off following a south-eastern direction towards the port of Demetrias (Karagiorgou, 2001: 18-19; Κουλουράς, 1997: 18) passing from modern-day Velestino and continuing close to the village of Sesklo (and called by the locals "Velestinostrata" in modern times). It was located in the beginning of the 20th century by Arvanitopoulos (1911: 301-302), who managed to track it to the city of Demetrias. The other main road that crossed the area of the Pagasetic was oriented towards an east-to-west axis that connected the two ports of Demetrias and Thebes with western Greece and more specifically the city of Nikopolis (Karagiorgou, 2001: 18-19; Αβραμέα, 1974: 116). The existence of this road was confirmed by the discovery of two milestones that prove the connection between Larisa and Thebes, while the part of the road that goes to Demetrias is confirmed in the *Itinerarium Antonini* (Karagorgou, 2001: 19). Outside of those main roads, there were others, more local in nature that connected the various settlements, both on the inside and on the outside of the gulf. One of them started from modern-day Lamia (called "Zitouni" in the Byzantine period) and headed towards the north, following a parallel course with the coastline and passing through Pteleos, Almyros, Thessalian Thebes and finishing at Demetrias (Αβραμέα, 1974: 113; Κουλουράς, 1997: 18-19).This was the road followed by the Hebrew rabbi Benjamn of Tudela in the 12th century (Asher, 1840: 48-49).

The connection of the major port centers mentioned abovewith the Thessalian plain through the road networkunderlines theimportance of the western Pagasetic gulf for the trade and economy of the area. The ports clearly functioned as gateways for exporting agricultural trade products from the plain, such as grain, and, in turn, imports, such as wine were distributed, through the road network, in the mainland. Especially the port of Almyros and its control over the Krokion plain and the river network that ran through it, is possible to reflect its central place in the maritime and terrestrial trade network in the region.

5 The ethnography of coastal navigation

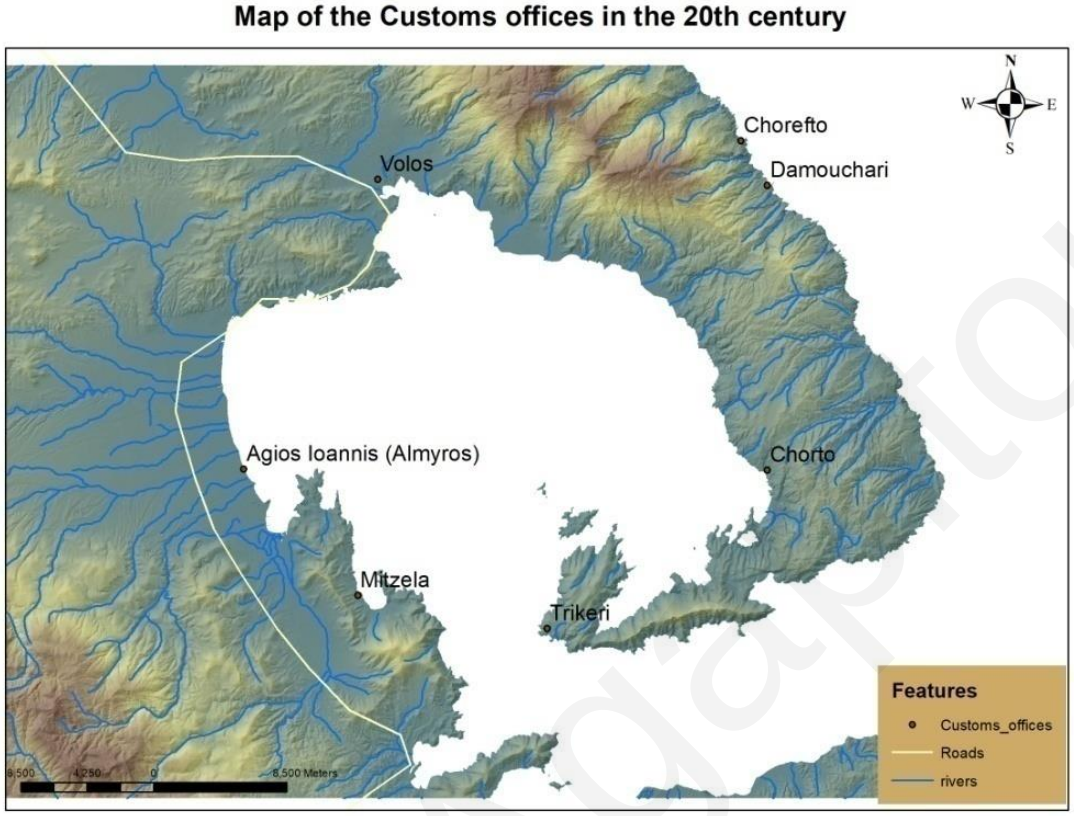

Figure 35: Map of the customs' offices of the Pagasetic gulf during the 20th century (Map by Elpida Agapitou)

Volos has been a major port and trade center, even in recent decades and most of the villages in the gulf during the past two centuries were so-called "skalai", meaning a small wharf or inlet, a man-made structure most of the time, where ships could land (Vella, 2023: 37, 41), essentially, where the ships from larger, international ports would stop and unload part of their cargo. The most important of these "skalai" had also customs offices (**Fig. 35**). The main office was located in Volos, which functioned as the main port of the gulf in the 19th century, and under its jurisdiction were the offices of New Mitzela, Trikeri, Chorefto, Chorto, Agria and further smaller stations in villages along the Pelion peninsula to the eastern part of the gulf, such as Afissos, Milina and Platanias (https://www.pesty.gr/index.php/mouseia).

One of the basic notions of the MCL is the relationship between man and landscape and man's perception of this same landscape, (Westerdahl 1992: 5). Given the diachronic values and processes of maritime activities, modern coastal communities and their connection to the sea can provide useful insights into the inter-relation of the water environment and the people that live by or off the sea. This connection with the sea remains alive in the people even today. A large amount of the local population still makes its living by the sea, either by fishing or by sailing. The tourist industry has also helped a lot with the rise in maritime tourist activities. These people had a lot of insightful knowledge concerning coastal navigation and sailing inside the gulf.

In the course of this thesis, a small-scale ethnographic research took place in the area of Volos and the Pagasetic gulf. The interviewees were local fishermen and sailors, namely people who understood and worked with the sea and could provide some information concerning the local winds and sailing in the gulf.During the course of the ethnographic research, the majority of sailors declined to have their personal information published in any form, thusthey will remain anonymous. Also, local historians were interviewed and provided useful insights into recent history (**Table 3**).

Before moving on with the details of the research, it would be prudent to expand upon the nature of the ethnographic research itself. Due to several problems that arose in the course of the interviews, the overall character of the ethnography turned out as a more qualitative one rather than quantitative.Thus, the questions themselves were aimed more to the understanding of the nature of sailing inside the gulf. Only a few people were interviewed, who would be able to provide more in-depth information. The small number of interviewees included mostly fishermen and sailors in the area of Volos, due to the fact that the people working in the area of modern-day Nies were not very forthcoming with information. As a result, there is no homogeneity in the research. Nonetheless, the acquired information was proved to be very useful for the general assessment of the maritime culture of the local communities.

Table 3: People interviewed during the ethnographic research.

Name	**Age**	**Profession**
ApostolisPlakas	35	Sailor
Dimitra Rymenidi	33	Sailor
George Bastis	34	Sailor
George Podaras	38	Sailor
Giannis Koutis	57	Historian/Head of the Municipal Centre of History Verification in Volos
SavvasKyriakidis	51	Fisherman
Kyriakos Nikolaou	47	Fisherman
ZisisSxoinas	71	Sailor

Before explaining the results of the ethnographic research, it is important to discussthe unwillingness of people to share information. This has to do mostly with the fishermen, who, due to the many demands that stem from their work and the fact that they were pressed for time due to their duties, they were not very forthcoming with information. While some of them showed an interest in the research and were willing to talk about their memories and experiences, the majority of them were not open to discuss these matters. It is something understandable since a research such as this requires time and patience to gain the trust of the local population and see how the people react to such interviews. Fortunately, this inquiry was met with more interest by other people interviewed, such as the sailors/ skippers, who were interested in the subject and provideinformation, both about their profession and their experiences in sailing inside the gulf.The main components of the MCL were used as the focal point of the questions posed to the interviewees so that theircontribution could be used in the discussion of the thesis(see the questionnaire in Annex I).

One final note to be made before moving on to the more practical results of the ethnographic research, addresses the issue of the questions that remained unanswered. Questions such as those concerning the toponyms and the landmarks that would have been used for sailing, were not answered because sailors themselves did not use landmarks to aid in the navigation. Since the distances inside the gulf can be covered in a very short amount of time, even in earlier years, when the use of the sail for smaller fishing boats was more prominent, sailors and fishermen would not move very far from the coastline to garner the need to have landmarks for navigation. Other questions that pertained to local history and traditions, such as the existence of shipsheds in the area of Pefkakia or the local trade that would have happened between the ports during modern periods before the existence of the road network, while there were some information that occurred through the ethnographic research, especially coming from G. Koutis, as a local historian, these could not be adequately verified as to be used in this thesis.

Since the modern sailing vessels share some common functions with the ancient sailing rigs, despite the fact that they use a different type of sail (Bermudan sail), as Whitewright (2011) explains, it is possible to draw parallels from the answers given in the interviews. According to the sailors interviewed, under perfect wind conditions, i.e. the north-eastern and south-eastern winds that would aid a sailing ship in traversing swiftly to and from the entrance of the gulf, a ship from the port of Volos could reach the straits of Trikeri in 2 to 3 hours, averaging on a speed of 2 to 3 knots, sailing “beam reach”, which is to have the wind blowing at 90 degrees to the course of the vessel. This could not be the case with ancient ships carrying a square sail rig, since it would be difficult to maneuver with such a sail, and also given the fact that the “beam reach” requires a degree of maneuverability difficult for the square sail to achieve. However, this information can provide some possibly interesting insight as to how long it would approximately take for a ship that had a lateen or settee rig to travel the gulf. The sailors further explained that travelling against the wind would still have been possible, albeit it would take more time to travel the same distance, since the conditions would not have been ideal and the speed of the vessel would have been reduced.

A great insight, especially in better understanding the connectivity between different ports and bays as well as the maritime activities that took place in the gulf, was provided by the fishermen. These were people that have spent their entire life in the fishing vessels either by being in the family business or by joining the trade from a young age. They had a lot to share concerning the fishing season and the weather that would determine when a boat could go out to the sea. The older fishermen, the captains or fathers of the ones interviewed, knew that the conditions would turn harsher when the clouds gather from above the Pelion Mountain and the wind blows from the north-east. Althoughancient literaturesuggests the summer months as the best for sailing, in small, enclosed environments such as the one encountered in the Pagasetic, it is clear, from the information provided by the fishermen, that the gulf would be open for short journeys all year long and thus, also with the help of the winds these journeys would have been possible to happen daily.

Concerning the communication and sailing between the various ports of the gulf, in ideal conditions, i.e. when the winds would be favourable (broad reach, beam reach or running), a sailing vessel could reach Amaliapolis or the Bay of Nies from the port of

Volos in about one hour, however if the return journey should be done under the same wind conditions, i.e. against the wind, it would have taken up to 3 hours.Given the fact that communication between ports by boats was also common in the recent centuries, traveling around the gulf in short journeys was something common that could be achieved in relative ease under these conditions. Also, regarding coastal navigation, the sailors and fishermen maintained that closer to the coast, the wind movement will be affected by the land breezes, thus making sailing more difficult. For example, a ship that would have been traveling with a north-eastern wind towards the Bay of Nies, it could have been caught in the western winds that blow from the Amlyros plane. This would have delayed its journey. During summer, the Etesians (meltemia), i.e. the north-eastern winds that blow across the Aegean, impact on the Pelion peninsula and are diverted to the south, where they enter the gulf through the opening of the Straits of Trikeri. This means that in the spring and summer months it is easier to travel from the entrance of the gulf towards the ports inside of it, with theprevailing winds on their side or aft. In the autumn, the winds often change course, and they tend to blow from the north, north-east, thus making it easier for a ship to exit the gulf rather than enter it. This opens up the possibility of changes in the nature of the journeys inside the gulf, with summer offering opportunities for ships to have easier access to the gulf from the outside, while during the autumn and winter months it would have been easier for ships to make shorter journeys inside the gulf, also utilizing the bays and anchorages (see also Chapter 6, below).

6. Discussion: The Maritime Cultural Landscape of the Pagasetic Gulf

6.1 The shipwrecks

Although the weather of the gulf is relatively mild, with winds not acquiring great speeds, squalls often occur around promontories, and then seas around them become difficult to navigate. Especially around the Bay of Nies, the katabatic winds that originate from the hills around the area reinforce the coastal winds, thus making the area extremely difficult for navigation. This was further established after visits to the area during the months of March and September, i.eduring the sailing season, when the winds inside the bay picked up with greater force. From the processing of the meteorological data (see above), it seems that the winds that blow through the gulf during the months of spring and summer blow mostly from the south-east. This suggests that the summer months, i.e the sailing season for the Aegean, could have been a good period for ships to undertake longer journeys and come into the gulf. On the other hand, the north-eastern winds that dominate the gulf during the autumn and winter months, would have made it easier for smaller ships to perform shorter journeys inside the gulf, following the coastline. Thus, what can occur from the winds data is the picture of a gulf where the maritime movement and activities remain constant, only changing in the nature of the journeys.

From the studies that have been done on the water movement inside the gulf (Petihakis, 2012) it can be seen that on the eastern part of the gulf a water cyclone is created from the movement of the waters coming in and out of the gulf, something which would have made navigation around the area of Trikeri islands and the eastern part of the Straits difficult, since it would have conflicted with the passage through the straits. On the contrary, the concentration of shipwrecks along the western coastline indicates a busy and diachronic maritime route that connected the ports and anchorages all the way from the entrance of the gulf to the bay of Almyros. For its continuity further along the coast until the ports of Thessalian Thebes and Demetrias, despite the existence of the road network, there is no shipwreck record, yet.The underwater archaeological survey in the western Pagasetic was not exhaustive, so more shipwrecks might exist, still undiscovered. However, the fact that all eight shipwrecks under consideration are dated to the Later Roman and Byzantine periods is indicative of a peak in seaborne trade between the gulf and the Aegean.

If the hypothesis that the ships under examinations were coming in the gulf stands corrected, it is possible that they did so during the sailing season, taking advantage of these favorable south-eastern winds. They could have been caught in the unpredictable squalls at the promontories of Glaros and Telegraphos and were forcefully thrown against the rockyheadlands.Such squalls can be interpreted as either winds of speeds greater than 5 Beaufort that would not have been able to be diverged from the Pelion peninsula and thus hit the gulf with full force, or as the interchanging of the land and sea breezes that takes place around noon –as was explained by fishermen and sailors during the ethnographic research. More specifically, in response to the question concerning the wind conditions that would dictate navigation closer to

the coastline, the sailors mentioned the interchanging cycle of the land breeze that picks up in the gulf early in the morning and aids in the more practical journeys for fishing and changes around noon to a breeze that comes from the sea. If so, then the ships could have been traveling easily during the summer months towards the ports inside of the gulf. Moreover, apart from the sudden gusts of wind, from the meteorological data that have been collected, it can be seen that the area of NeaAnchialos, the northern part of the gulf of Almyros, is affected by westerlies during the 'sailing season'. So, it is also possible that the shipwrecks on the eastern front of Glaros promontory were victims of these adverse winds that could have pushed them against the face of the promontory. Furthermore, the interchanging of the land and sea breezes also serves to place the wrecksites located on the entrance to the Bay of Nies in their environmental context. The wind that picks up from the land early in the morning until noon (see chapter 2.1.2) would have been challenging for ships to enter the Bay during this time.

As it has already been seen, the "sailing season" for the ancient mariners, rather than being something fixed, was a notion more complicated than it first appeared. It can be seen that despite the harsh conditions that would have existed in the winter months, sailors would still brave the weather, especially in the face of profit (Beresford, 2013). The same complicated notion of the sailing season would have existed inside the gulf as well. Given that the movement of the winds facilitates navigation along the western coastline of the gulf, it can be assumed that the sailors would have taken advantage of the south winds of the summer months to hasten their entrance at the gulf. However, the conditions inside the gulf would have allowed for shorter journeys to take place even in the winter months despite the adverse winds, thanks to the small bays that are located along the western coastline. These bays would have played a key role, especially for the southbound trips during the summer and spring months, when the southerlies were blowing. The sailing season within the area of the gulf could have extended throughout the year, with ships of medium size, making segmented trips from shelter to shelter and thus achieving a continuous maritime traffic. As is evident from the excavated cargoes at the eastern front of the Glaros promontory, ships of a medium to small size could cover such short distances and the existence of those shelters along this stretch of coast, facilitated their movement. If this is the case, then the wreck sites off Glaros, would have also represent cargo spillages during such short trips, all year long.

Having already discussed the presence of the currents, especially in the Straits of Trikeri, in the entrance of the gulf, it would be fair to say that they also affect sailing conditions, up to a point. Since the water movement inside the gulf does not exceed the speed of 2-5 knots, even in the water cyclones that form on the western side of the gulf and also close to the Straits, it is safe to say that these currents would only serve to aid the journeys of the ships entering the gulf and heading towards the ports on the western coastline. Around the promontories, which are the main focuses of the discussion, while the currents would have been more intense due to the nearshore current that is located around these coastlines, they would not have a major influence over sailing and navigation in the area. Thus, it is more prudent to focus on thewinds and their effect on the sailing conditions of ships.

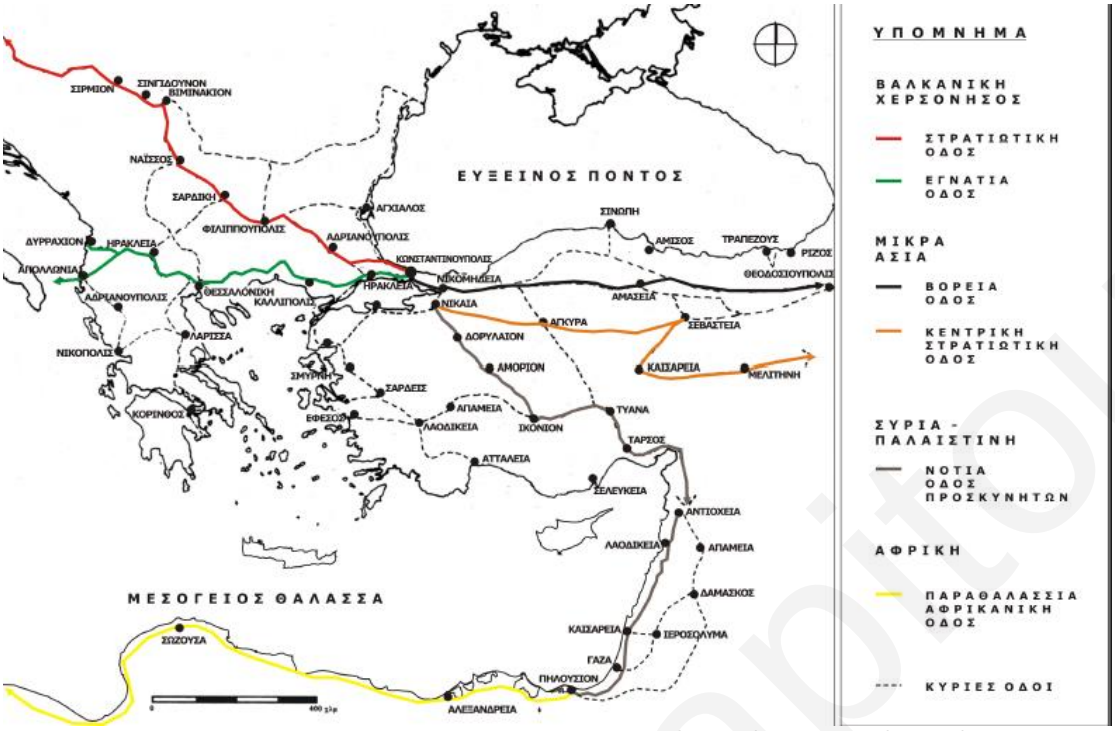

Figure 36: Map of the main road network of the Late Roman period (Δρακούλης, 2008; χάρτηςΓ3)

It is interesting that the major ports of the western gulf were also focal points in the road network that spanned along the Greek peninsula and connected the major ports and centers of the Byzantine Empire**(Fig. 36)**, thus allowing them to function as the gateways for products from the Thessalian plain to other ports of the empire. Sites like the Bays of Nies and Amaliapolis alongside other sheltered bays would have functioned not only as shelters but also as possible "rural anchorages" (Demesticha, 2022: 315) that facilitated coastal navigation inside the gulf.Under this light, the mixed cargo of Shipwreck no. 7 at Telegraphos, could be indicative of cabotage: it could be a ship tasked with the redistribution of products within the ports and anchorages of the gulf that had arrived from different provenances at a major port of the region.

6.2 Connectivity and Coastscapes

From the ethnographic research it occurs that the distances between ports can be covered in short periods of time (**Table 4**); for example, the distance between the gulf of Volos/ Demetrias to the Bay of Nies is about 2 hours, with a medium sized-craft bearing a modern "Bermuda" rig, while a trip between NeaAnchialos and Almyros, could last under 1 hour. This was specifically explained by older sailors that frequently made these journeys from port to port. The performance of ancient sailing ships, such as the Keryneia II, could have been similar. Based on the records of the experimental voyage of the Keryneia II from Greece to Cyprus (Katzev, 1990), the ship managed to reach a speed of an average 2 to 4 knots with favorable winds that averaged 4 to 6 on the Beaufort scale. Thus, a medium size ship like the Kyrenia (14m long) could have covered the distance of 10 miles between Demetrias and NeaAnchialos in under 4 hours. Small coasters would have been able to travel more

swiftly aided by favorable winds on an average speed of the same caliber –i.e. 2 to 4 knots- thus being able to make the shorter journeys inside the gulf, within a timeframe that would enable them to make these types of shorter journeys every day.

Table 4: Distances and average sailing times between ports of the Pagasetic gulf, modelled after the Kyreneia II voyage

Modern Ports	Distance in miles	Travel Time with a modern sailing boat (estimated, speed 2-4 knots)	Estimated Travel Time of the Kyreneia II (speed 2-4 knots based on Katzev, 1990)
Demetrias – NeaAnchialos	10 miles	2 hours	3 hours
Demetrias - Almyros	14 miles	1,5 hours	3,5 hours
NeaAnchialos - Almyros	8 miles	30 minutes	1 hour
Demetrias - Amaliapolis	14 miles	1,5 hours	4 hours
Demetrias – Bay of Nies	18 miles	2 hours	4,5 hours

Following Tartaron's (2018: 74) approach to the Bronze Age landscapes of the Saronic gulf, the term "coastscape" was also used for the analysis of the Pagasetic MCL. The cognitive aspect of the term, the "lines of sight and lines of sound" that Horden and Purcell (2000; 2020) put forth as basic components of the notion of connectivity, usually focuses on a specific settlement or port, with its own connections and influence over its surrounding environments. In this instance, it can be surmised that ports such as Demetrias, Almyros and Thessalian Thebes would have been central places of distinctive coastscapes, with a wider circle of influence over both their surrounding landscape and the sea with their maritime routes. The same can be tentatively said about the rural anchorage around the area of the Bay of Amaliapolis and the Bay of Nies, and their role as a rural anchorage and a shelter respectively. The extent of each coastscapewas defined by the visibility analysis performed in GIS, as the limits of the visible lines that these particular ports would have had.The basis of the visibility analysis and the coastscapes that were constructed were primarily the lines of sight that could be constructed from these sites and were established after visits in the area. To this,informationwas added on the construction of fortification walls of Late Roman cities of Demetrias and Thessalian Thebes. Furthermore, to better define the limits of the coastscapes and to ascertain where the interpolation of them would stop, especially in the cases of Thessalian Thebes and Almyros, the road network and the traveling times by land were taken into account.

The port of Demetrias would have been in the center of small -scale maritime activities over the entire area of the gulf of Volos, as well as the surrounding landscape of the hills of Iolkos and the promontory of Pefkakia. Another coastscape would have surrounded the area of the port of Thessalian Thebes, during the Late Roman period, and would have encompassed the northern side of the gulf of Almyros, as well as the visible surrounding area alongside the road network that would have functioned there. One more coastscapedeveloped around a major port of the gulf would have been the one around the port of Almyros,during the Byzantine period. This coastscapecould have also extent over the southern side of the gulf of Almyros,

as well as the majority of the Krokion plane and the river network that would have connected the port cities of Almyros, with the settlements that were further into the mainland.

Along with these hypotheticalcoastscapes(**Fig. 37**), some secondary hubs of maritime activity at the Bays of Amaliapolis and Nies, could also have existed. Caution needs to be exercised here, however, becausethere is no archaeological evidence on land, such as coastal installations or inland settlements,that could provide a clearer picture on the role that these anchorages played on the broader area of the gulf. However, considering the role thatthese bays might have playedin the MCL of the gulf, it is possible that they would have functioned as peripheral linksbetween individual coastscapes. The bay of Nies in particular, had its role as a possible shelter from the adverse winds that could have housed and protected the ships, same as with the island of Kikynthos in front of the Bay of Amaliapolis. While the same parameters of "lines of sight and sound" can be still used to determine the limits of the coastscapes, the influence that a shelter would have further inland, is diminished due to the role of the shelter itself. Without the support of any archaeological evidence on the coast, it is challenging to draw any certain conclusions about the size of these coastscapes, thus what is presented here is solely based on the "lines of sight" theory and the timeline of everyday, short journeys, that Tartaron has proposed in his writings.

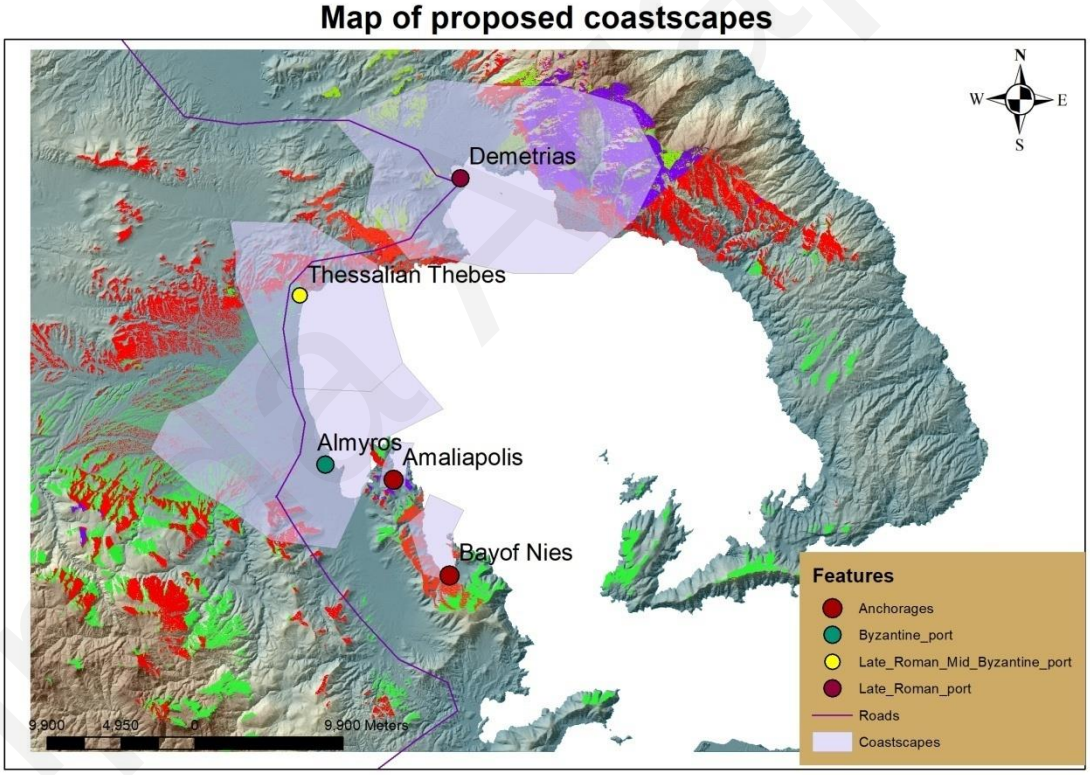

Figure 37: Map of proposed coastscapes in the Pagasetic gulf, superimposed on the visibility analysis of the area, to demonstrate the "lines of sight" which were part of the basis for the construction of these coastscapes. The polygons representing the coastscapes are extended over the surface, including the higher areas that were visible from the ports and anchorages. Thecoastscapes are marked in different colours, as follows:1) red for the coascapes of the Bay of Nies and Amaliapolis, 2) purple for Almyros 3) dark green for Thessalian Thebes and 4) light green forDemetrias (Map by ElpidaAgapitou)

This brings to the fore the question of "connectivity" which denotes the potential of movement and the connection between certain nodes or hubs of activity. In the case of the Pagasetic gulf, communication between the major ports was something common

and that was done often, up until the modern period. Since smaller shipscould travel in short distances all year long, making the connection and exchanges between ports an easy and continuous one, it would have been possible to make use of the bays and natural shelters that existed alongside the western coastline and thus making the journeys between the major ports something that could have been accomplished within a few hours.

With this it is possible to go a step further and try to apply Tartaron's term (2013: 186) of "maritime small world" to the area of the Pagasetic gulf. Tartaron (2013) first applied the term to the area for the Late Bronze Age, based on the available archaeological evidence. It is possible, with the available data, to apply this term for later periods, as well.Since it has been established that the trips between the ports would have taken a few hoursbased on the speed of the trading vessels,and since it is possible for the sailing season inside the gulf to be extended due to the enclosed environment of the area, communication between major centers of maritime activity would have been a continuous one, further establishing the connectivity within the area of the gulf and the ability to look upon the area as a "maritime small world". It is thus possible to apply the term "maritime small world" to the Pagasetic gulf during the Late Roman and Byzantine periods, given the fact that it fulfills the criteria that was established by Tartaron in his application of the term in the area during the Bronze Age. Both from the archaeological record and from the research that has been done for this paper, it seems plausible to suggest that the maritime movement would have been constant throughout the year, and the communication between ports, both by land and by the sea was possible. In 'small worlds' like the Pagasetic gulf, there were no closed seas, at least not for small or medium-size carriers. Texts such as Vegetius's "*Epitoma rei militaris*" (4.39) and the "*Codex Theodosianus*" (13.9.3) (Beresford 2001: 9-40), set parameters pertain more to the bigger ships that would make longer journeys, of warships or large merchantmen that connect the area with the rest of the Aegean.

In terms of "connectivity" the relationships between the major ports of the gulf, both during the Late Roman and later, during the Byzantine period were firmly established. Given the fact that the journeys between the major ports of the gulf were achievable within a few hours, an interesting notion can occur from this, concerning the trade and its nature within the gulf, as part of the notion of "connectivity". Having seen that the seas were open throughout the year for medium-sized vessels, it would be probably safe to assume that there would be a consistent flow of trade within the gulf. This would be especially prominent during the Middle Byzantine period, when the largest number of shipwrecks has been found. This can be supported, up to a degree, by the network of sites that were developed around the port cities of Almyros, sites that would have been dependent on the port cities for communication. The same consistency in trade cannot be fully established for earlier periods, due to the lack of archaeological evidence –one shipwreck is definitely not enough to establish a trade route- however, with the knowledge of the existence of the road network that would center around prominent ports of the period such as Demetrias and Thessalian Thebes, it can be said that it is possible, the same consistency in trade would have existed then.

To further expand on the question of "connectivity" within the gulf, it is important here to note that there were changes in power and overall influence of the ports

throughout the periods discussed. Demetrias and Thessalian Thebes peaked during the Late Roman period, while the Almyros plane and the two port cities that sustained it came to prominence during the Byzantine period, when the previous ports fell into decline. This can be further established from the presence of many Middle and Late Byzantine shipwrecks in the concentration studied (7 out of the 13 shipwrecks in total are dated in these periods). Thus, while hierarchies might have changed during these periods, communications were not interrupted.

To conclude, the study of the aspects MCL and the application of it is something that requires the use of "imaginary eyes and ears of mariners or merchants" (Knapp, 2018: 179; Demesticha, 2022: 315) to realize their perception of the landscape and better understand how they interacted with it. It can bring to "life" a vibrant area of maritime activity from the perspective of the people who lived in it and can help researchers to better understand the archaeological material that is studied.

7. Conclusions

The Maritime Cultural Landscape (MCL) is a notion that aims to bring the people and their perception of the landscape to the center of archaeological analysis. When it was first introduced by Westerdahl (1992; 2011) it brought in new aspects in the study of the archaeological material. Its application to the area of the Pagasetic gulf, with a particular focus on the shipwrecks and sailing in the area, was a new approach in studying this particular area and the evidence of maritime activities it holds.
During this research it was interesting to see how the archaeological material fitted into its landscape context and what further information it could provide as an aspect of the MCL. Having already seen that the winds of the Pagasetic favored the entrance in the gulf during the 'sailing season' –i.e. summer and spring- it is interesting to note the fact that the maritime movement was further favored by these particular winds, thus trade during these months would have been reinforced.

Thus, the picturepainted is that of a gulf interconnected, where the maritime activities were continuous, and the landscape and general environment helped to further boost the trade of the Late Roman and Byzantine periods. The gulf itself is an area which can create conditions that can favor coastal sailing, thus reinforcing the continuous communication between the major hubs of the maritime activity within it, i.e. the ports and anchorages that have been discussed here. It is a landscape that emerges as a maritime "small world" as of itself, with the meteorological conditions, most importantly the winds, providing a clearer picture of sailing and navigation that can fit into the concept of the MCL by shaping the traveling conditions and the trade of the gulf.

8. Bibliography

Primary Sources
Strabo, *Geographica*
Codex Theodosianus
Vegetius, *Epitoma rei militaris*

Secondary Sources

Arnaud, P. (2011). Ancient Sailing Routes and Trade Patterns: the impact of human factors. In D. Robinson, & A. Wilson (Ed.), *Maritime Archaeology and Ancient Trade in the Mediterranean* (pp. 61-80). Oxford: Oxford Centre for Maritme Archaeology.

Asher, A. (1840). *The itinerary of rabbi Benjamin of Tudela.* London: A. Asher & Co.

Beltrame, C., & Medas, S. (2021). The Hook-Shaped Masthead in Late Antiquity and the Early Middle Ages. *International Journal of Nautical Archaeology, 50*, pp. 34-44.

Beresford, J. (2013). *The Ancient Sailing Season.* Leiden: Brill.

Blackman, D. J. (1982). Ancient Harbours in the Mediterranean P.1. *International Journal of Nautical Archaeology, 11* (2), pp. 79-104.

Brennan, M., Davis, D., Opait, A., & Stay, M. (2020). Deep-water shipwrecks in the East Mediterranean: a microcosm of Late Roman exchange. *Journal of Roman Archaeology, 33*, pp. 291-329.

Casson, L. (1994). *Ships and Seafaring in Ancient Times.* London: British Museum Press.

Casson, L. (1971). *Ships and Seamanship in the Ancient World.* Princeton, New Jersey: Princeton University Press.

Casson, L. (1959). *The ancient mariners : seafarers and sea fighters of the Mediterranean in ancient times.* New York: Minerva Press.

Demesticha, S. (2022). Seascapes and Maritime Capacity of Late Roman Cyprus. In A. B. Knapp, *Critical Approaches to Cypriot and Wider Mediterranean Archaeology* (pp. 313-340).

Demesticha, S., & Spondylis, E. (2011). The Hellenic Institute of Marine Archaeology Survey Project at Pagasitikos Gulf, Greece: the late Roman and Byzantine wrecks. *Skyllis, 11* (1), pp. 34-40.

Duncan, B., & Gibbs, M. (2015). Shipping Mishaps and the Maritime Cultural Landscape. In B. Duncan, & M. Gibbs, *Please God Send Me a Wreck: Responses to Shipwreck in a 19th Century Australian Community* (pp. 7-33). New York: Springer.

Ginalis, A. (2014). *Byzantine Ports: Central Greece as a link between the Mediterranean and the Black Sea (unpublished PhD thesis).* Oxford: Merton College and Institute of Archaeology.

Harpster, M. B. (2005). *A Re-Assembly and Re-Construction of the 9th-century AD vessel wrecked off the coast of Bozburun, Turkey (PhD thesis).* Texas.

Horden, P., & Purcell, N. (2020). *The Boundless Sea: Writing Mediterranean History.* London; New York: Routledge.

Horden, P., & Purcell, N. (2000). *The Corrupting Sea: A Study of Mediterranean History.* Oxford: Blackwell.

Karagiorgou, O. (2001). Demetrias and Thebes: The fortunes and misfortunes of two Thessalian port cities in late antiquity. In L. Lavan (Ed.), *Recent Research in Late-Antique Urbanism Journal of Roman Archaeoogy Suppl.* (Vol. 42, pp. 182-215). Portsmouth, Rhode Island: Ann Arbor.

Karagiorgou, O. (2001). *Urbanism and Economy in Late Antique Thessaly (3rd - 7th century AD): The archaeological evidence (unpublished PhD thesis) .* Oxford.

Katzev, M. (1990). An Analysis of the Experimental Voyage of KERYNEIA II. In H. Tzalas (Ed.), *Tropis II: 2nd International Symposium on Ship Construction in Antiquity* (pp. 245-256). Athens: Hellenic Institute for the Preservation of Nautical Tradition.

Knapp, B. (2020, October 16). Maritime Naratives of Prehistoric Cyprus:Seafaring as Everyday Practice. *Journal of Maritime Archaeology, 15*, pp. 415-450.

Knapp, B. (2018). *Seafaring and Seafarers in the Bronze Age Eastern Mediterranean.* Leiden: Sidestone Press.

Leidwanger, J. (2013). Modeling Distance with time in ancient Mediterranean Seafaring: a GIS application for the interpretation of maritime connectivity. *Journal of Archaeological Science, 40*, pp. 3302-3308.

Leidwanger, J. (2013). Opportunistic Ports and Spaces of Exchange in Late Roman Cyprus. *Journal of Maritime Archaeology, 8*, pp. 221-243.

Leidwanger, J. (2020). *Roman Seas: A Maritime Archaeology of Eastern Mediterranean Economies.* Oxford: Oxford University Press.

Leidwanger, J., & Knappet, C. (2018). Maritime Networks, Connectivity and Mobility in the Ancient Mediterranean. In J. Leidwanger, & C. Knappet (Eds.), *Maritime Networks in the Ancient Mediterranean World* (pp. 1-21). Cambridge: Cambridge Unvivesity Press.

Makris, G. (2002). Ships. In A. E. Laiou, *The Economic History of Byzantium: From the Seventh through the Fiftheenth Century* (pp. 91-100). Washington D.C.: Dumbarton Oaks Research Library and Collection 39.

McGrail, S. (2001). *Boats of the World: From the Stone Age to Medieval Times.* Oxford: Oxford University Press.

Morton, J. M. (2001). *The role of the physical environment in ancient Greek seafaring.* Leiden: Brill.

Murray, W. M. (1987). Do modern winds equal ancient winds? *Mediterranean Historical Review, 2*, pp. 139-167.

Palmer, C. (2009). The Windward Sailing Capabilities of Ancient Vessels. *The International Journal of Nautical Archaeology, 38* (2), pp. 314-330.

Petihakis, G., Triantafyllou, G., Korres, G., Tsiaras, K., & Theodorou, A. (2012). Ecosystem modelling: Towards the development of a management tool for a marine coastal system part-II, ecosystem processes and biogeochemical fluxes. *Journal of Marine Systems, 94*, pp. S49-S64.

Pomey, P., Gianfrotta, P., Nieto, X., & Tchernia, A. (1997). *La Navigation dans L'Antiquité.* Aix - en - Provence: Edisud.

Pryor, J. H. (1988). *Geography, technology and war: Studies in the maritime history of the Mediterranean 649-1571.* Cambridge: Cambridge University Press.

Reinders, R. (2001). The Coastal Landscape between Thermopylai and Demetrias from a maritime point of view. In H. Tzalas (Ed.), *6th International Symposium on Ship Construction in Antiquity: Lamia 28, 29, 30 August 1996 : proceedings* (pp. 457-478). Athens: Hellenic Institute for the Preservation of Nautical Tradition.

Reinders, R., & Aalders, Y. (2007). The Medieval City of Almiros and its Hinterland. *Pharos, 14*, pp. 47-58.

Roberts, O. T. (1995). An explanation of ancient windward sailing - some other considerations. *The International Journal of Nautical Archaeology, 24* (4), pp. 307-315.

Rouge, J. (1981). *Ships and fleets of the ancient Mediterranean.* Middletown: Wesleyan University Press.

Roussos, K. (2021). Port and Harbour Networks in Crete During Late Antiquity (4th - mid-7th c. AD): A Modern Approach. *Journal of Greek Archaeology, 6*, pp. 328-357.

Sarris, A., Donati, J., Kalayci, T., Garcia, C. G., Simon, F.-X., Manataki, M., et al. (2015). Towards an integrated remote-sensing strategy for revealing the urban details of the Hellenistic- Roman city of Demetrias, central Greece. *Archaeologia Polona, 53*, pp. 351-355.

Spondylis, E., & Michalis, M. (2018). ITACA's test case Greece: the Pagasetikos underwater archaeological research at Metohi and Glaros. *ΕΝΑΛΙΑ, 13*, pp. 78-109.

Spondylis, E., & Michalis, M. (2018). ITACA's Test Case Greece: The Pagasetikos Underwater Archaeological Research at Metohi and Glaros. *ΕΝΑΛΙΑ, 13*, pp. 78-108.

Tartaron, T. F. (2018). Geography Matters: Defining Maritime Small Worlds of the Aegean Bronze Age. In J. Leidwanger, & C. Knappet (Eds.), *Maritime Networks in the Ancient Mediterranean World* (pp. 61-92). Cambridge: Cambridge University Press.

Vella, J. (2023, January). Greek Words in Maltese Harbour Toponymy. *Athens Journal of Mediterranean Studies, 9* (1), pp. 25-52.

Walker, D. S. (1960). *The Mediterranean Lands.* London: Butler & Tanner Ltd.

Westerdahl, C. (2011). Conclusion: The Maritime Cultural Landscape Revisited. In B. Ford, & B. Ford (Ed.), *The Archaeology of Maritime Landscapes* (pp. 331-344). New York: Springer-Verlag.

Westerdahl, C. (1992). The Maritime Cultural Landscape. *The International Journal of Nautical Archaeology, 21* (1), pp. 5-14.

Whitewright, J. (2018). Sailing and Sailing Rigs in the Ancient Mediterranean: implications of continuity, variation and change in propulsion technology. *International Journal of Nautical Archaeology, 47* (1), pp. 28-44.

Whitewright, J. (2009). The Mediterranean Lateen sail in Late Antiquity. *International Journal of Nautical Archaeology, 38* (1), pp. 97-104.

Whitewright, J. (2011). The Potential Performance of Ancient Mediterranean Sailing Rigs. *The International Journal of Nautical Archaeology, 40* (1), pp. 2-17.

Αβραμέα, Ά. (1974). *Η Βυζαντινή Θεσσαλία μέχρι του 1204: Συμβολή εις την ιστορικήν γεωγραφίαν (αδημοσίευτη.*Αθήνα: Εθνικόν και Καποδιστριακόν Πανεπιστήμιον Αθηνών.

Αρβανιτόπουλος, Α. (1911). Ανασκαφαί και Έρευναι εν Θεσσαλία κατά το έτος 1911. *Πρακτικά Αρχαιολογικής Εταιρείας* , pp. 280-356.

Γιαννόπουλος, Ν. Ι. (1904). Οι δύο Μεσαιωνικοί Αλμυροί και ο νύν. *Επετηρίς, 8*, pp. 65-92.

Δεμέστιχα, Σ., & Σπονδύλης, Η. (2004). Αναγνωριστική έρευνα ΙΕΝΑΕ Δυτικών Ακτών Νοτίου Παγασητικού. *ΕΝΑΛΙΑ, 8*, pp. 11-27.

Δεμέστιχα, Σ., & Σπονδύλης, Η. (2002). Αναγνωριστική έρευνα ΙΕΝΑΕ Δυτικών Ακτών Νοτίου Παγασητικού, Έτους 2000. *ΕΝΑΛΙΑ, 6*, pp. 24-31.

Κουλουράς, Γ. (1997). *Η περιοχή του Παγασητικού κατά τους Μέσους Χρόνους (Δ' - ΙΔ' αι.) (αδημοσίευτη διδακτορική διατριβή).* Ιωάννινα: Πανεπιστήμιο Ιωαννίνων.

Μπακιρτζής, Χ. (1989). *Βυζαντινά τσουκαλολάγηνα : συμβολή στη μελέτη ονομασιών, σχημάτων και χρήσεων πυρίμαχων μαγειρικών σκευών, μεταφορικών και αποθηκευτικών δοχείων.* Θεσσαλονίκη: Πανεπιστήμιο Θεσσαλονίκης.

Πατελοδήμος, Γ. (2001). άλλος για... Πευκάκια. *Εν Βόλω* (3), pp. 74-75.

Σπονδύλης, Η. (2017). Παγασητικός: ανασκόπηση υποβρύχιων ερευνών (2000-2013). *ΕΝΑΛΙΑ, 12*, pp. 18-31.

Σπονδύλης, Η. (2012). Υποβρύχια Έρευνα ΙΕΝΑΕ στον Παγασητικό Κόλπο. Ερευνητική περίοδος 2005. *ΕΝΑΛΙΑ, 11*, pp. 16-39.

Σωτηρίου, Γ. (1993). *Αι Χριστιανικαί Θήβαι της Θεσσαλίας.* Αθήνα: Εν Αθήναις Αρχαιολογική Εταιρεία.

Τσολάκης, Σ. Γ. (2009). *Παλαιάς και Νέας Μιτζέλας: Άπαντα τα ιστορικά.* Βόλος: Πανεπιστημιακές Εκδόσεις Θεσσαλίας.

Φιλιππάκης, Δ. (2017). *Θαλάσσια Γεωαρχαιολογική Έρευνα στον Όρμο Νηών (Παγασητικός Κόλπος) (αδημοσίευτη μεταπτυχιακή διατριβή).*Πάτρα, Τμήμα Γεωλογίας.

InternetSources

https://www.ahdictionary.com/word/search.html?q=port
https://www.ahdictionary.com/word/search.html?q=harbour
https://www.pesty.gr/index.php/mouseia

Annex: Questionnaire for the Ethnographic Research

1. The Economic Landscape: fishing and coastal agriculture

1.1 Where there any evidence of fishing villages inside the gulf?

1.2 Are there any testimonies of certain products being shipped or transported by the sea?

2. Transport and Communications (sea routes, seamarks, habours and anchorages, navigation)

2.1 Which are the favorable winds for someone to sail from the entrance to the gulf to the port of Volos?

2.2 Which are the favorable winds to sail from the port of Volos to the entrance of the gulf?

2.3 When is the best time for fishing near the coastline of the western Pagasetic, in specific areas such as near maritime centers like Almyros, Demetrias, Bay of Nies, Amaliapolis?

2.4 Where did the fishermen learn to "read" the winds? Which are the signs of on hands meteorology?

2.5 Which are considered to be the dangerous winds for sailing inside the gulf and how can we know when they would be dominant?

2.6 Which are the winds that can create favorable conditions for sailing between: ports such as from Demetrias to Almyros and back, or from the northern side of the gulf (gulf of Volos) to the southern side (bay of Nies) and to the entrance of the gulf (straits of Trikeri)?

2.7 Which are the difficulties of traveling between ports (from Volosto Almyros and back, from the Bay of Nies to Volosand/or Almyros? Which are the known shelters from the winds and which can be considered as dangerous promontories?

2.8 Which are the main anchorages in the Pagasetic gulf?

2.9 Which are the environmental conditions that dictate navigation alongside the coastline and which are those that allow navigation and sailing in the open sea?

2.10 Which are the traveling times between ports?

3. The Outer Resource Landscape (supplying material)

3.1 Are there any testimonies of transportation and/or small-scale trade between ports/anchorages before the existence of roads?

4. The Inner Resource Landscape (surplus for ship construction and trade)

4.1 What is known about shipsheds

5. The Cognitive Landscape (mental maps, oral traditions/songs, place names)

5.1 Are there any testimonies for certain place names inside the gulf that have a connection with either sailing or navigation?

5.2 Which are the landmarks –if any- that are used for navigation?

5.3 Are there any oral traditions –like stories or songs- that are about the sea?