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THE COASTS OF KAPIDAG PENINSULA IN TERMS OF GEOMORPHOTOURISM

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Abtract: Geomorphotourism is a form of tourism that has been developped all over the world in recent years. Focusing on geomorphological site, morphological and landscape features, it is little known in Turkey. However, many landforms, which possess cultural, historical and environmental values, can be found in Kapidag Peninsula as well as all over Turkey. Kapidag Peninsula should be studied for its environmental significance in addition to its cultural, historical value and morphological heritage. The study area, located in the northwest of Turkey, has a significant potential for geotourism. The main purpose of this study is to assess geomorphotourism and geomorphological sites of Kapıdağ Peninsula.

Key Words: Kapidag Peninsula, Coast, Geomorphotourism, Geomorphosite

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INTRODUCTION

Geomorphotourism is a type of tourism based on scientific and cultural use of geomorphological sites. It includes landforms such as volcanoes, fairy chimneys, caves, canyons, pothole lakes and cliffs unlike geotourism or geological tourism which includes the formations of rocks, minerals, sediments, fossils, etc. on earth (Ekinci & Doğaner, 2012; Gates, 2012). These landforms have been included within natural tourism up until recently. However, vegetation constitutes the basis of natural tourism since biological content is at the forefront. Geomorphotourism analyse landforms since it is related the earth's crust. It is people's curiosity and their efforts to know that originated this type of tourism.

Landforms that have higher scientific, aesthetic and cultural values within geomorphotourism is called "geomorphosite" (Panizza, 2001; Reynard, 2002; Reynard et al., 2007; Panizza & Piacente, 2008). The preservation status of large areas, which include different geomorphosites and geosites, are known as "geo-parks" (Reynard et al., 2007; Pereira et al., 2007; Necheş, 2013; Gavrilă & Anghel, 2013; Lazzari & Aloia, 2014). Geomorphotourism concept, which was implemented in the 2000s by UNESCO known as List of World Geological Heritage, is still new concept in the international literature. In Turkey, Geological Heritage Conservation Society was established in 2000 and the first geo-park was created in 2010 in Kizilcahamam-Camlidere (Ekinci & Doğaner, 2012; Yolal, 2012; Koçan, 2012). However, there are no geo-parks, geosites and gemorphosites under conservation status by law in Turkey. Landforms in Turkey are protected under the

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conservation status specified for natural sites, natural memorials, national parks, natural parks, nature conservation area and natural monuments. Geosites, located at Kizilcahamam-Camlidere, have been attempted to be preserved by General Directorate of Nature Conservation and National Parks after registering them as natural monuments. It is necessary to look at these attempts still conducted under the hegemony of geologists with a geographical perspective, to evaluate and to clarify them on scientific basis by the people concerned with geomorphotourism (Ekinci & Doğaner, 2012; Akyol, 2012).

Even though there are many positive effects of tourism activities, unveiling landforms to tourism brings some downsides alongside with it. Placing landforms that are intended to be unveiled to tourism primarily within a conservation status is an important factor in preventing these adverse effects. It is also necessary for a landforms to fulfill conditions such as rarity, having value in terms of paleogeography, and becoming a sample in order to be able to represent a formation for being taken under protection and assessed within the scope of tourism. Today, geomorphosites are grouped under headings in terms of structural shapes as rivers, morphoclimatic shapes under the control of glaciers and winds, volcanic shapes, karstic shapes and coastal forms and in terms of details as canyons, lagoons, fairy chimneys and rocks etc (Panizza, 2001; Dingwall et al., 2005; Ekinci & Doğane, 2012). However, it is necessary to assess these landforms with geographical perspectives by classifying them separately under the umbrella of geomorphologic tourism. Awareness should be created in terms of geomorphotourism and conservation by classifications such as the most beautiful cave, the most beautiful fairy chimney and the most beautiful cliff after determining the most beautiful and the most characteristic examples (geomorphotop) of landforms in the country or in the region.

For this purpose, field work was conducted on July 2012 after administering office task for determining and evaluating of the geomorphologic characteristics of landforms with tombolo properties in Kapidag Peninsula. Landforms and their characteristics, which were formed along the coastal line in Kapidag Peninsula, were determined in the study. Then size features of identified landforms, their vegetation, their relations with hydrography, damages that were inflicted by physical and human causes and future threats were examined.

THE STUDY AREA

Kapidag Peninsula, situated in the northweast of Turkey and in the south of the Marmara Sea, and has an area of 300 km² and coastal length of 90 km, is within the boundaries of Balikesir province (Kurt, 2013; Uysal et al., 2010). The Gulf of Bandirma is located on its east and the Gulf of Erdek is on its west. The study area is situated at 35th Zone according to UTM Coordinate System and between 27º 40 ´30˝ - 28º 02 ´30˝ Eastern longitudes and 40º 22´ 30˝ - 40º 31´ 30˝ Northern latitudes with regard to Geographic Coordinate System (Figure 1).

GENERAL GEOGRAPHICAL FEATURES OF THE STUDY AREA

Being connected to the mainland by a narrow and low isthmus (tombolo), Kapidag Peninsula is an old part of land and its highest point is 803 m (Adamkaya). The area, formerly an island that was very close to the shore, is connected to the mainland by two separate cords both from west and east. The width of this alluvial plain, which separates the Gulfs of Bandirma and Erdek from one another, is 1700 m and its is length is 1500 m. There are sand dunes on the east, beach on the west and alluvial fields with terraced morphological characteristics on the north and the south. While gap between these two cords was a lagoon in the beginning, it turned into a swamp later on and was merged with a land in the end. There is a swamp called Belkis which covers an area of approximately 1 km² and is situated in the middle.

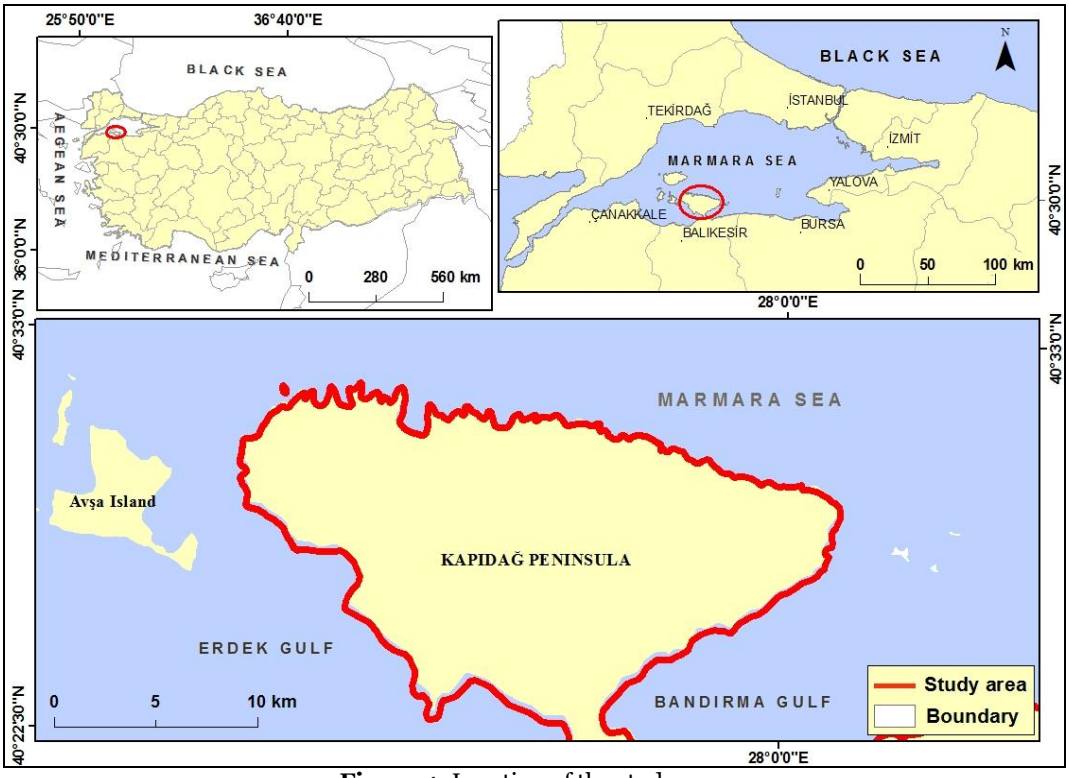

Figure 1. Location of the study area

Kapidag Peninsula is a part of body of southern Marmara islands in terms of its geological structure. There are mainly granite, quartzite, mica schist, and gneiss in its structure. Its coasts are mostly steep and sinuous (Ardel & İnandık, 1957; Ertin, 1994; Zortul, 2001; Hızal, 2008). Leveled areas are usually between around Erdek and Belkis tombolo. The climate of the Peninsula is under the influence of "Marmara Transitional Type" which has transitional characteristics between the Mediterranean and the Black Sea climates (Koç, 1996). Even though it was generally covered by shrubs, woodlands and brushwood can be seen in some regions. The major center of settlements is Erdek situated in the southwest. This part was covered by olive groves, fruit orchards and vineyards. Forest cover, consisting of oak species, maple trees, ash trees, quaking aspen, white aspen, elm trees, alnus, willow, sycamore, redbud, Calabria pines, Daphne and other species, can be found starting from the coasts to the inland of the Peninsula.

METHODS

Located on G19-c3, G19-c4, G19-d3, H19-a2, H19-b1, H19-b2 and H20-a2 sheets of 1: 25000 scaled Turkey topographic map, the data used for this study consist in topographic map (1:25000), geological maps (1:100000), color digital orthophotos (0.45 resolution) and field data obtained from field campaigns (carried out in July 2012). After geological map sheets (1:100000) were scanned in high resolution in JPEG format (UTM, WGS 84, Zone 35N), database was created by digitizing them and was determined the distribution of lithological units by using ArcGIS 10 CBS software.

Sheets in 1:25000 scale and vector format were used as a main layout in the determination of geological features of the field. Main geomorphologic units were identified from 1:25000 scale topographic maps within the boundaries of the study area

off the coasts of the Marmara Sea. Color digital orthophotos (UTM, WGS 84, Zone 35N) in 0.45 cm resolution produced by General Command of Mapping were used during the creation of the maps.

GEOLOGICAL AND GEOMORPHOLOGICAL FEATURES

The coasts of Kapidag Peninsula are generally, in terms of lithological properties, composed of metamorphic rocks with crystal and schist properties and partly from marble and limestone. However, the presence of metamorphites that metamorphosed prior to Permian and old Quaternary alluvium that cut them have been identified in recent geological research (Güneysu, 2000; Aksoy, 1998; Figure 2).

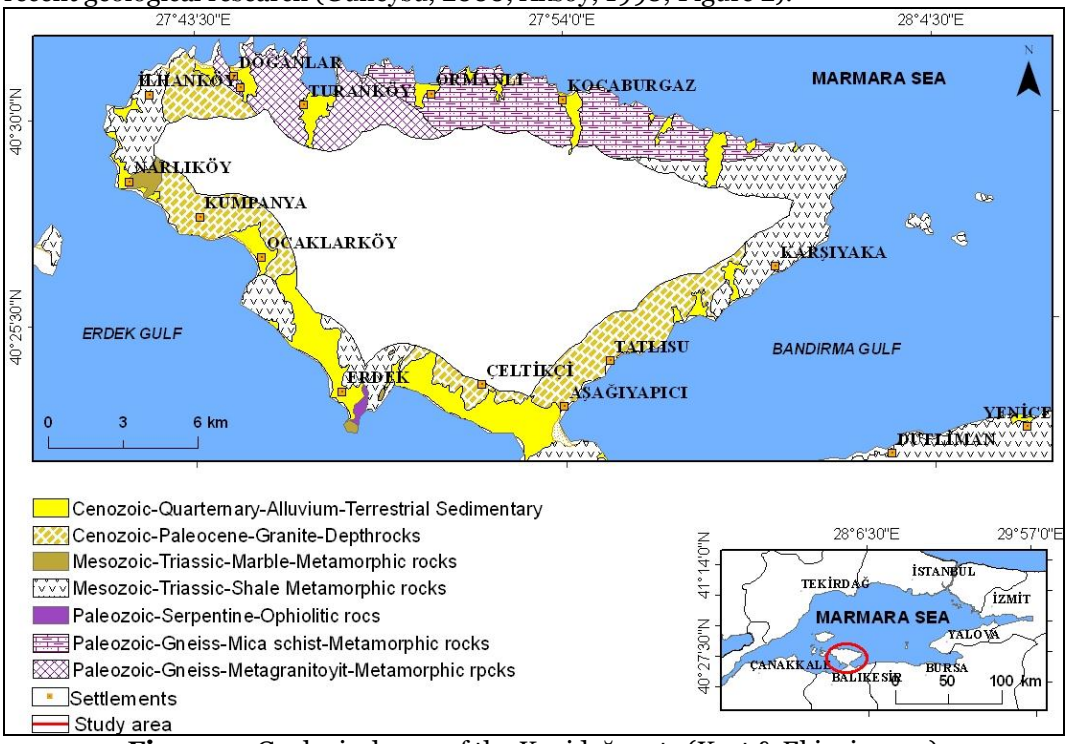

Figure 2. Geological map of the Kapidağ casts (Kurt & Ekinci, 2013)

Rocks that extend from Dalyan Burnu to Cakil village in the northeast and show metamorphic and schist structure along an area of approximately 11 km can be found. A more straight coastal line stretches out along the coast with the disappearance of bay since these rocks are more open to erosive effects in comparison with granite rocks. Gnays continue from Kestanelik village in the east to Ormanli village in the east. Crystallized and schist metamorphic rocks are formed from Ocaklar to the southeast of Erdek. Gravel, which lie between the southwest of Ilhan village and Balyozfeneri Burnu, were formed from amphibolite schist, granite, andesite and marble. Valley slopes of Kavakli Creek, situated in the southeast of Ocaklar, consisted of gravels that contain amphibolites schist, basalt, andesite and granite. Kavakli Creek, Muhla Creek and Katirkirman Creek flow over crystalline and schist featured rocks in this region (Ardel & İnandık, 1957; Ertin, 1994; Aksoy, 1998; Zortul, 2001; Hizal, 2008; Figure 2).

Kapidag Peninsula has occurred as a result of attachment of a large island that was situated near the coast with the land through a spit in the last periods of the Fourth Time. Being one of the islands that water could not cover during the recent rise on the sea-level

known as Flandrian Transgression, Kapidag Peninsula is an old island that was later connected to the land through a tombolo by the accumulation of sediments brought by waves occurring due to the dominant winds and coastal currents (Ardel & İnandik, 1957; Aksoy, 1998; Güneysu, 2000; Erinç, 2001). The base level (sea-level) changes, stream movements, structural features, lithological characteristics of formations and young tectonic movements performed an important role in obtaining tombolo and its surroundings that formed the island to assume its geomorphologic appearance today in addition to waves and coastal currents. Edincik Paleozoic Massif, which consists of metamorphic crystallized schist, is located in the south and Kapidag Granite Massif in the north of the tombolo composed of two narrow and short spits. The mass, on its north, is mid-size, grainy, amphibole and biotite. The Upper Cretaceous end and age of Kapidag Granite Massif formation that coincides with the beginnings of Paleocene was estimated to be 73.9 ± 8 million years (Cürebal et al., 1998). Quaternary and alluvium in little clay, sandy and gravel character were recognized to be old and youngest units of the tombolo. The thickness of the alluvial material in this area increases from 2 m up to 45 m from the north and south towards the Belkis swamp. This alluvial plain that also separates the Gulfs of Bandirma and Erdek from each other is 1700 m in width and 1500 in length. Surrounded by sand dunes in the east and beaches in the west as well as a swamp covering approximately an area of 1 km² (Belkis swamp) in the middle, alluvial fields, with a morphological character, are located in the north and in the south. Eroded surfaces, which were split by narrow and deep valleys, are located on its north in elevations of between 200-250 m (Cürebal et al., 1998).

Coasts of the Peninsula have properties of high coasts composed of steep cliffs with elevations up to 10 meters (Figures 3, 4, 5). Schist-structured layers, which form the area, are immersed into the sea with a slope of 40-70 degrees. 100-500 meter wide crescent-shaped coves and sandy beaches behind them can be seen in the areas where wave erosion is effective due to quite evident retrogression (Figures 3, 4, 5). Low-marine terraces are located in some parts of the coves at different elevations. Marine terraces are found near freshwaters with 5-10 meter elevations and in the northeast of Edincik with 65 meter elevation (Güneysu, 2000; Artuz, 2007).

Kapidag Peninsula has been exposed to the tectonic events such as the elevation of Kazdagi and its surroundings in the Oligocene, to the separation of North Anatolian Fault zone into northern and southern arms in the Marmara region and the activation of the Aegean expansion system during the neo-tectonic development of Turkey (Seyitoğlu & Scott, 1991; Aksoy, 1998; Okay & Satir, 2000;). High and rocky coasts were formed in the area of the Marmara Sea due to expansion of the existing fault lines parallel to the coast since it is the most active tectonic sea area of northern arm of the North Anatolian Fault (NAF) zone passing on the direction of east-west (Figure 3). North Anatolian Fault of east-west direction led to the narrowing of the shelf area by affecting the coasts of the area. Therefore, coasts that develop under the control of tectonism and lithology are faulty coasts particularly in the regions where faults can be found (Erol & Sencan, 1996; Kurter, 2000).

Southeastern coasts of the Peninsula extend along relatively low cliffs (approximately 20 km) from Asagiyapici village to Cakil village in the northeast (Figures 4, 5). Broad-based and flat-sloped valleys were also formed at times in this part. The dominant wind becomes effective in northwest of Bandirma on the direction of Southeast-Northwest and continues to blow on the direction of Northeast and parallel to the coast starting from Asagiyapici.

Major rivers that would ensure the alluvial accumulation on the coast are not located in this part. Marine terraces, whose heights range between 2 m to 5 m, are found from the northeast of Asagiyapici village to the close surroundings of Dalyan Burnu and

Tatlisu (Güneysu, 2000; Erinç, 2001). The northern coasts of the Peninsula, which are about 40 km in length, begin from the northeast of Cakil village and continue as steep and rocky coasts until the settlement in Ilhanli in the west (Figures 4, 5). This region constitutes the most sinuous part of the peninsula. Here, erosion has also become quite effective at the same time depending on the accessibility of the winds on the sea and North-Northeast direction.

Figure 3. Coasts with cliffs in North of Kapidag Peninsula (between Ormanli-Ballipinar) (Source: http://gezginkopek.com/?p=748)

While there are, at times, cliffs on the coast extending from Narli to the west of Ocakli cove, marine terraces have occurred at the levels of 15 m – 18 m in the southeast of Ocaklar and in the slopes of Kavakli Dere valley located in the northwest of Erdek. These terraces are thought to be related to the Tyrrhenian period when considering the Neo-tectonic features of the Marmara Region (Güneysu, 2000; Erinç, 2001). Marine terraces have also been identified in the northeast and southeast of Erdek with the heights of 20 m, 30 m, 60 m and 65 m. The presence and heights of these terraces show that the sea penetrated inwards before the formation of coastal valleys (Güneysu, 2000; Erinç, 2001).

The heights of marine terraces, located in the northwest of alluvial coastal plains in the south of Kapidag Peninsula and closer to Çeltikçi village, are at the level of 20 m, 25 m, and 50 m. The height of terrace in the south of Hamamli village is 110 m. Coastal terraces are located in the region extending from the southwest of Ilhan to Narli in Kapidag Peninsula at the level of 30 m and 80 m and in the elevation near Tatlisu at the level of 5-10 m. There are three terraces from Upper Pleistocene and Holocene periods which are developed at different levels from one another on the alluvial floor in the south of Belkis village and in the west of Asağıyapıcı and whose average heights range between 2.5- 3 m, 7-8 m and 12-15 m.

There are marine terraces, whose heights range between 2 m and 5 m, starting from the northeast of Asagiyapici up to the close surroundings of Dalyan Burnu and Tatlisu (Ardel & Inandık, 1957; Cürebal et al., 1998; Güneysu, 2000). It was thought that some of these terraces occurred as a result of tectonic and some occurred as a result of eustatic movements (Erinç, 2001).

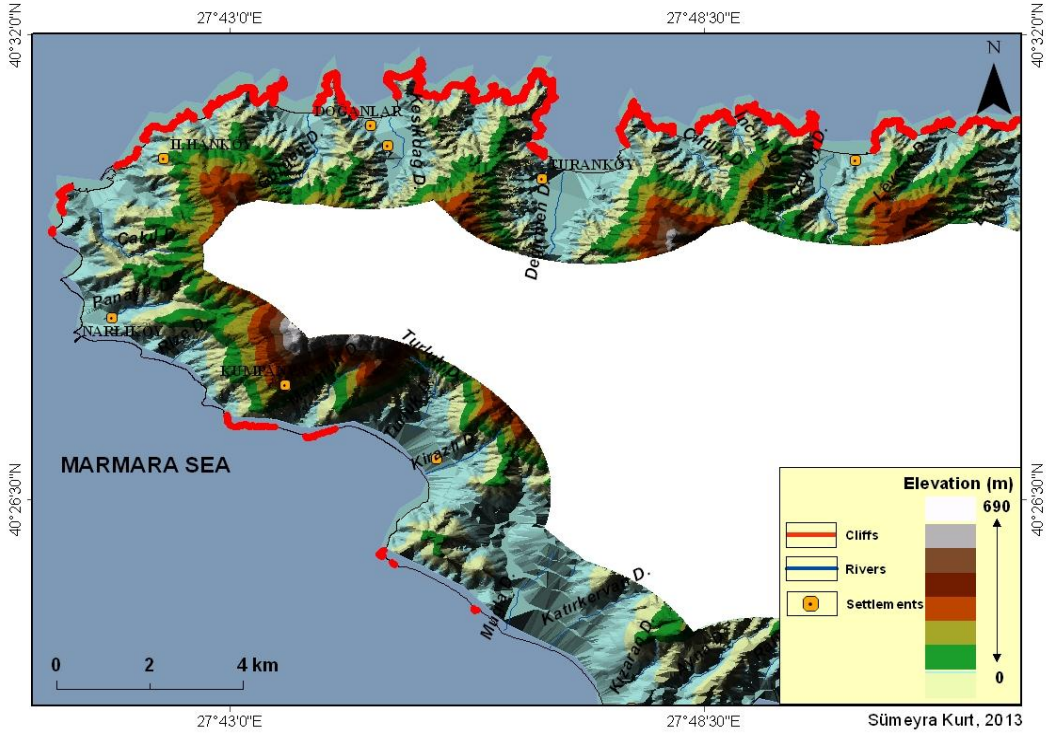

Figure 4. Coasts with cliffs in the North and West of Kapidag Peninsula

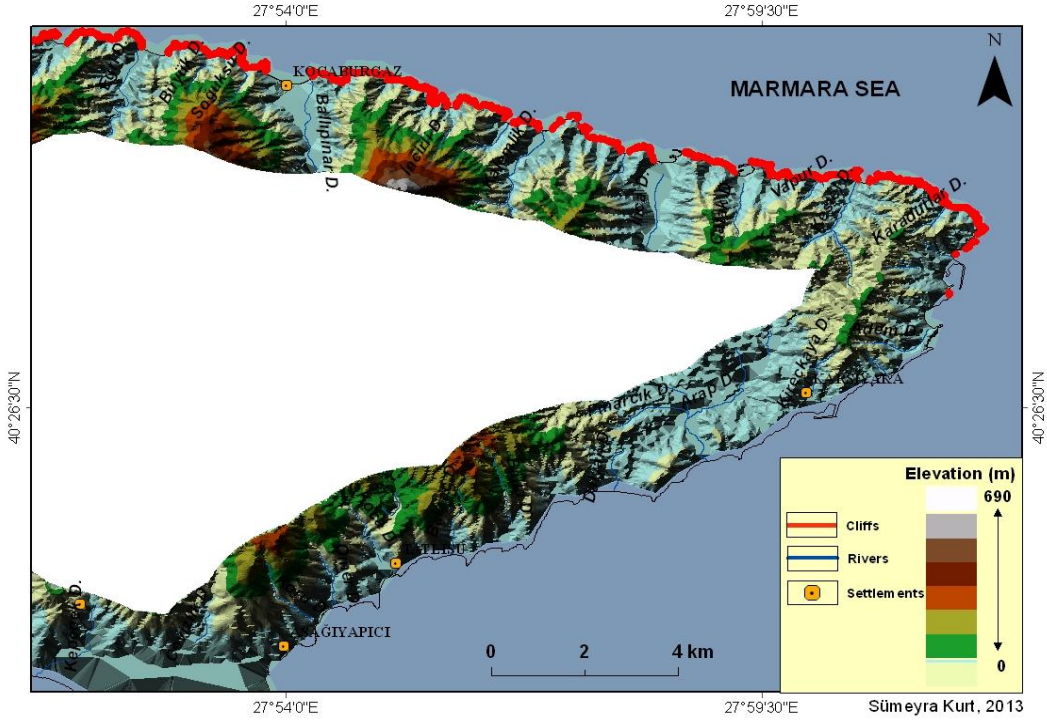

Figure 5. Coasts with cliffs in the North and East of Kapidag Peninsula

Marine terraces can be found, at the levels of 45-50 m close, to Celtikci village in the north of coastal plain formed by the alluvial materials deposited by Gedevre Dere, Degirmen Dere, Celtikci Dere and Hamamli Dere located in the south of Kapidag Peninsula. A terrace, at the level of 110 m, can be identified in the south of Hamamli village located in the north. There are two terraces at the levels of 20-25 m and 70 m in the south of the coastal plain (Güneysu, 2000).

The area, where Kapidag Peninsula merges with the mainland, has a feature of flat coast since the coastal line does not have much sinuous places. A straight coastal line extends, instead of coves, in the coastal part that continues from Dalyan Burnu up to the northeast of Cakil village and is in 11 km in length. The reason for this is the further sensitive (rocks that show metamorphic and schist structure) of lithological structure that forms that coast to the effects of erosion. The coastal region, extending from Buyukakca Cove up to Ilhan village, also has a feature of lower coast where there are no deep valleys and sinuous places. The effects of northeastern winds decrease depending on the exposure in addition to the effects of lithological structure in the formation of this situation. The southwestern coasts of Kapidag Peninsula, which start from Ilhan village and continue up to Belkis locality and where mostly accumulated forms are seen, are places where the coastal lines extend the most straight among the coasts of Kapidag Peninsula. Coastal arrow, located in the southwest of Ilhan village and in the west of Narli, have low coast features as can be understood from their forms. The coastlines, extending from the south of Ocaklar Cove up to Erdek, are low-coastal areas upon which beaches, and width ranging between 30 m and 75. Mostly accumulated formations are effective in this region. The coastal line extends through a more straight line because of its lithological features.

The eastern section of Belkis Tombolo, which overlooks the Gulf of Bandirma and connects Kapidag Peninsula to the mainland, is covered by a swamp 1700 m in length and 600 m in width (Figure 6). The discovery of salty and dirty water, found in water-wells deeper than 9 meters and opened at agricultural fields around the swamp, indicates that groundwater in the alluvial area is fed from the sea through Belkis swamp.

Sand dunes, which are formed in the section of Belkis tombolo known as northern tombolo that connects the Peninsula to the mainland, are blown the northwest in the direction of the dominant wind after being dried with the effect of the sun. Blown sand dunes form sand hills in the direction of the prevailing wind. These sand dunes, some of which become stable and some are still moving, cover the surrounding agricultural fields as well as fill the swamp. Blanketing fertile soil layers with sand dunes adversely affects the quality of the soil. Coastal arrows, which form the connection points of Kapidag Peninsula to the mainland, draw attention as one of the most important geomorphologic formations. The development directions of the spits in this region has been in opposite direction to one another based on the sediment loads carried by surface currents that develop over the Gulf of Erdek on the west and the Gulf of Bandirma on the east.

Coastal arrows in the west, which starts from the northwest of Erdek and is of 7 km in length, connects to the mainland that is in the feature of tombolo in the south of the Belkis. Surface current, which caused the formation of this spit, is a surface current of 0,5 knot coming from the west of Pasalimani Island and is located in the direction of northwest-southeast. A sandy beach was prospered in the width between 30-80 m on the spit. The spit, which was formed on the east, starts from the southeast of the Belkis settlement and ends in the feature of a tombolo in Asagiyapici settlement after continuing for approximately 1,5 km in the northern direction. Surface current, which caused the formation of the spit, is an arm of a surface current of 0,5 knot coming to the Gulf of Bandirma from the direction of northeast-southwest. A beach cover was also formed on this spit throughout the coastal line (Ardel & Inandik, 1957; Cürebal et al., 1998; Güneysu, 2000).

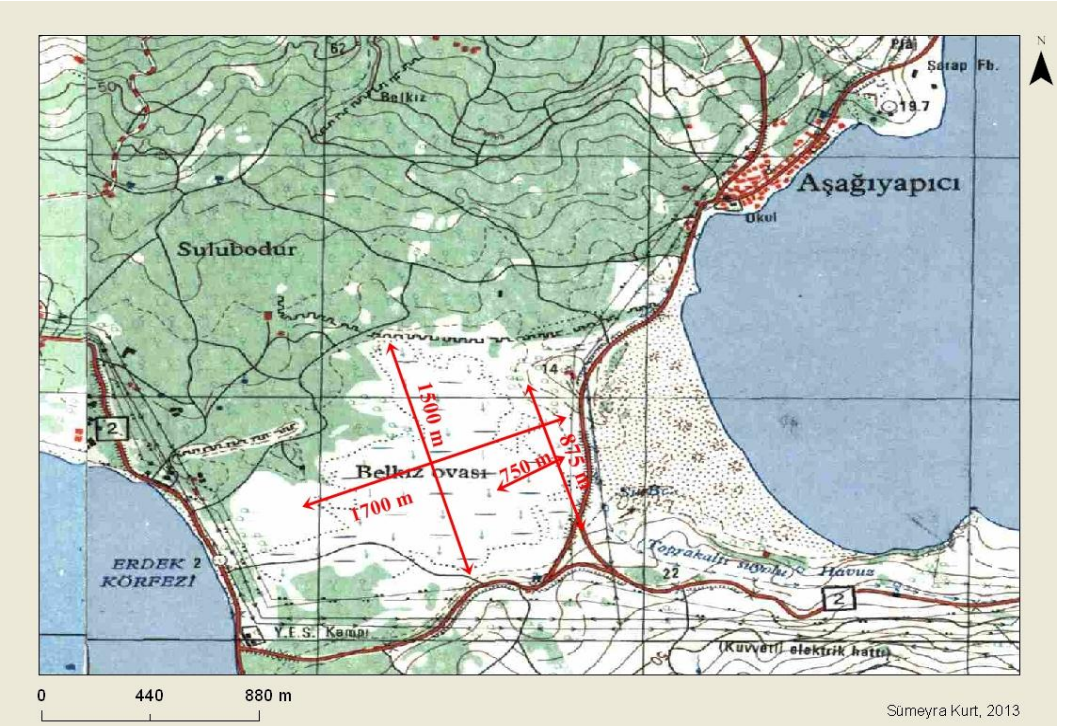

Figure 6. Belkis Tombolo

The section connecting Kapidag Peninsula to the mainland has a feature of high coast that drifts with sharp angles. The section, which extends up to the Gulf of Bandirma, is included within the groups of high coasts with cliffs over 10 m. Here, rivers are shorter in size due to this feature of the coast. Coasts, which overlook the Gulf of Erdek, extend in Northeast-Southwest direction. Cliffs, whose elevations range between 3 m and 10 m, have been identified (Güneysu, 2000; Erinç, 2001). Small beaches have been formed in this region by the accumulation of some of the sediments carried by the surface currents of northeast-southwest direction on the coastal line, interrupted at times and having no continuity.

GEOMORPHOTOURISM FEATURES OF THE COASTS OF KAPIDAG PENINSULA

The coasts of Kapidag Peninsula have 3 values according to their geomorphosite features. These are scientific, aesthetic, cultural and economic values. The scientific values of the landforms should primarily be higher in order for them to be geomorphosite. Landforms, in the southern, northern and eastern coasts of Kapidag Peninsula, have interesting topographic characteristics such as tombolo and cliffs. Even though tombolo and cliffs are forms of accumulation and erosion, they are not formations that can easily be formed everywhere. Some conditions primarily need to come together in order for these landforms to occur. Belkis Tombolo was formed by connecting Kapidag mass (Old Bear / Arktonnessos Island) to the Anatolian coast through spits that develop from east and west at the same time between two gulfs (Gulfs of Erdek and Bandirma) (Ardel & Inandık, 1957; Curebal et al,. 1998; Güneysu, 2000; Ceylan, 2011). Acquiring its name after historical city of Kyzikos/Belkis, tombolo is a unique example known as twin tombolo in Turkey (Kurt & Ekinci, 2013; Figure 7). It has scientific importance from this perspective.

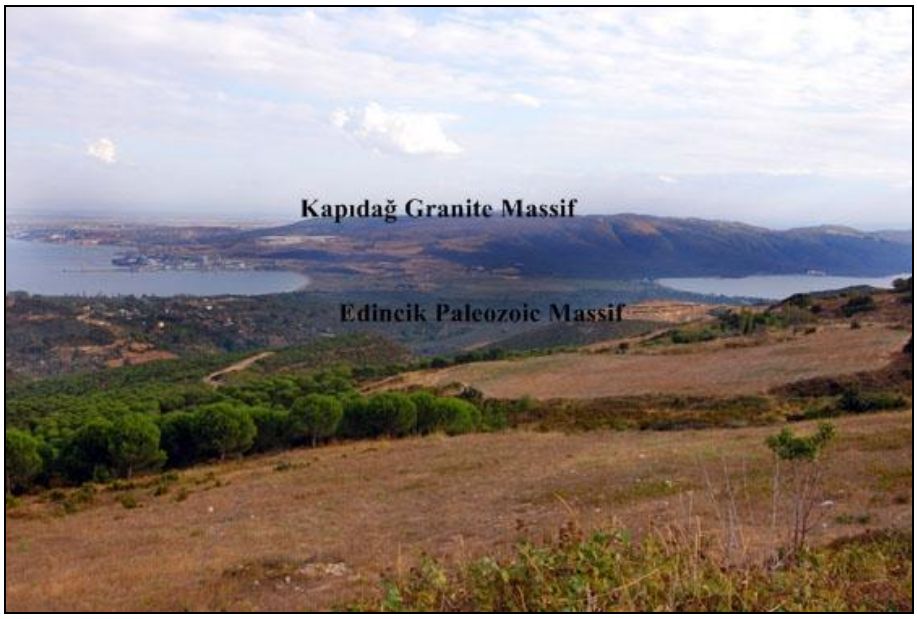

Figure 7. Belkis Tombolo and view of Kapidag Peninsula from the direction of Edincik
Source: http://rota360.net/otomobilrotalari.asp?id=31

In terms of geomorphology, the Belkis Tombolo is situated between Edincik Paleozoic Massif and Kapidag Granite Massif. Parts of the erosional surface, dead cliffs and alluvial plans, which are split by rivers and are at different levels, are located on the north and south of tombolo. Alluvial plans have a gradual morphology that shows changes at sea-level. There are agricultural fields on the western tombolo and sand dunes and plants that undertook the task of a set against erosion on the eastern tombolo. Belkis swamp, upon which reeds can be found, is formed between two tombolos. The area of this field is about 1 km². While the west of tombolo is an agricultural area covered by vineyards, olive and fruit trees, its eastern edge is completely enclosed by sand dunes. Tombolo area with these different aspects has a feature that renders it capable to be assessed as a sample area in geologic and geomorphologic researches and educational purposes applications.

The second important feature of geomorphosites is their high aesthetic values. Coasts of the Gulf of Erdek, located on the west of Kapidag Peninsula, has one of the most beautiful natural beaches of Turkey whose shores are entirely surrounded by non-pebbled sand strip. Beach starts from the coasts of Edincik and extends up to Cugra. The population of the district center of Erdek, the most developed district of the Peninsula in terms of tourism, increases 5 times in the months of summer. The population of the district in 2013 is 21,042. After Erdek, coasts of Ocaklar, Narli, and Ilhan village are also other important beaches surrounded by natural sands. The coast, between Narlu-Ocaklar is partly rocky. Ocaklar Cove, one of the largest coves of Kapidag Peninsula, is located in this region (Figure 3).

The width of the cove, where the sea penetrates 1,5 km inward, is as much as 2,5 km. The coastal line toward the cove is covered with cliffs. Coastal line, in the region from Fatya Burnu up to Erdek, has a flat appearance based on the lithological features. A pebbled and sandy beach, 6 km in length and 30-75 m in width, extends throughout the coast and marine terraces, at the levels of 5m, extends at the back of it. Seyitgazi (Wish) Hill (103 m), which is located on the southeast of Erdek, and connected to Kapidag with a pass of 350 m in width and 25 in height, Tavsan Island (45 m), which is located 800 m on

the southwest of this hill and has entirely a rocky and non-woody appearance and Zeytin Island, which is located at a 250 m distance from Erdek coast and has a marble-structure, increased the visual value of the coast (Kurt & Ekinci, 2013; Figure 8).

Figure 8. Coasts of Erdek Gulf of the Kapıdağ Peninsula
(Source: http://kenan-akyol.blogspot.com)

Turan village is one of the places, which is calm and possesses beauty unknown by many people, located on the north of Kapidag Peninsula. Historical ruins can be found in this village that has a beach entirely located within a large cove and has a lush nature. Ballipinar village, which stands on the east of Turan village, established in a small cove and is known as Kocaburgaz among the people, is located at an area of Kapidag Peninsula overlooking the Sea of Marmara. Ballipinar is one of the best examples that can be attributed to a place that merges its green and blue with its nature. Kestanelik village is the first village on the direction of northeast.

It is known among the people as Kestel. People lead a completely self-oriented life since there are no activities in the village for touristic purposes. The reason for this village to retain the name of Kestanelik is the chestnut trees in its high slopes. Kestanelik exhibits a beauty with its nature that is worth-seeing. Asagiyapici village, on the southeast of the Peninsula, is one of the largest villages in the peninsula. Small waterfalls, streams, and natural beauties consisting valleys, which are unexplored in terms of eco-tourism and extend throughout the road when proceeding from Asagiyapici village to Yukariyapici, are also important aesthetic values of the peninsula.

Third important feature of the coasts of Kapidag Peninsula is their high cultural values. The Peninsula has so many natural and cultural values throughout its coasts that can be visited and seen for touristic purposes. Three city-states, called Cyzicus, Arteka and Prokonesos, were historically established on the southwest of Erdek and its surroundings. One of them is Cyzicus which is located 9 km away from Erdek and is one of the important places worth-seeing with its historical city ruins. Artifacts of Roman

Period can especially be found in the area known as Belkis Ruins. Ruins of Adrianus Temple, the amphitheater ruins and theater location, called Belkis palace, are the most important ruins. The ruins of the historical city were spread in an area of about 11 km² starting from Belkis Tombolo and extending towards the north. Temple of Hadrian, which still remains today among these ruins with its vaulted foundation scattered around in pieces, provides information about the splendor of the city during the Roman period. Temple of Hadrian is recognized as the 8th Wonder of the world (Arslan, 2005). Foundations of a small church can be found on Seyitgazi Hill located on the southeast of Erdek district. The offering place, known as the Tomb of Seyitgazi among people on the hill, is also another one of interesting places.

Zeytin Island, Turkey's first Archeopark island (island museum), is located on the southwest of Kapidag Peninsula (Figure 9, 10). Being used as a camping and resting place by the Department of Physical Training since 1957, excavations began on the island when it changed hands within the framework of Protected Area and Conservation Plan initiated by the Ministry of Culture and Tourism in 2006. The only olive tree on the island has also been placed under protection in this regard. The ruins of Virgin Mary Church are also found on Zeytin Island that has been a place of ancient ruins for 2300 years. Island was opened to visitors in 2012 after the completion of the works and the project prepared by Erdek Tourism Foundation being approved by the South Marmara Development Agency.

Figure 9. The only olive tree under preservation in Zeytin (Olive) Island
(Source: http://www.haberimport.com/haber/tarihi-zeytinliadanin-tek-zeytin-agaci-koruma-altina-alindi-118186.htm)

The fourth geomorphologic value of the coasts of Kapidag Peninsula is their economical significance. Tourism generates an economical resource in a place that it gets into. Settlements on the coasts of Kapidag Peninsula have the characteristics to become an importance source for Balikesir province as well as the country's economy. Having a transitional feature between the climates of Mediterranean and Black Sea (with an average

temperature about 14,6 °C), the coasts of Kapidag Peninsula provides unique beauty with their small villages, rich-vegetation, and secluded coves. Regions closer to the coast are covered by olive groves, mid-lands by hills with shrubs and mountainous regions by forests. Its coasts are full of holiday resorts followed by one after the other.

Figure 10. Erdek coast and Zeytin Island (Archeopark Island)
(Source: Ortofotos and http://erdekkonaklama.com/locations/erdek/)

Settlements, which are on-course and easily-accessible, such as Ilhan (412 people), Narli (625 people), Ocaklar (1555 people), draw attention as suitable places to be used for touristic purposes. Acquiring its name after granite quarries found on the mountainous regions, Ocaklar experiences a great mobility during summer season with its 3 km long beach and attractive sea even though it is located 5 km north of Erdek and is a settlement with a population of 1555 people. Absence of industrial facilities around and the capacity of northeasterly winds, which blow from land to sea, to prevent natural contamination by sweeping the sea ensure the sea to remain clean. All kinds of water sports and wind surfing can be also done in the cove. Hot and cold water supplies in Zeytin Island are also important for health tourism. Waters of hot-water supply, whose temperature is 23° C, are thought to be good for skin and eye diseases since they are one of the rare thermal waters that are salty and contain 26354.118 mg/lt. of minerals and (ra 0.4) radon gas at low levels. Hot water beds can be found from these spring waters and they can be introduced to thermal tourism. Sale-oriented efforts can be spent for cold water supplies by bottling method.

CONCULSION

Extensive credit and incentive opportunities, provided for the coasts in the Mediterranean and Aegean Regions due to changes carried out in tourism policies in the periods after 1980 in Turkey, drew the interests of investors as well as tourists away from the coasts of the Gulf of Erdek. The relative shortness of touristic season, 2-3 months, led investors to divert interests to the Mediterranean and Aegean coasts where summer season lasts longer like 6-9 months. When looked at the touristic activities and tourism types in the coasts of Kapidag Peninsula, the area remains limited to marine tourism. However, Kapidag Peninsula, particularly the coasts of the Gulf of Erdek, has a rich structure with its features of geomorphotourism and historical and cultural values. It is a major problem to be unable to promote a destination that includes many touristic values within itself in the country as well as in abroad.

Therefore, the promotion of geomorphotourism areas in the coasts of Kapidag Peninsula is of great importance. Promotional billboards can be placed in suitable places, especially on the roadsides, brief information and sketches can be provided regarding the formation and characteristics of Belkis tombolo that especially has an interesting appearance and various functional features. It is necessary to preserve tombolo area in various statuses, to plan the use of land and to unearth historical values by conducting archeological excavations.

One of the geomorphologic problems of the coasts of Kapidag Peninsula is the dispersion of sand dunes, which are formed at a region of Belkis tombolo known as the northern tombolo connecting the peninsula to the mainland, by the dominant winds in the direction of southwest after being dried under the influence of the sun. Dispersed sand dunes create sand hills in the direction of the dominant winds. Mobiles ones of these sand dunes, some of which became stable, cover the surrounding agricultural areas as well as fill the swamp. Covering of fertile soil layers by sand dunes adversely affects the quality of the soil. It is necessary to take measures in this respect.

Changes primarily taking place at the level of waves and currents, activities of streams, structural features, lithological features of formations and young tectonic movements played an important role in the formation and development of the research area. Therefore, seismic features should be taken into account in the determination of new places of settlements by making development plans of existing settlements since the area, at the same time, is included in the first-degree earthquake zone. Geomorphotourism is a new and important concept that is being spread all over the world. Therefore, there is a need for carrying out state-funded projects and planning with the purpose of preserving and promoting coastal heritage. This study is only carried out in the coasts of Kapidag Peninsula approximately 100 km in length located in the coastlines of Turkey surrounded in three sides by coasts and having a coastline of 8333 km (Altınok & Ersoy, 2000).

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