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LAND USE CHARACTERISTICS ON THE COASTS OF IZMIT BAY

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ABSTRACT

The 21st century draws attention as a century in which environmental destruction continues, on the one hand, and efforts are made to prevent these destructions with holistic and sustainable approaches. Rapid and unplanned population growth, industrialization, informatics and industry 4.0 revolution, carbon emissions, ecosystem destruction, environmental pollution, global climate changes continue unabated. On the other hand, many institutions and organizations, especially the United Nations, are taking steps and setting goals to slow down this trend. The shores of Izmit Bay were examined in this study in terms of holistic and sustainable spatial use. In this field, where demands and usage needs are high but resources and potential are limited, it is clear that optimal and correct use is imperative, considering the future and future generations and environments. In the study, land use characteristics were determined and evaluations were made in terms of sustainable holistic basin management. Correct and sustainable use, as the most basic application subject of Geographical Science, which deals with the interaction between natural and human elements in a place, has been evaluated from a multidisciplinary perspective.

KEY WORDS: ***Izmit Gulf, Spatial, Land Use, Sustainability, Planning, Management***

INTRODUCTION

Industrialization in the last two centuries and parallel rapid and unplanned population growth have caused a dominant change, especially in places with high geographical potential. Although this change is positive for welfare and development in the short term, it has caused and continues to cause irreparable and irreversible destruction on the "Earth", our living space. Species extinction, biodiversity destruction, carbon emissions and effects on climate are the first things that come to mind. However, the Earth, which is 4.6 billion years old, has its own sustainable Ecosystem and maintains it with uninterrupted cycles. In the last 10 thousand years, humans, who increased their influence first with hunters and gatherers, then with agriculture and sedentary life, became a much more dominant factor after the industrial revolution, damaging these cycles and therefore the entire earth system. These destructions continued with the voices of the academic circles initially coming to the fore, and then coming to the agenda of the ruling elites, and decisions regarding sustainability were taken and implemented at the UN level (Akova, Kahraman, 2021). In this regard, studies on the concepts of spatial use and sustainable holistic planning have gained momentum.

Izmit Bay, one of the most industrially dense locations in our country, is a location that should be studied from this perspective. Therefore, the main purpose of the study is to reveal the entire geographical potential of the basin in question, to describe and classify the spatial uses in the light of data, to identify correct and incorrect uses and to make suggestions in this direction (Akova, S.,2019; Akova, S., Bayartan, M., Akova, İ., 2013).

For the study, all human and physical data were compiled, digitalized in GIS and turned into a visual document. With numerous scientific and technical field studies carried out in different seasons and years, on-site observations and determinations were made through spatial use and change monitoring. Thus, spatial use characteristics in the coastal zone of Izmit Bay were determined and mapped, and evaluations were made in terms of holistic space management.

Izmit Bay is within the scope of the Marmara Sea surrounding it. The coasts constitute the coastal belt of this basin belonging to the Marmara Sea. In terms of geographical regions, the study area lies in the Marmara Region, within the borders of its Çatalca-Kocaeli and Southern Marmara Sections (Figure 1).

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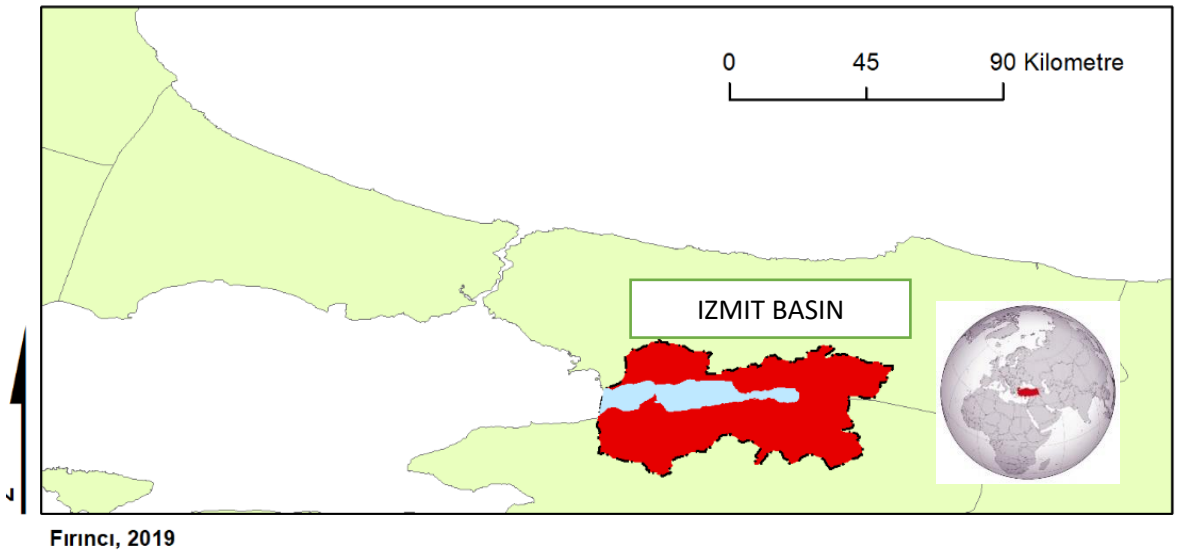

Figure 1. Location Map of the Study Area

Although the study area remains mostly within the borders of Kocaeli Province in terms of administrative units, it also extends to the borders of Yalova, Sakarya and Bursa Provinces. According to the districts, the study area is Darıca, Çayırova, Gebze, Dilovası, Körfez, Derince, İzmit, Kartepe, Başiskele, Gölcük and Karamürsel of Kocaeli Province; It falls within the borders of Yalova's Altınova and Çiftlikköy, Sakarya's Pamukova and Bursa's İznik districts.

According to the Geographic Coordinate system, it lies between 29° 20'- 30° 14' eastern longitudes and 40° 30'- 40° 54' northern latitudes. According to the UTM projection coordinate system, it is located between the 4531150, 902 north, 4485943, 459 south ordinate axes of the north 35 zone and the 696423.944 east - 771440.661 west apse axes.

The Izmit Bay Basin extends to the water division line between the Marmara Sea and the Black Sea on the Kocaeli Plateau in the north. In the south, it continues along the Samanlı Mountains to the water line separating the Iznik Lake and Gemlik Bay basins from the Izmit Gulf. While the Darıca-Çiftlikköy line, bordered by the Marmara Sea offshore of the gulf, constitutes its western border; It continues to the east to the water section of the Sapanca Lake Basin.

The Gulf of Izmit, which is the sea area east of the line drawn between the Yelkenkaya Lighthouse in Darıca and Çatal Burnu, formed by the drowning in the water rises during the Flanders Transgression of a graben area that forms the western line of the North Anatolian Fault Zone, together with the Gemlik Gulf in the east of the Marmara Sea. It is one of the important Gulf regions.

General Characteristics of the Coastal Zone

Today, 11 districts connected to Kocaeli and Yalova in the Gulf of Izmit have coastal areas. In coastal use, residential areas have a large share of 31% with 31.12 km², so the most coastal use is reserved for settlements (Figure 2).

The second largest usage type consists of agricultural areas with 12.06 km², which has a share of 12%, and industrial areas, with 12.05 km², which also has a share of 12%. While agricultural areas generally start slightly behind the coastline, industrial areas are often integrated with the coastline as industrial activities are carried out in an integrated manner with coastal ports. It is also seen that large industrial facilities form an integrity with their ports.

The military areas on the Gulf coast, with a size of 9.03 km², have a share of 9% and include partly settlements and partly green and wooded areas. Coastal usage areas include 6% secondary business centers, 5% forests, 5% central business areas, 3% public areas and 3% tourism areas. Other coastal usage areas are fragmented and occupy narrow areas.

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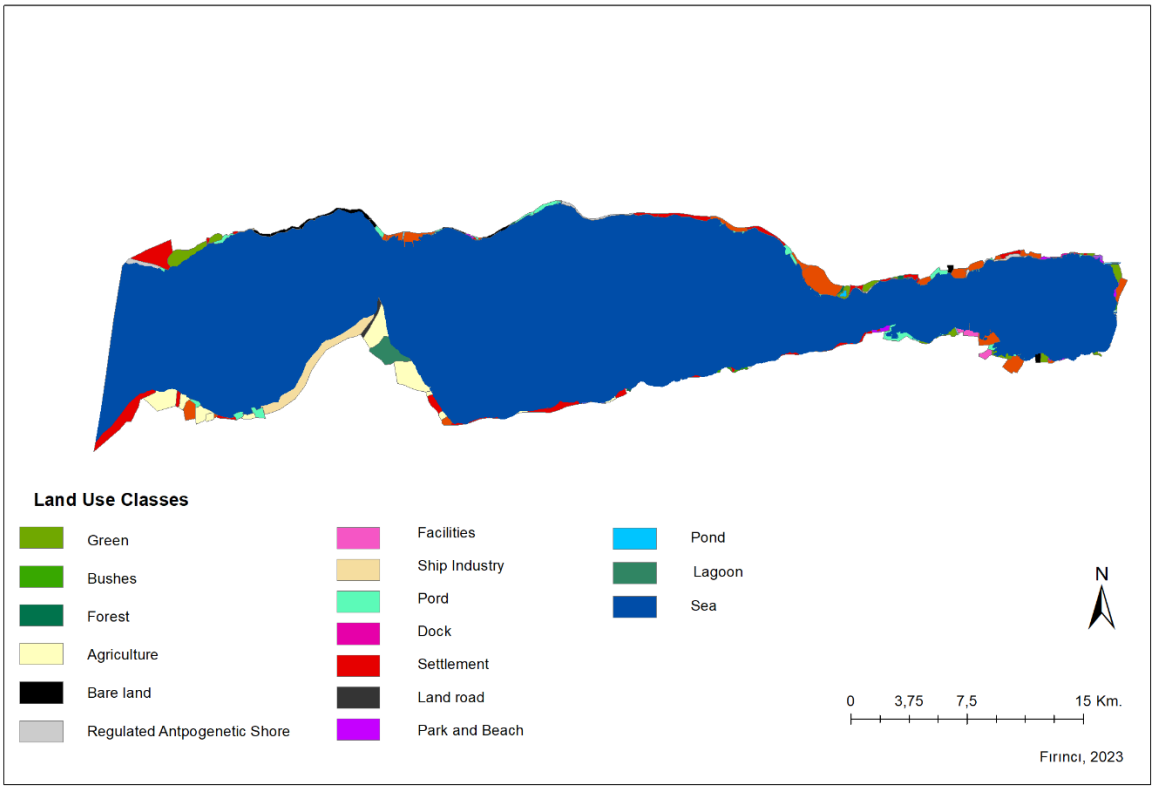

Figure 2: Coastal Land Use Classes of the Study Area

Agricultural areas on the shores of the Gulf of Izmit are located mostly in the districts of Karamürsel, Altınova and Çiftlikköy, located in the south of the gulf. When we look at the types of use on the southern shores of the bay, we see that residential areas come first with 31%, followed by agricultural areas with 22%, industrial facilities with 16% and military areas with 15%.

On the eastern shores of the Gulf of Izmit, it is seen that the majority of business and trade center areas constitute the majority with 72%, followed by recently built tourism and recreation areas such as Seka Park with 17%. Residential areas on the northern shores of the Gulf have a significant share of 38%. Therefore, the northern coasts are the part with the highest proportion of residential areas. In terms of coastal use on the northern coasts, residential areas are followed by industrial facilities with 19%. Compared to the eastern and southern coasts, it is seen that the areas allocated to industrial facilities have the highest share in coastal use on the northern coasts. A similar situation also applies to forest areas. While forest areas have a large share of 13% on the northern coasts, this ratio is 0% on the eastern coasts and a small share of 3% on the southern coasts. There is a relationship between coastal geomorphology and coastal use under the influence of human activities on the coasts of Izmit Bay. As a result of this relationship, changes occur in natural coastal elements. Many of these changes are changes that occur in the coastal area and coastline with coastal filling works (Uzun and Garipağaoğlu, 2014).

In the study conducted by Uzun (2021) on human-induced geomorphological changes on the shores of the Gulf of Izmit, an accumulation area of 6.15 km² and an erosion area of 0.53 km2 were detected on the shores of the Gulf of Izmit between the 1950s and 2020. Analyzes conducted in the study showed that 90% of the change areas were caused by direct human-induced impacts, 7% were indirect human impacts, and 3% were the result of natural conditions. While the coastal length of the Gulf of Izmit was 131 km in 1950, this length reached 190 km in 2023. There has been a 45% increase in the total coast length. It is seen that this increase is 38% on the northern coasts and 58% on the southern coasts. On the other hand, there was a 20% decrease on the eastern coasts. The fact that 90% of the linear and areal changes experienced on the coasts are caused by humans has led to the observation of anthropogenic geomorphology units both on the coasts and behind the coasts. For this reason, anthropogenic geomorphological changes occurring behind the coast have also indirectly and directly affected the coasts and caused changes in coastal geomorphology in certain areas (Uzun, 2015, 2021).

Land Use in the Northern Marmara Coasts

Izmit Gulf starts from the Darıca coast in the north. At the extreme point here are the Public Beach and Darıca National Park (Photo 1).

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Photo 1: Darıca Nation Park and Coastal Zone

Next is Şehit Er Gökhan Hüseyinoğlu beach. Darıca Hobbit Village attracts attention as a beautiful excursion and souvenir area (Photo 2).

Photo 2: Darıca Hobbit Village and Houses

Eskihisar Castle is one of the important historical ruins in the region. There is Eskihisar ferry pier in front of the castle, and from here there are regular car ferry services to Topçular on the opposite shore. (Photo 3).

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Photo 3: Eskihisar Castle

Gebze coasts begin in the east. Gebze Industrial Zones and piers are located here. When we pass to Dilovası, the Osmangazi Bridge, which connects the pier and the Gulf to the opposite shore, welcomes us. In Dilovası, there are important institutions such as the informatics valley, Gebze University, TÜBİTAK and many industrial enterprises. Dilovası OSB and Assan Aluminum factory are important industrial establishments here. (Photo 4).

Photo 4: Osman Gazi Bridge

Continuing east, we pass to the coasts of Tavşancıl and Hereke. The coastal areas here, from Şirinyalı, Kirazlıyalı and Körfez district, are steep and rugged. The low population density has resulted in the natural protection of the coasts here. Transportation here is provided by viaducts and tunnels. NUH Cement Facilities on the coast is the main industrial enterprise. (Photo 5).

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Photo 5: NUH Cement Facilities

Körfez and Derince districts are located on a wide and flat coastal area. Located on the shores of Körfez district, TÜPRAŞ is one of the important industrial organizations of Turkey. Evyaport Port Facilities, Gübretaş Yarımca Factory, Rota Port, Yarımca Beach Park, district center, Tosfed Körfgez Race Track and Tütünçiftlik beach and park attract attention as other usage areas. (Photo 6).

Photo 6: TUPRAS Facilities

After the gulf, towards the east, Derince district is located. Derince has regular residential areas. There is a parking area and shopping market called Wonderland beach on the shore (Photo 7).

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Photo 7: Derince Wonderland Beach Smurfs Village

Derince port and Safi Pord are important port establishments in the region. The facilities where Derince Çene water comes out and is distributed are also located in this location, along with the Çene stream and the recreation area (Photo 8).

Fotoğraf 8: Derince Safi Pord

TEM highway divides Derince in two in the west-east direction. There is D100 Highway and YHT high-speed train line on the coastal road. This line continues along the coast after Gebze and reaches Izmit. Kocaeli Derince Ice Sports Complex, just north of D100, attracts attention. Izmit Coasts are organized as SEKA PARK. For many years, the area where the SEKA Paper Factory was located was turned into a museum, and the coastline was arranged as a park area and green areas and opened to the public. There are many social facilities, restaurants and entertainment venues here (Photo 9).

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Photo 9: SEKA PARK

Izmit is where the Gulf named after it ends. The shores where the bay ends have been filled with artificial fill and landscaped, creating recreational areas. Izmit is the most densely populated city in the region. After the 1999 earthquake, the city grew rapidly and spread from the coast to the north to the mountainous region. Kocaeli University and the Faculty of Medicine, located in Umuttepe, have been effective in the growth of the city in this direction. Izmit West and East industrial zone was established in the area created by the drying of the swamps on the southern side of the Izmit Bay. On the shore here, there are Kocaeli Fairground, OUTLET CENTER shopping mall, 41 BURADA AVM, Emek Hotel, Automobile market and public picnic and walking tracks.

Land Use in the Southern Marmara Coasts

The southern shores continue with the Başiskele district (Photo 10). Başiskele takes its name from the military area. The supply port for the marine vessels of the Gölcük navy is located here and there is a military zone on the shore. A public picnic and parking area has been created on the Başiskele beach, outside the military zone.

Photo 10: A Section from Başiskele Beach

On the coast, touristic 5-star hotels and industrial establishments are located side by side. Yıldız Entegre Port, Hayat Kimya Bingo Factory and Port, Beyçelik, Limas Port, Başiskele Sanayi, İzmit Customs Directorate, Auto Port port operations, Çimtaş, İzmit Free Zone, Ford Automobile Factory are the main businesses here (Photo 11).

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Photo 11: FORD OTOSAN Facilities

The southern part continues with the shores of Gölcük. The Military Region within the scope of Gölcük Navy and Military ports and supply centers constitutes an important part of the Gölcük coast. The important public areas here are Değirmendere and Halıdere coast. (Photo 12).

Photo 12: Gölcük Shipyard

Continuing towards the west, Karamürsel district is located. The coastal area here contains plains more suitable for settlement. Karamürsel coast consists of public landscaped shores. Afterwards, we move on to the Herzegovina Delta, which is an important agricultural area. However, Karamürsel Industry, Ship Industry, Ship Maintenance Ports and the southern leg of the Osmangazi Bridge are located on this fertile agricultural land. It can be seen that Altınova district center, which spreads over a wide area to the west, is also established in the Herzegovina delta. In the remaining parts of these occupations, there are only the last shelters of agricultural areas. There is also a beach on the shore and chemical factories next to it. Greenhouse cultivation is quite common in the Hersek Delta and its continuation, Tavşanlı. Greenhouse products, arboriculture, and floriculture are important activities here. There is Topçular ferry pier on the coast of Tavşanlı (Photo 13, 14).

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Photo 13: Hersek Delta and Orchards

Photo 14: Hersek Lagoon

İzmit Bay ends at Taşköprü location after Altınova in the direction of Yalova. Yalova industry is located on the small delta here. Fatınel Shipyard, AG Girişim joint treatment facilities, Benoplastic mold and packaging industry, Akkim Chemical industry, Aksa Akrilik chemical industry, Yumtek food production facilities and Dov Aksa Facilities attract attention as the main enterprises (Photo 15).

Photo 15: AKSA Acrylic Industry

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RESULT AND CONCLUSIONS

As stated, the study area is a location with rapidly increasing population dynamics following a widespread industrialization process. Port, industry, trade and university functions attract attention in the cities in the field. The housing demand of the rapidly increasing population in this area with a strong economy has led to unplanned and unplanned construction.

Industry and environmental pollution stand out as the main pressures on the natural potential and species diversity in the basin. Apart from these, land filling on the natural biotopes in the field, excessive material purchase, garbage storage, daily picnics, coastal repair, transportation, urban and agricultural land uses attract attention as other elements of destruction. As a result of misuse, negative situations such as land division in the field, erosion, deterioration of the natural structure, changing the water bed and reclamation of streams, disruption of water flow due to the transition to a closed canal system, and visual pollution due to excessive construction in some places have been experienced.

Industrialization and urbanization are inevitable. However, urban and industrial spaces should be arranged accordingly in line with the principles of living in harmony with nature. Industrial establishments should construct and implement treatment facilities that meet the discharge standards given in the Water Pollution Control Regulation as soon as possible. The principle that the polluter must pay should also be implemented in the short term.

At the same time, elements such as nitrogen and phosphorus from the fertilizers used in this area, where agricultural activities are carried out intensively, mix with the clean water system. Correct and limited use of fertilizers and pesticides should be ensured by soil analysis. Thus, nitrogen and phosphorus inflow to water resources in the basin can be reduced.

The algae bloom and mucilage problem in the Marmara Sea is at an advanced level due to the wastes in the waters discharged into the sea. It is clear that the high concentrations of pollutants in this area had an impact on the occurrence of this disaster. 21 coastal beaches, 6 of which are blue flag, located on the shores of the Marmara Sea, which have reached the level of hypertrophic pollution, should be urgently re-planned and protected in harmony with the environment. The easiest way to improve the water quality in the Marmara Sea is to prevent polluting sources reaching the sea. For this, first of all, the concentrations of microplastics and other pollutants in seawater should be reduced to low levels.

A holistic environmental plan must be implemented on the site by completing at least a 1/50,000 scale Environmental Plan.

In today's world where agriculture is vital, potential erosion areas should be determined with erosion risk models in order to minimize soil losses in productive agricultural areas. Erosion should be minimized by land use characteristics.

Wetlands are also being dried through projects carried out under the name of swamp drying. For this purpose, water is absorbed by water-loving woody plants that do not belong to the wetland. Ecological balance is damaged by both drying the wetland and using wrong methods. Again, the gain of land area by filling the sea also attracts attention in the field. Opening these areas to settlement and turning them into population gathering areas brings with it risks. In a possible earthquake, ground liquefaction will occur and great destruction will occur in these locations. These possibilities should be prevented through planning.

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