

THE TIDAL PHENOMENON AN IMPETUS FOR MILD TOURIST ACTIVITY IN CHALKIDA - A FIELD STUDY

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Abstract

The present article attempts to succinctly map the city of Chalkida, as well as the surrounding area. It outlines the contemporary tourist activities of the city. It poses questions regarding the development of tourist standards, in respect to the current data of the region. The tidal phenomenon, our research interests, as well as thematic tourist destinations are all presented in depth. At the same time, through the findings of the study, the dynamics that emerge in relation to mild forms of tourist activities in Chalkida are detected, mainly focusing on the oral and written answers of the sample.

1. Getting to know Euboea

The Prefecture of Euboea comprises the island of Euboea, the second largest island in Greece and third largest in the Eastern Mediterranean. It is 160 km in length, and it is located along Continental/Central Greece, with the Euboean Gulf between them (Vliamos-Karagiannis, 1999). The Gulf is divided into the North Euboean Gulf and the South Euboean Gulf by the narrow channel that lies before the city of Chalkida, the Euripus Strait, which, at its most narrow point, constitutes a maritime block, 40 m long and wide and 8,5 m deep, widening at both sides. We can thus see that the Euripus has two wide basins, one to the north, where the Port of Chalkida is, and one to the south, where the southern port of Chalkida is (G. M. Chors, 1939). The fate of Euboea is inextricably linked to the fate of the Euripus Strait. The arch drawbridge under which the changing currents take place has been established as the meeting point, because it is there where the tidal phenomena of the ebb and flood tide of the strait are combined (Ch. Sfetsas, 1999). Euboea has a total area of 3.896 km² (Euboean Encyclopedia, 1990) and a population of 215.136, according to the 2011 census statistical data by the Hellenic Statistical Authority (H.S.A., August 1st 2012).

2. A short walk around Chalkida

The 2001 census data showed a population of 55.241 for Chalkida, while the population number in the most current census is 53.384 (H.S.A., 2012), which means there was a 3,4% decrease in population. Currently, the tourist period in Chalkida is limited to the three summer months, offering an escape for weekend tourists (predominantly from Athens) and allowing them to enjoy the natural environment and culture, but mainly the unique tidal phenomenon which makes the area one of a kind.

Our proposal based on the tidal phenomenon could be an integrated local development planning within a wider model of development of mild forms of tourism. This could be unique

in the area of tourism, since the tidal phenomenon of the Euripus is actually uniquely attractive, attracting many visitors at least from the rest of the country. As this phenomenon is a product of nature, luxury and extravagances are clearly antithetical to the type of tourism it would and does attract. Therefore, it becomes clear that the tidal phenomenon of the Euripus is indeed an alternative model of tourist development.

3. Getting to the city of Chalkida

You can get to Chalkida by train, whose route follows the meandering coastline; there are many train services to and from the city around the clock, day and night. The end of the line is outside the traditional building close to the old drawbridge, which completes the extraordinary picture of the Euripus Strait, a picture unlike anything else. Besides the railway, there are connections along the island through the strait to and from places such as Aidipsos, Eretria, Skyros, and Karystos, in which cases one can reach Chalkida by crossing the inland – following spectacular routes – while the speedy flying dolphins connect Chalkida with the Sporades and other Aegean islands in practically no time.

Chalkida can also be reached by bus following the Athens – Lamia national highway, crossing the new high bridge, which is about one km long. But one can also enter the city through the aforementioned old drawbridge, over the Euripus Strait. There one can admire the strange and rare phenomenon of the tide, which occurs every six hours, with the water changing direction from the north to the south and vice versa.

4. Views on the tidal phenomenon of the Euripus

Many Greeks in ancient times tried to explain this phenomenon, which follows the natural laws of tide, such as the great Greek philosopher Aristotle, until his death in early August of 322 b.C. (S. Kallias, 1986), and Eratosthenes (Encyclopedia “Nea Domi”, 1996). It has attracted the interest of a multitude of people throughout history, on both a philosophical and a practical level, due to its charm and mysteriousness (A. Miaoulis, 1882). Even though all intellectuals have examined the phenomenon, from Aristotle to contemporary ones, an explanation is yet to be found. It is a fact that the current changes direction every 6-7 hours, but the law that governs this ebb and flood tide has not been discovered yet, so they cannot be accurately determined in advance (S. Kokkinis, 1941).

Most of the theories developed by modern scientists to explain the phenomenon coincide with those by Aristotle, and they indicate that these currents are due to the different gravitational pull the Moon and the Sun have at the center versus the surface of the Earth, which creates different pressure levels in sea water, that the rise and fall of the water mass. The tidal phenomenon of the Euripus is complex, that is, its causes are not just astronomical, but are also meteorological, topographical, geographical, and geological (S. Leontaris, 1984-1985). Chalkida became known due to this tidal phenomenon, which occurs every six hours when the water current changes direction (N→S and S→N), with a few minutes of calm between changes. These regular changes last about 23-24 days; for the next 5-6 days there may be no current changes at all, or there may be a few which do not have a set duration or acceleration, and then the tidal phenomenon occurs all over again (Mastrodimitris, 1964).

5. The astronomic explanation of the tide

Newton was the one who explained the phenomenon of the tide, claiming that it was due to the combined gravitational pull of the Moon and the Sun on the surface of the Earth. Tides are created because the side of the Earth which is closer to the Moon is pulled most strongly by it compared to the opposite side, that is the one which is furthest away from the Moon (Figure 1).

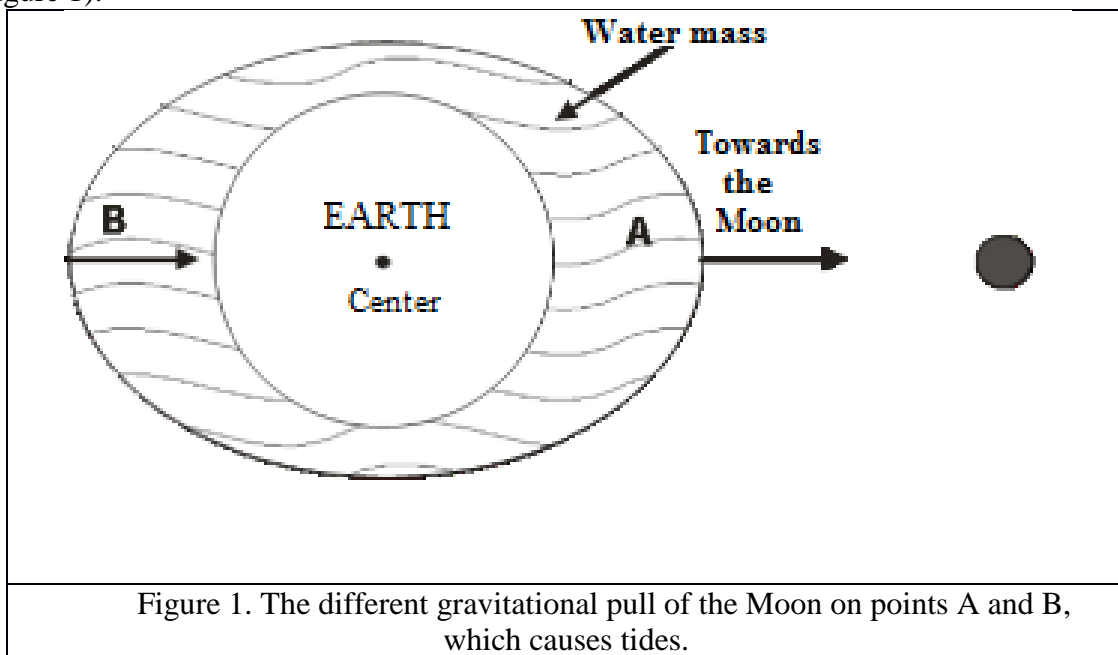


Figure 1. The different gravitational pull of the Moon on points A and B, which causes tides.

The above figure shows that the Moon exerts gravitational pull on point A, the center of the Earth, and point B, but the pull is greater on point A than it is on the center of the Earth, where it is in turn greater than it is on point B. The pull on point A tends to move the water masses towards the Moon, while the pull on the center of the Earth tends to move the entire planet towards the same direction, even though such movement is imperceptible due to the great difference in mass. The gravitational forces exerted on point B are significantly weaker than those exerted on point A, therefore the movement of the water masses towards the Moon is significantly weaker at that point. The result of the gravitational forces exerted by the Moon on points A and B is the rise of the water level – that is, a flood tide.

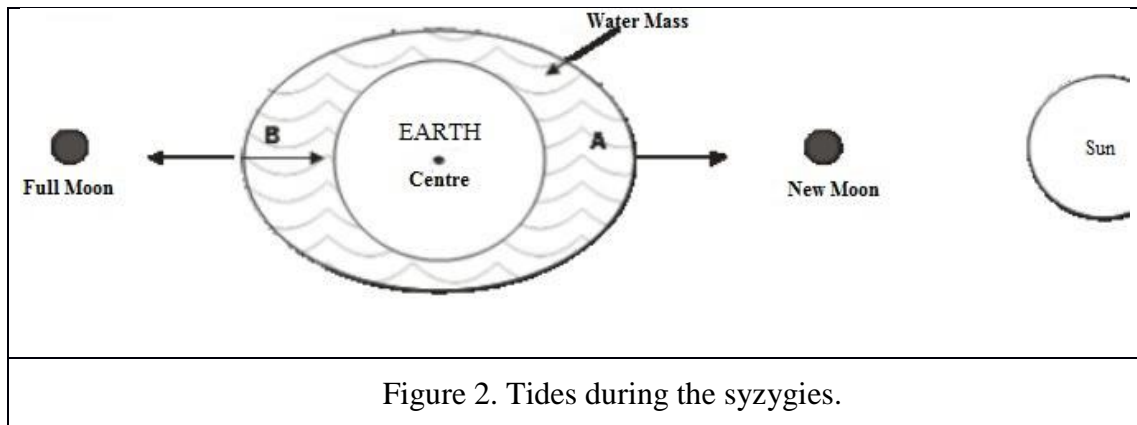
The tide is essentially created by the different gravitational pull of the Moon on the surface versus the center of the Earth, which results in the rise of the waters in the directions that connect the Earth and the Moon horizontally (syzygies) and the fall of the water in the vertical directions (quadratures). It should be noted that tides also occur on the earth’s crust and the atmosphere – the latter to a far greater degree than the former.

The force causing the tide is called a tidal force, and is represented by the following equation: $F_{\pi\alpha\lambda} = -2g \frac{M}{r^3}$ (1) (where: F = tidal force, M = mass of the Moon as compared to the mass of the Earth, r = the distance between the moon and the center of the Earth, in earth radii, and g = gravitational acceleration on the surface of the Earth).

Besides the Moon, the Sun also causes tidal phenomena, however those tides are about 55% weaker than the ones caused by the Moon. If F_H and F_Σ are the tidal forces of the sun and moon respectively, M_H and M_Σ are their masses, and R_H and R_Σ are their distances from the center of the Earth. Using equation (1), we have: $F_H = -2g \frac{M_H}{R_H^3}$ and $F_\Sigma = -2g \frac{M_\Sigma}{R_\Sigma^3}$. Given that the Sun’s distance from the center of the Earth is about 400 times greater than that of the Moon, dividing the two previous equations in parts, after substituting $R_H = 400 R_\Sigma$, will give us: $\frac{F_H}{F_\Sigma} =$

$\frac{M_H}{64.000.000 \times M_\Sigma}$. Also taking into consideration that $M_H \approx 29.090.090 M_\Sigma$, we have: $\frac{F_H}{F_\Sigma} = \frac{5}{11} \Rightarrow F_H = 45,5\% \times F_\Sigma$ (2).

The tidal phenomenon is stronger when it is a lunisolar tide, that is when the Sun's gravitational pull is added to that of the Moon. This phenomenon is observed during the syzygies, that is when there is a New Moon or a Full Moon (Figure 2).



Using the data regarding Chalkida mentioned earlier in the article, and comparing them to the main regions of Euboea which attract tourists, we performed an empirical analysis of fluctuation of arrivals to the city, the seasonality index – which has increased – as well as the average tourist spending per capita – which has been steadily decreasing. This is why we deemed that a field study was required, and we wanted to see how could the decision makers of the city use the tidal phenomenon to attract tourists and develop mild tourist activities in the city.

6. The data of the study

Location: Chalkida

Time period: the study took place during the months of June, July and August of 2015

Type of study: quantitative, using an anonymous questionnaire and pre-designed personal questions for those who did not want to answer the questionnaire.

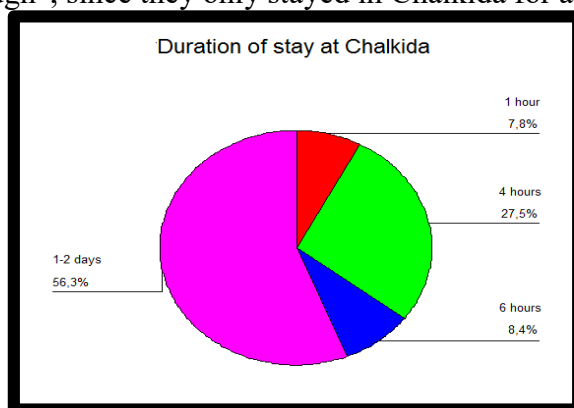
Sample: 320 individuals

Sampling: random (random sample), among people who had just visited the Strait

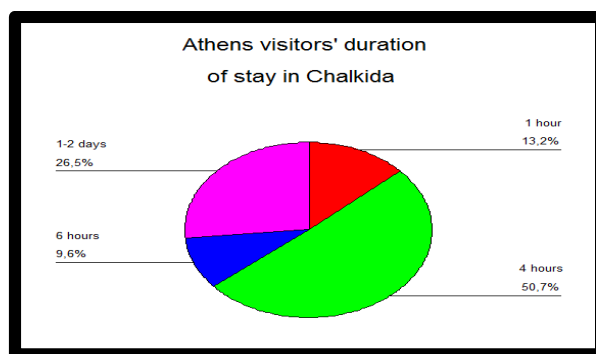
7. The findings of the study

The study showed that 42,5% of visitors came from Athens, and the remaining 57,5% came from every corner of Greece. Regarding the age of the visitors, 55,6% was between 15 and 35 years old, 23,1% was between 36 and 50 years old, while the rest were over the age of 50.

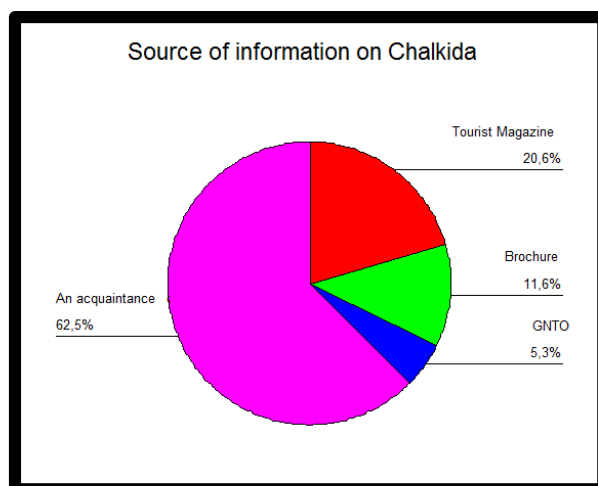
56,3 % of the visitors chose to spend at least one night in Chalkida, while the rest of them were just “passing through”, since they only stayed in Chalkida for a few hours (1 to 6 hours).



The majority of visitors from Athens (73,5%) stayed in Chalkida for a few hours, either as a daily trip or (just) to eat, while the remaining 26,5% stayed for a couple of days, combining their visit to Chalkida with visits to other regions of Euboea as well. When it comes to the visitors who came from the rest of the country, only 21,7% of them stayed in the city just for a few hours, while 78,3% of them stayed for a few days, so their visits to the city are statistically different to those of visitors from Athens ($\chi^2=198,725$, $df = 3$, $p = 0,00$, Pearson Coefficient = 0,516).

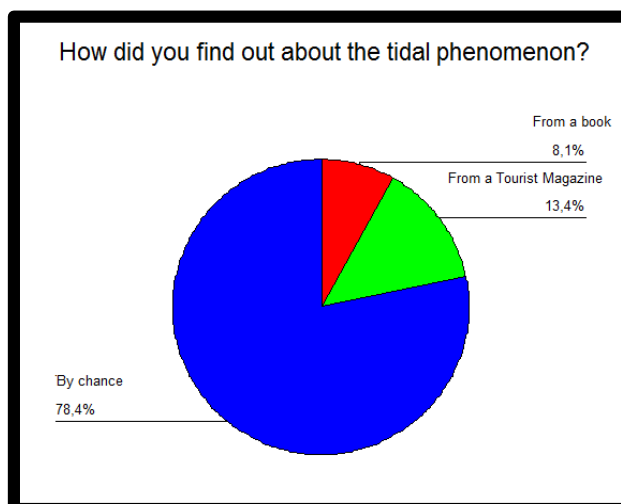


The findings regarding the visitors’ source of information on Chalkida, particularly on the tidal phenomenon, are quite interesting, since for the source of information for 62,5% of the visitors was “an acquaintance”.



12,5% of the visitors from Athens got their information on Chalkida from a tourist magazine, 5,9% from a brochure, 8,8% from the Greek National Tourism Organization (GNTO), and 72,8% from an acquaintance, while the respective percentages for visitors from the rest of the country are 26,6%, 15,8%, 2,7%, and 54,9%, therefore statistically different from those of visitors from Athens ($\chi^2=255,175$, $df = 3$, $p=0,00$, Pearson Coefficient = -0,222).

The answers regarding the visitors’ source of information on the tidal phenomenon are of equal interest. 78,4% of them found out about it “by chance”.

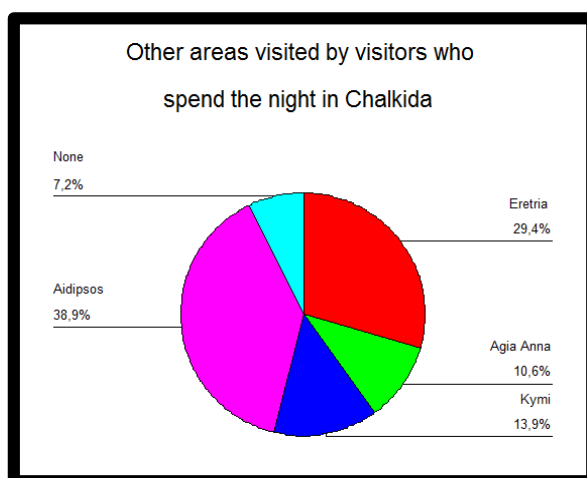


5,1% of the visitors from Athens found out about the tidal phenomenon from a book, 9,6% from a tourist magazine, and 85,3% by chance, while the respective percentages for visitors from the rest of the country are 10,3%, 16,3%, and 73,4%, therefore statistically different from those of visitors from Athens ($\chi^2=294,306$, $df = 2$, $p=0,00$, Pearson Coefficient = -0,139).

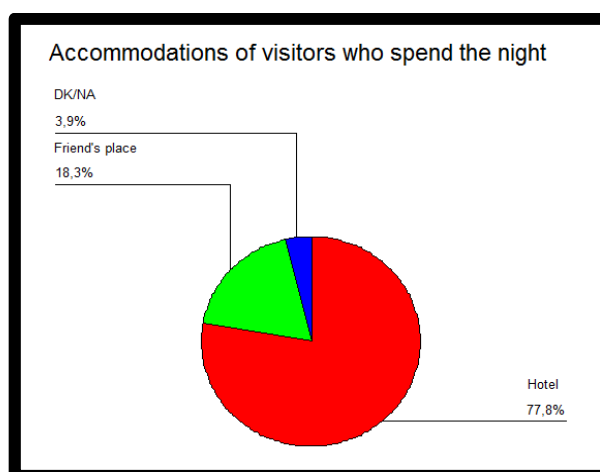
Despite having found out about the tidal phenomenon by chance, 98,4% responded that visiting Chalkida to witness it had been worth it. In fact, visitors seem to love the city, since the percentage of those who had visited it again in the past (repeaters) is quite high (70,6%). The percentage of visitors from Athens who had also visited Chalkida in the past is exceptionally high (92,6%), while the respective percentage for visitors from the rest of Greece is 54,3% ($\chi^2=54,45$, $df = 1$, $p=0,00$, Pearson Coefficient = 0,416).

The tidal phenomenon does not benefit only the city of Chalkida, but other regions of Euboea as well. 56,3% of the visitors combine their visit to Chalkida with a visit to another nearby town or area. This percentage actually surges to 92,8% among the visitors who spend

the night in the city, who usually combine their visit to Chalkida with visits to other popular destinations in Euboea – in order of preference: Aidipsos (particularly elderly individuals, due to the famous thermal springs there), Eretria, Kymi, and Agia Anna.

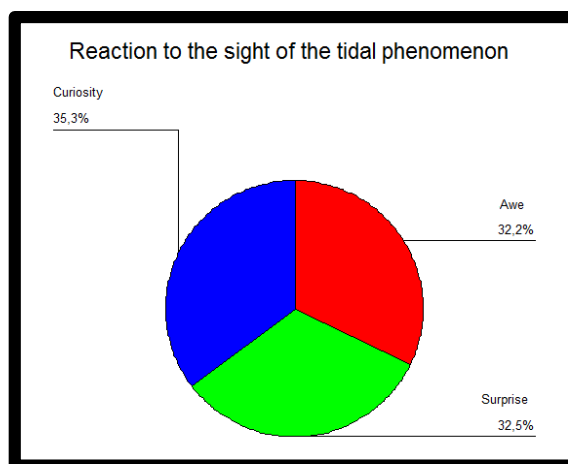


Although a considerable number of visitors who spend the night in Chalkida stay at friends’ places (18,3%), 77,8% of them stay at various hotels in the city, creating significant revenue for the local economy.



61,1% of the visitors from Athens stay in a hotel and 38,9% at a friend’s place, while the respective percentages for visitors from the rest of the country are 81,9% and 13,2%; 4,9% of the people questioned chose not to answer. The aforementioned percentages are statistically different ($\chi^2=165,633$, $df = 2$, $p=0,00$, Pearson Coefficient = 0,0). Among the visitors who are “passing through” for a few hours, 47,1% spend some of the time at a friend’s place, which confirms the highly developed sense of hospitality of the people of Chalkida.

Visitors’ feelings when they witness the tidal phenomenon range from awe to curiosity to surprise, as the following chart shows. Nearly all visitors (98,4%) consider this particular phenomenon as an important point of attraction for the city of Chalkida, and Euboea in general, and that it constitutes a powerful tool for the development of the region.



8. Conclusions

Looking at the findings of the study, one could say that there are two types of visitors to Chalkida: those who come for a few hours of recreation (for coffee or dinner), the majority of whom come from Athens, and those who come from the rest of Greece, either in organized groups or on their own, stay for a few days, and combine their visit with visits to other tourist destinations of Euboea or, in the specific case of Aidipsos, with visits to the thermal springs for health reasons – particularly by elderly people. These two groups of visitors clearly have different characteristics, and their answers on their sources of information on the city and on the tidal wave, the length of their stay, their accommodations, etc., also differ. Visitors from Athens tend to get their information on the region via “word of mouth” rather than magazines or brochures, realize daily trips to Chalkida and only stay there for a few hours, and have more personal relationships with people from their city, therefore staying with friends once there to a high percentage. The visitors from the rest of the country, on the other hand, have usually been informed via magazines or brochures, stay in Chalkida for a few days also visiting other parts of Euboea, and staying in hotels (M. Zacharatos, 2014).

It is evident that different types of strategies should be developed to attract visitors from these two groups, adapted to the particular characteristics of each one. The tidal phenomenon of the Euripus Strait is a prominent attraction for the city of Chalkida, and Euboea in general. There could be a stronger, and possibly more organized, tourism flow if the city’s organizations and bodies advertised the phenomenon in conjunction with other attractions of the city and Euboea in general. Perhaps they should take advantage of the historical monuments and objects to develop cultural and museum tourism. The number of hospitality businesses could help promote gastronomic tourism, or even wine tourism, since there are various small and medium sized wine-bottling businesses working with local wine. Finally, the number of churches suggest that religious tourism (pilgrimages) could also be developed.

In any case, the tidal phenomenon is undoubtedly an agent for the development of the wider region, and it could create business and employment opportunities. It is up to the representatives and the authorities of the city to take advantage of this phenomenon, to the extent it is possible, taking care to maintain a balance and safeguard the environment at the same time. What this study shows is that it is necessary that strategies to attract tourists from different target groups be developed, as the city has a variety of locations which are suited for the development of recreational tourism, but lacks infrastructure and properly trained staff. It is time they review, study, and consider all the rich material the city has to offer, as well as the works of established intellectuals who have made and are still making history and culture, thus promoting the society of Chalkida.

Endnotes

1. See Vliamos-Karagiannis (1999), "Field Study of the Paradirfies Communities", University of Thessaly, Phase A, p. 86.
2. See G. M. Chors (1939), "Tidal phenomena of the Euripus", lecture at the "PARNASSOS" hall, print in the bulletin of the Hellenic Military Geographical Service, 1st trimester of 1940, Athens, p. 1.
3. See Ch. Sfetsas (1999), "Chalkida and the Tidal Phenomenon", self-published, p. 5.
4. See "Euboean Encyclopedia" (1990), Volume A, Pub.: Steph. D. Vagilopoulos, Athens, p. 544-545.
5. See H.S.A., 2012.
6. See *H.S.A. Records, Aug. 1st 2012*.
7. See S. Kallias (1986), "Chalcis from a natural and medical approach", Pub.: Typ. Estias, Athens, p. 36-37.
8. See Encyclopedia "Nea Domi" (1996), Issue 35, Pub.: Tegopoulos, Athens, p. 122.
9. See Andreas Miaoulis (1882), "On the Tide of the Euripus", Athens, p. 9. Among other things, he reports that: the Tidal Phenomenon of Euripus is 2.500 years old, and had not been studied but in the year 1686, when the Jesuit Rabinus, who had been living in Chalkida for 2 years, and the Venetian Coronelli made some detailed observations, and again in 1703, by the Flemish Dapper.
10. See Spyros Kokkinis (1941), "Buchon's Journal. A visit to Chalkida.", Athens, p. 11.
11. See Sotirios Leontaris (1984-1985), "The contribution of the tidal phenomenon of the Euripus, Chalkida, to the study, in relation to the coastline geographical condition of the North and South Euboean Gulf", ESA VI, p. 193-220.
12. See Pan. Mastrodimitris (1964), in "Euboea" by Strabo: Ancient Text, translated in Modern Greek, with annotations, ESA XI, p. 315. On the tide of the Euripus he writes: "suffice it to say that they claim that the current changes seven times in the passing of a day".
13. See Makis Zacharatos (2014), A study realized by professor Makis Zacharatos in 2014 for the Research Institute for Tourism (R.I.T.) in the context of the general assembly of the R.I.T. at the 10th HORECA, which produced a series of interesting data.

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