



# KOCASU RIVER DELTA IN TERMS OF HOLISTIC SUSTAINABILITY

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## ABSTRACT

The distortion on the ecosystem is caused by human impacts in general. People, by affecting the ecosystem they live and nonliving entities leads to deterioration of the ecosystem. People who are also one part of the ecosystem began to play a changer role in our globe especially after the industrial revolution. With the development of technology, this process has become dominant over time. The creation of uncontrolled population gathering areas, inappropriate land use, unplanned urban sprawl, use of natural resources in an unconscious and uninhibited way, forest destruction and pollution of water resources the release of greenhouse gases into the atmosphere can be some examples. Therefore, the atmosphere, lithosphere, hydrosphere and biosphere destruction lead to ecosystem problems. This negative experience of those losses affects the whole system together with other elements of the biosphere. River delta and the immediate surroundings of Kocasu, hosting the terms of the diversity of natural habitats has unique natural wealth with delta, dune plants, marsh, swamp natural forests and lagoons it hosts several lives. Swamp forests consisting of ash, alder and willow; lilies, sea bean, tamarisk, hyacinths, onions lake, aquatic plants such as oak rabbit; black stork, Ferruginous, pochard, marsh swallow, Kentish Plover, little bittern, the night heron, pied herons, little egret, gray herons, swans, green head, garganey, Hungarian duck, apple head Duck, White-Tailed Eagle, coot, oystercatcher, the tern, little tern and the delta where several woodpecker species, bird species such as the pygmy cormorants and white pelicans are housed during migration. Examination field has earned the status of Important Bird Areas breeding bird populations such as black storks, marsh swallow, cut necklace rain bird. Soil frog, marsh frog, spotted turtle, striped turtles, water snakes, amphibians and reptiles such as the southern crested newt living in the area are other biosphere elements. These lagoons are home to extinct eel with pike, roach, carp, flounder, and fish such as rhodeus sericeus amarusich. The Tatars black chards on the field in terms of endemic species of vegetation are in the high-risk category. Sand lilies, rhododendron protection priority; discrete sand, while the lake onion is located in the delicate protected category. The spleen herb is considered endemic in the low-risk group. Swamp forests, dune plants, aquatic vegetation, birds and lagoons of ecotourism and geomorphotourism poses potential appeal. Although natural sites in Dalyan, pollution in Poyraz and Arapçiftliği the lagoons, incorrect land use, chemical fertilizer use, Kocasu mixing the river water with the Bursa industrial waste, siltation, eutrophication, sand withdrawal, some wrong practices, such as cutting of trees in the swamp forests leads to compensation impossible degradation.

**KEY WORDS:** Kocasu River Delta, Ecology, Vegetation, Climate, Air, Water, Soil, Degradation

## AIM AND SCOPE

The most rational approach to the protection of natural life is holistic area protection (Ekinci 2016, Ekinci, 2022). Living species cannot exist without suitable quality and size of living spaces. While area protection protects living environments on the one hand, it also allows different living species from plants to birds to be protected together, thus ensuring the protection of biological diversity as a whole. When protected together with natural habitats, species are affected more indirectly by new situations and changes since they are in the ecosystem they are formed in, and they have more opportunities to adapt to changes (Ekinci, 2004). On the other hand, these areas are also important for understanding and seeing the conditions and rules that dominate life on our planet. The importance of determining "Important Bird Areas" and "Important Natural Areas" and protecting them in accordance with the purpose is therefore not limited to birds and other species only (Arı, 2001). The quality information provided by the increasingly widespread birdwatcher and nature lover community allows our understanding of

important areas such as the Kocasu Stream Delta and its immediate surroundings to change rapidly and allows us to realize the threat much more strikingly. From this perspective, our country continues to be an important study area in terms of the ecosystems it contains (Bariş, 2006, Özşahin, 2009). The study area also has the potential of a quiet city due to its natural and human characteristics (Ekinci 2024a).

For this purpose, it is necessary to evaluate the Kocasu Stream Delta and its immediate surroundings with its unique nature and ecosystem from an ecological perspective and examine them from a geographical perspective. As a result of ecological degradation, events such as biosphere destruction, plant migration, excessive rainfall and floods, drought, and changes in groundwater levels are experienced. Having accurate and sufficient information about urbanization (Ekinci vd., 2007), ecosystem degradation and the changes that occur as a result of this constitute the first step of planning and sustainable management of natural resources (Ekinci and Akkaya, 2013a, b). Therefore, the study aims to

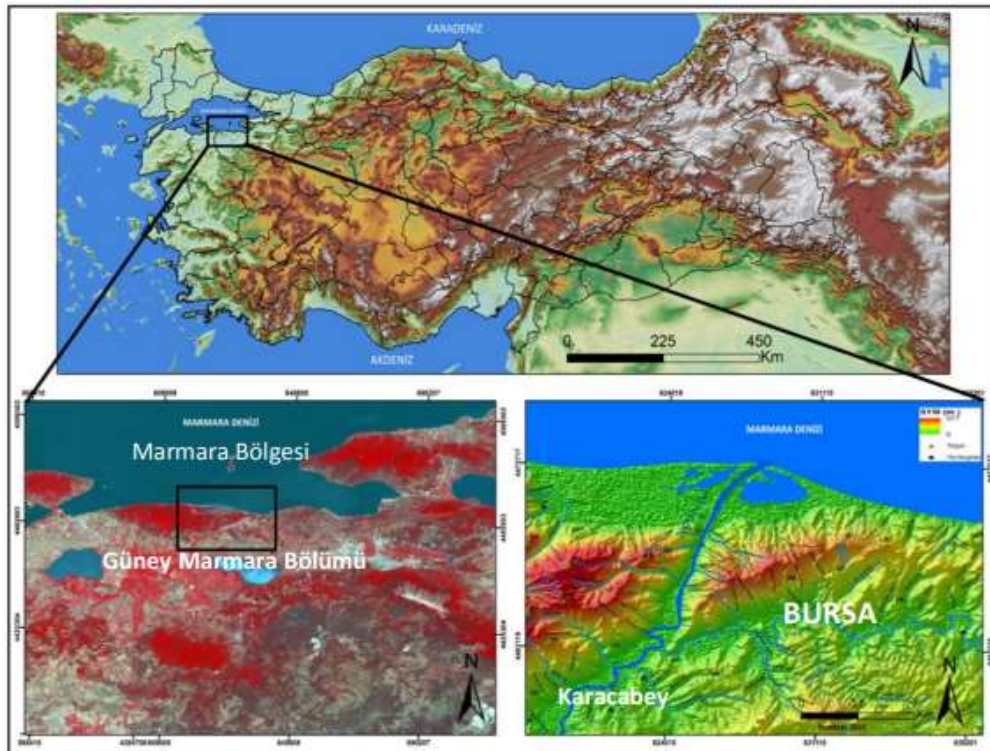


identify the problems that exist in the field and to plan the solution of these problems (Ekinci, 2016). The main purpose of the study is to examine the Kocasu Stream Delta and its immediate surroundings from an ecological perspective. Karacabey Longoz Forest, which has a rare ecosystem, and the natural life around it is special enough to be included among the natural heritage of not only the local people but also the world and are important places that need to be examined and researched (Özen, 2010). According to the researches, it is understood that tourism demands for natural environments have increased day by day in recent years and this increase will continue. According to the researches, it is understood that tourism demands for natural environments have increased day by day in recent years and this increase will continue (Atalay, 2008).

It is seen that the Kocasu Stream Delta Longoz, which is one of the few in the world and an important flooded forest of our country, is a natural environment that attracts attention with its natural richness, touristic attractions, flora and fauna diversity and has national and international importance. However, it has been understood that the studies conducted on the region are quite limited and it has been foreseen that a study should be conducted on the subject.

## INTRODUCTION

The Kocasu Stream Delta, formed by the Susurluk River, consists of lakes, swamps, sand dunes and floodplain forests. The Kocasu Stream Delta is located on the southern coast of the Marmara Sea within the borders of Bursa province. It is approximately 30 kilometers away from the Karacabey district (Figure 1).



**Fig 1: Location Map of Kocasu River Delta**

The study area consists of lakes, swamps, sand dunes and floodplain forest ecosystems. In the western half of the delta, the Dalyan and Poyraz lakes, which have a total area of 194 hectares and are fed by the Maliç Stream, reeds covering an area of 600 hectares, floodplain forests consisting of ash, alder and willows spread over an area of 730 hectares and a wide sand dune band with a wide variety of flora are worth evaluating and analyzing in this respect (Saçın, 2010). Species breeding in this area include black stork, ferruginous duck, marsh swallow, white-legged plover, little bittern, night heron, pied heron, little egret, grey heron, swan, mallard, garter, Hungarian duck, common pochard, white-tailed eagle, coot, poyraz bird, tern, little tern and many woodpecker species. In addition, during migration, there are large

numbers of water birds, especially pygmy cormorant, white pelican and in winter, coot.

The aim is to determine the habitat characteristics of these birds and what needs to be done for their survival. Longoz, also known as flooded forest, is one of the few forest types. Longoz is a special ecosystem formed where the sand brought by the streams flowing towards the sea accumulates, forms a barrier on the shore and closes the mouth of the stream. Only certain tree, plant and bird species are found in this habitat. The most basic condition for the continuity of this ecosystem is the continuity of water. Clay and organic materials coming with water enrich the soil (Kazancı et al., 2009a, b). Again, the water lily flowers covering the wetlands of the area make it inevitable to research this area and



include it in the areas that need to be protected. This research is important in terms of better understanding the importance of Karacabey Longozu, lagoons and delta area, revealing its natural riches, determining its touristic attractions, determining the types of tourism that can be developed, ensuring the sustainability of the region and revealing the opinions of local stakeholders about the region.

Today, increasing touristic demands for natural environments have led to the need to protect and develop these regions. With the increase in these demands, the risk of damage, pollution and destruction of natural environments increases (Özer vd., 1996). It is understood that ensuring that tourism activities are carried out without damaging these regions and raising the awareness of local governments and local people is important. The studies of local stakeholders about the region, measures taken to protect natural assets, and raising the awareness of local people are the most important elements affecting sustainability. Again, our research aims to reveal the geomorphotouristic supply elements of the region, to raise awareness about its richness, to give ideas about the types of tourism that can be developed and to reveal the views of the relevant stakeholders on the sustainability of the region.

Due to the unplanned increase in population density and the rapid destruction and misuse of natural resources, the effects of ecosystem degradation are increasing day by day. Against these environmental ecologic problems like similar lake (Ekinci, and Şenol, 2013), where people have a great impact on the formation of damages, determining what people living in the field and in the basin of this field or affected by these 25 basins should do to combat the problems and reduce the damages can also be counted among the objectives. Again, in line with this purpose; the determination of ecosystem features such as hydrogeological, morphological, atmospheric, climatological, biological and the presentation of their characteristics constitute the scope of the thesis. Sustaining the Functions and Values of the Study Area It is obvious that with effective precautions, the rivers, lagoons, marshes and other wetlands, agricultural areas, birds, land and sea animals and plant species in the Kocasu Stream Delta and its close vicinity can be protected for many years with rational methods. Activities such as industry, agriculture, tourism and urbanization are evaluated as pressure, and the results of these activities on the environment are evaluated as impact. Environmental factors affecting the Kocasu Stream Delta; The excessive pollution of the Nilüfer Stream with various industrial wastes and the pollution of the lagoons and wetland habitats in the Kocasu Stream water collection area, the continuous extraction of sand from the streams feeding the sandy areas, the transportation of garbage from Yeniköy and nearby settlements and domestic wastes resulting from tourism activities to the garbage collection area inside the delta, the free roaming of cattle throughout the year in the delta, illegal hunting in the lakes in the delta, and the destruction of the forests in the delta to open up agricultural land, winter wood and poplar groves are practices that disrupt sustainability.

Regulatory rules should be implemented in and around the delta as soon as possible and the way of supervision should be increased day by day with much better methods. Thus, the principles of sustainable management should be put into practice.

## ECOLOGICAL FEATURES OF KOCASU STREAM DELTA IN MAIN LINES

The study area has an important place in terms of ecology due to the fact that it contains marine, coastal, forest and wetland ecosystems at the same time and is located on an important bird migration route passing through Anatolia. The Marmara Transition type of the Mediterranean climate is dominant in the area.

There are forms of river and coastal morphology in the area. A monogenic topography draws attention. Kocasu Stream Delta, Karacabey Strait, Dalyan, Poyraz and Arapçiftliği lagoons are remarkable landforms. The main streams in the area are Nilüfer Stream, Hanife Creek, Kara Creek, Çapaz Stream and Kocasu Stream.

In terms of vegetation, the Delta hosts many natural lives with its longoz forest, sand dune plants, swamps, longoz forests and lagoons. Longoz forests consisting of ash, alder and willows; aquatic plants such as water lily, sea bean, tamarisk, hyacinth, lake bulb and rabbit oak are widely found. In terms of vegetation, the Tatar krapazi is an endemic species in the field in the high-risk category. Sand lily, rhododendron are priority in protection; sand wheat, lake onion are in the sensitive protected category. Another endemic species, dalakotu, is evaluated in the low-risk group. In the delta, the inner parts of Dalyan and Poyraz Lagoon, the coastal parts of Dalyan Lagoon bordering the Marmara Sea, the sandy areas where Kocaçay opens to the sea, Arapçiftliği Lagoon and Kocasu Stream are rich areas in terms of birds (Turan, 1990a, b).

The delta, where black storks, ferruginous waders, pochards, swifts, white-legged plovers, little bitterns, night herons, pied herons, little egrets, grey herons, swans, mallards, gargantians, Hungarian ducks, common pochards, white-tailed eagles, coots, mallards, terns, little terns and several woodpeckers are found, also hosts bird species such as pygmy cormorants and white pelicans during migration (Seçmen and Leblebici, 1996; Yaman, 2008).

The study area has gained the status of an Important Bird Area with the breeding populations of black storks, swifts and cut-necked plovers. There are 114 bird species in 15 orders and 44 families in the Kocaçay Delta. 38 species are local, 22 species are summer migrants, 11 species are winter migrants and 16 species are transit. In the Kocaçay Delta, representatives of 15 out of 20 bird orders found in our country were encountered. Passeriformes is in the first place with 48 species, Charadriiformes is in the second place with 17 species, and Ciconiiformes is in the third place with 9 species. According to IUCN criteria, 110 out of 114





species identified in the delta are in the Low Risk (LC), 2 are in the Vulnerable (VU) and 1 is in the Near Threatened (NT) class. *Pelecanus crispus* is in the VU (vulnerable) danger class of 200. The area has gained the status of Important Bird Area (IBA) with the breeding populations of Black Stork (*Ciconia nigra*), Marsh Martin (*Glareolapatincola*) and Cut-Ring Plover (*Charadrius alexandrinus*). Specific birds such as *Glareolapatincola*, *Charadrius alexandrinus* and *Ciconia nigra* also live in the area. *Charadrius alexandrinus* is definitely breeding in the delta, *Glareolapatincola* probably is breeding in the delta. *Motacilla citreola* is also a rare species seen in the Kocaya Delta. Little Cormorant, which was under threat of extinction on a global scale until recently, lives in the Kocaya Delta. *Motacilla alba*, *Delichon urbica*, *Calandrella brachydactyla*, *Charadrius alexandrinus* are other species breeding in the Kocaya Delta. *Larus cachinnans* is seen in the Kocaya Delta. Amphibians and reptiles such as earth frog, plain frog, spotted turtle, striped turtle, water snake, crested salamander are other biosphere elements living in the area. In addition to these, the lagoons host endangered eels and fish such as pike, rudd, carp, flounder, *rhodeus sericeus amarusic* (Altunel, 1990, Oğuz, 1991).

### HOLISTIC SUSTAINABLE ASSESSMENTS

The lithosphere, biosphere, atmosphere and hydrosphere characteristics that make up the ecosystem are shaped especially in the context of human interaction (Ekinci, 2012; Ekinci, and Karataş, 2012). Therefore, evaluating these factors together provides a correct human and spatial interaction. In addition, the climate change we are experiencing today raises concerns about whether the world is going through a process of extinction (Ekinci, 2024b, c).

Domestic and industrial wastewater, diffuse pollutants from animal husbandry and agriculture and atmospheric transport are the most important pressure elements for the study area. Especially pollution in Nilüfer Stream, mining activities, fertilizer use and human destruction are the main pressure elements. Despite being a natural protected area, pollution in Dalyan, Poyraz and Arapçiftliği lagoons, wrong land use, chemical fertilizer use, industrial wastes of Bursa province mixing with Koçasu Stream, siltation, eutrophication, sand extraction, cutting down trees in longoz forests and some wrong applications lead to irreparable degradations. Environmental factors affecting Kocaya Delta; The excessive pollution of Nilüfer Stream with various industrial wastes and the pollution of lake and wetland habitats in Kocaya water basin, continuous sand extraction from streams feeding sandy areas, transportation of garbage from Yeniköy and nearby settlements and domestic wastes resulting from tourism activities to the garbage collection area inside the delta, stray cattle and sheep roaming around the delta throughout the year, illegal hunting in the lakes in the delta, destruction of forests in the delta to open up agricultural land, winter wood and poplar groves. 201 Bursa province, which is among the most developed areas in terms of industry, is also among the polluting provinces in terms of air quality. Gases and dust originating from

vehicles, industrial and domestic heating reach the stream and delta through dry and wet deposition.

A large-scale modeling study should be conducted to determine the effect of atmospheric transport in Nilüfer Stream and air quality should be monitored. Important examples of point pollution sources include industries, sewage systems, mines, solid waste storage areas and animal manure storage. Domestic wastewater originating from settlements, wastewater originating from industries, wastewater and solid waste originating from large animal fattening areas, leachate from solid waste storage facilities, septic tank discharge water from rural areas are the main pollutants and cause great damage to the ecosystem. The main sources of diffuse pollution are agriculture, forestry, fisheries and fish farms, and mining activities. Among these, agriculture has a great impact. Diffuse pressures particularly affect the chemical quality of water. Especially phosphorus and nitrogen enrichment caused by agricultural activities cause eutrophication in surface waters. This artificial enrichment process has negative effects on the biological diversity in the water source and water quality.

In addition, this situation may reduce the value of water bodies used for recreation and water supply. Bursa Province, which is located in the hinterland in terms of affecting the field, contributes to the Turkish economy with industrial establishments operating in textile, automotive, food and leather sectors as one of the important industrial cities of our country. These have half of the WWTPs and the untreated water reaches the field via Nilüfer. There is also wastewater originating from mining activities carried out in the field. It was observed that Kesteleks Boron Enterprise discharged its wastewater into Orhaneli Stream. The enterprise has a discharge permit obtained on 27.07.2005. It was determined that there are fundamental problems related to water usage in the region within the triangle of agriculture, industry and domestic use, and that water is consumed much more than the need, especially due to the flood type wild irrigation methods used in agriculture. The pollution caused by Kocaya coming from the mine in Balya both pollutes Lake Manyas and carries a negative burden on the water budget of the basin. The fact that Borax facilities established in the early 1970s discharged their waste into the lake through Sığircı Creek until the late 1990s encourages pollution. 202 In addition, it has been determined that most of these businesses consume underground water and send this water back to the same reservoir after using it, in addition to the presence of intensive industry. In addition to these, despite the underground wells expressed in the number of 1000s in the Nilüfer Stream area in Bursa Plain alone, the number of licensed wells does not exceed 100. Precautions should be taken in streams where water quality is Class IV in terms of many parameters and has been determined as hot spots. First of all, point pollutant sources in the hot spot area (domestic, industrial, OSB etc.) should be subjected to a detailed examination in terms of capacity and treatment performance with good production and treatment technologies and possible improvements should be made within a certain period of time.



The river environment where the hot spot is located should also be examined in terms of Ecological Flow (Environmental Flow) and whether the necessary environmental flow is continuously available should be determined within the framework of the principles of the Regulation on Amendments to the Regulation on Procedures and Principles Regarding the Signing of Water Usage Rights Agreements for Production Activities in the Electricity Market published by the General Directorate of State Hydraulic Works. Discharge standards should be provided for some basic parameters included in the Communiqué on Hazardous Substances in Water, such as PAH, color, total phenols and pesticides for industries. Sustainable management principles should be implemented in every field in the study area. For this purpose, global partnerships should be established with civil society organizations focused on ecology, protection, tourism and environment issues to share priorities, exchange knowledge, skills and achievements and thus grow with competence, competence and efficiency. The focus should be on the elements that threaten the ecosystem, especially biodiversity, to the most dramatic extent and these should be identified and their rehabilitation should be ensured. Action plans should be created and implemented to stop the damage in the field, prevent further damage, repair the damage and protect the ecological, cultural and biological diversity of the field. Relationships should be established and developed between the relevant parties in order to positively develop the impact of policy makers on the environment. Studies should be carried out on sustainable transportation and tourism and these should be implemented. Human education should be provided on sustainable development, environmentally and socially responsible tourism, sustainable regional development and effective environmental education by looking at the sustainability of nature in the field from a democracy and equality perspective and awareness should be increased on these issues. Partnerships should be established between scientists, the public, educators and the business community on the sustainable use and protection of natural resources and cultural heritage. In particular, organizations should be made to influence, encourage and assist individuals, institutions and organizations in order to protect the integrity and diversity of nature and to guarantee the equal and ecologically sustainable distribution of natural resources in terms of the effects of this in the field. The scientific data produced by committees consisting of scientists should be made available to civil society organizations and policy-making institutions working on this issue. In order for visitors to protected areas to benefit from educational structures and vehicles, their attention must first be attracted. For this purpose, the use of different types of vehicles instead of conventional and ordinary vehicles will appeal to visitors of all ages, education, gender and cultural levels and allow them to focus on them. Tourism is an important economic activity and all indicators show that this activity will tend to grow.

With the growth in tourism, the demand for nature-related tourism such as sustainable tourism and ecotourism has increased, as has the diversity in tourism products. Just as nature-based tourism types are rapidly developing all over the world, tourism trends for

unique unspoiled natural environments and rural areas are also developing in our country. In addition to comfortable travel and accommodation, tourist demands are directed towards different desires such as learning about cultural values specific to the region, flora and fauna diversity of natural regions, special ecosystems and interest in natural life. Thus, we see that the demands for ecotourism types are increasing day by day. In the face of these increasing demands, it is very important to ensure the sustainable use of the richness of regions with their unique attractions and qualities without destroying them, to protect and develop natural and cultural values, and to develop a tourism concept that ensures the participation and development of local people in tourism activities. Nature-based tourism activities, which are among the alternative tourism types, create both national and regional tourism supply and make great contributions to regional and national development. Natural environments enable the realization of different ecotourism types. The protection of these environments, which provide visitors with unforgettable times in calm and peaceful environments, also requires responsibilities such as maintaining their biodiversity and ensuring protection against natural disasters. Ecotourism, which protects the environment and looks after the welfare of local people and is sensitive to natural areas, should be developed through sustainable tourism policies. Increasing the quality of life of regions by maintaining environmental quality and increasing the economic and environmental contributions of tourism will be possible with the implementation of sustainable tourism policies. The protection and development of natural tourism resources should be ensured through joint efforts of experts and local stakeholders. All stages of planning processes should be carried out within the scope of sustainable tourism principles, and all local governments and relevant stakeholders should fulfill their duties. It is possible to be successful in this way by using the sustainable use of the region in which natural areas and protected areas are located. In this way, the needs of the hosts and tourist segments in the tourism industry will be met in a long-term and uninterrupted manner by preserving the resources that exist today and their values in the future. In sustainable tourism development, it is aimed to meet the current needs of visitors by preserving and expanding future opportunities. This approach includes the continuation of economic, social and aesthetic needs, cultural integrity, essential ecological processes, biodiversity and processes that support natural life.

The United Nations World Tourism Organization emphasizes that in holistic sustainable tourism development; environmental resources should be used in the best way, the socio-cultural structure and traditions of the visited communities should be respected, and socio-economic benefits should be distributed fairly to all interest groups and consistent and long-term economic activities should be presented. It is also known that some activities carried out in natural areas cause harm. For this reason, we, who are responsible for protecting nature, need to be in good harmony with our environment. It is the right course of action for individuals and institutions to be pioneers for the control of activities in nature and for the development of nature



tourism in natural areas. In recent years, it is quite pleasing that civil society organizations and other organizations have also contributed to the development and protection cooperation for such natural areas. Sustainable nature tourism and ecotourism have emerged with an understanding that ensures the protection of natural environments against the negative effects of mass tourism. These developments have led to an increase in tourism-related projects and studies in the regional planning of natural areas and their surroundings. Thus, tourism has pioneered the development of these regions over time and the increase in their local and cultural richness. Sustainable use of natural areas and protected areas will be more successful when considered within the scope of tourism, ecological agriculture, local products and sustainable principles. The existence of the tourism industry is structured on the environment and people. Holistic sustainability in tourism can only be meaningful with long-term strategies and planning. Sustainable tourism is a commitment to nature and requires integration with the local people. Increasing the quality of tourism, protecting destinations and improving the future of the tourism sector is possible with sustainability. Adopting sustainability principles in the tourism sector and conducting studies in this direction will ensure the protection of natural and cultural riches.

Correct policies and actions in this direction will increase the benefits of the tourism sector and reduce its costs. Sustainable tourism provides economic benefits to destinations while creating opportunities to minimize negative impacts on natural assets and the environment. Sustainable tourism development is expected to affect the local economy, the protection of natural and cultural heritage, and the increase in the quality of life of hosts and visitors by minimizing the negative impacts on society and the environment. Our country is in a very important position in world tourism in terms of both its geographical location and touristic values. It is very important to diversify, promote and market this wealth that our country has, to increase its socio-economic contribution and to ensure its sustainability. Today, it is seen that there is a shift away from the axis of sea, sand, sun and mass tourism and towards nature tourism. It is seen that the demand for these areas is increasing in our country, which has natural conditions and richness suitable for all kinds of tourism activities in all four seasons. In the face of increasing demands, it is necessary to ensure the planned and sustainable use of these areas. Sustainable tourism requires ensuring the continuity of natural, cultural, ecological etc. resources and making plans and studies in this direction. The plans should take into account the natural life, local people, environmental and economic effects. In order to achieve these goals, all relevant units, especially the Ministry of Culture and Tourism, the Ministry of Environment and Forestry, should act in a coordinated manner and develop projects and carry out studies. In order for tourism activities carried out in natural environments not to harm the natural environment and the environment, good planning should be done for these regions. The expectations of the local people should be addressed with the sustainable tourism approach, and in addition to making joint decisions for the protection of the natural and cultural values that

contain the development potential of the region, it is essential to use the skills and knowledge of the local people in the most appropriate way in the implementation and monitoring stages. In the sustainable tourism development stage, there are common interests of nature and the environment. Accommodation and other tourism infrastructures should be outside the natural area as much as possible. This situation minimizes the damage to nature and culture, and can increase the benefit to the region where activities such as guest houses can be carried out. Local people and other regional interest groups are important partners in tourism development, these groups will provide accommodation opportunities to tourists and will also take responsibility for the preservation of the quality of the product they will offer.

Natural areas are generally very sensitive, therefore ecological values will not be limited to a specific area. Traditional life, local culture, rural socio-economic structures are also the main source of tourism. Longoz forests, dune plants, aquatic vegetation, bird species and lagoons are attractive with their ecotourism and geomorphotourism potentials. Longoz, lagoons and delta are a unique ecosystem in terms of biological diversity and natural beauty, and therefore, they are a natural heritage that should be left to future generations without damaging their natural structure. In the preparation phase for tourism in the field; natural and cultural values should be determined, target audience analysis, visitor characteristics and land use status should be determined (Ekinci, 2006; Ekinci and Sönmez, 2006). In the planning and implementation phase, the tools and activities needed for education and awareness-raising in the area should be determined, and park employees who will take part in education and awareness-raising should be trained. A visitor center should be established, educational and informative tools and equipment planned to be in the visitor center should be provided, designed and produced. Places suitable for walking paths and tour routes should be determined and designed in a way that will not harm the natural and cultural values of the site, the ecosystem and the living creatures living in the area. Warning, guidance and information signs to be placed along the visitor center and walking route should be designed, implemented and placed in appropriate places in the area. Printed materials such as maps, brochures and books that introduce the natural and cultural values of the site should be designed and produced, handicrafts and local products produced by local people should be offered to visitors coming to the area, measures should be taken to encourage local people for this, contact should be established with tour operators that will bring ecological and nature-oriented visitors to the area, and when accommodation is needed, opportunities should be created in the immediate vicinity that will not negatively affect the site. The planned visitor center and connected park structures should be compatible with the site, should not conflict with the natural and ecological values of the site, should be compatible with the geographical features of the site and natural materials found in the area or in the immediate vicinity should be preferred. Since the site is covered with vegetation, it would be appropriate to build a tower in the area and observation huts that are suitable for the natural environment and will allow the birds to be watched



without being disturbed. It can be stated that the area does not have the awareness it deserves. The reasons for this are; misuse of natural and economic resources and economic inadequacy, lack of organization and coordination, ineffectiveness of civil society organizations as a whole, increase in lake destruction due to lack of control, opening of channels for agricultural purposes, use of water in the lake as irrigation water, lack of control or inadequacy, lack of sufficient understanding of the meaning and importance of longoz within the region, functioning or non-operation of purification systems, inadequacy of controls related to hunting, unconscious and uncontrolled hunting activities, increase in consumption needs, increase in demand for opening fields, viewing the lake as agricultural land, lack of awareness among the local people, and continuation of agriculture depending on limited products.

The main problems are the disappearance of floodplains in the area, the decrease in biodiversity and the deterioration of the wetland ecosystem. Due to these problems, the species are decreasing and especially the number of bird species using the area as a breeding and feeding area is decreasing. In order to prevent these, the Management and Development Plan for the protection of the Kocaçay Delta should be introduced to universities and NGOs and its implementation should be monitored. Mechanisms should be established to monitor the ecosystem of the area. A cooperation environment should be created with universities, research institutions and NGOs. Support should be given to conduct research on the required issues. Contacting local public institutions and organizations and interest groups for the promotion of the area will be among the works required for the ecological protection of the delta. Cultural and natural recreation opportunities that will diversify tourism, generate income, support the local economy and ensure the continuity of local customs and traditions should be developed. The action plan proposed for the 208 area is grouped as what needs to be done in the short, medium and long term. Accordingly, in this process covering thirty years of planning, the first 5 years (2015-2020) were determined as short term, the second 5 years (2020-2025) as medium term and the following 25 years (2025-2050) as long term. Urban WWTPs need to be built in the short term. If settlements are located in drinking water basins or have gained sensitive area status or if existing treatment systems require revision depending on the population, the necessary revisions should be made within the periods given in the legislation. All individual industries and OIZs should be ensured to make the necessary arrangements to comply with the discharge standards specified in the legislation, such as WWTP construction and environmental permits. In olive oil production enterprises, sectoral cooperation meetings should be held to prevent pollution caused by olive OMW and the solution methods to be determined as a result should be put into practice. In addition, it is essential to take the necessary measures to urgently prevent all uncontrolled discharges from such facilities to the sewage system and the recipient environment. The rehabilitation of solid waste irregular storage areas should be completed in all settlements in the basin. Hot spots and their effects should be monitored within

the field borders for the management of pollution originating from mining waste. In order to minimize the effects of agricultural pressure in the basin, Agricultural Pollution Management studies should be carried out first in the villages located around the river and then in the settlements affected by the streams feeding the stream. Fertilizer and pesticide sales should be controlled. The local people should be made aware of good agricultural practices such as organic farming and drip irrigation and encouraged to use them.

In small/medium-scale enterprises within the Livestock Organized Industrial Zone, animal wastes can be stabilized in compost and/or anaerobic digestion (biomethane) facilities and directed to organic matter and/or bioenergy recycling projects, and significant economic input can be obtained from renewable energy incentives and organic fertilizer production. By establishing effective coordination and cooperation with local units of the Ministry of Agriculture and Rural Affairs, small enterprises in regions where animal husbandry is intense can be encouraged to take place in the Livestock Organized Industrial Zone, and transition to large-scale enterprises can be targeted. In large-scale individual enterprises and small/medium-scale enterprises within the Livestock Organized Industrial Zone, animal wastes can be stabilized in compost and/or anaerobic digestion (biomethane) facilities and directed to organic matter and/or bioenergy recycling projects, and significant economic input can be obtained from renewable energy incentives and organic fertilizer production. The purpose of use should be determined according to the high groundwater abstraction for agricultural purposes in the field, according to the precipitation status, the flow rate of the stream, and the storage of treated wastewater, and water consumers should be directed accordingly. Longoz and Wetland Protection Areas, management plan services should be completed, and aquaculture production conditions in line with international standards should be provided. In the medium term, WWTPs should be built in the villages located in the study area in accordance with the legislation. If the settlements are located in drinking water basins or have gained sensitive area status or if the existing treatment systems require revision depending on the population, the necessary revisions should be made within the periods given in the legislation. The studies to be carried out to prevent diffuse and point loads originating from agricultural and animal husbandry activities should be started in the short term and their continuity should be ensured in the medium and long term. Systematic and continuous studies should be continued in the fight against erosion. Monitoring the flow and quality of underground and surface waters, reuse of treated wastewater, and agricultural water use reduction studies should be monitored and inspected. In the long term, all activities to be carried out within the scope of the Action Plan should be continuously monitored by the HSA/ÇİB and their compliance with the legislation should be ensured.

## RESULT

The Kocasu Stream Delta should not be used unlimitedly but protected; it should be utilized as an ecological value rather than





unlimited consumption and should be transferred to future generations. As stated, both terrestrial and aquatic ecosystems coexist in the Kocasu Stream Delta. The Kocasu Stream aquatic ecosystems; Dalyan, Poyraz, Arapçiftliği lagoons constitute the stagnant water ecosystems. Flooded forests and forest areas constitute the terrestrial ecosystem. Since these ecosystems contain many different vegetation types such as sand dunes, wetlands, maquis and forest vegetation, this delta is an important area in terms of floristic and phytosociological aspects. The biological diversity, natural, cultural, historical and landscape resource values of natural areas should be protected not only for today but also for future generations to benefit from these values. In this context, natural areas that are considered important due to the resource values they carry are protected by national laws and international agreements. Research and experience show that declaring an area as a protected area and surrounding it is not sufficient for effective protection. Effective and sustainable protection is only possible by introducing the values, making them accepted and owning them. Properly introducing protected areas with extremely sensitive ecosystems and raising public awareness constitutes one of the most effective tools for establishing a balance between protection and use and ensuring sustainable development. One of the important tools used in the protection of natural areas is the establishment of "Protected Areas". However, in order for protection to be effective and to ensure sustainability, the resource values of these areas must be known in detail and promoted. Protected areas also attract visitors due to their resource values and landscape richness.

In recent years, interest in nature has been increasing and accordingly the number of visitors to natural areas has also increased. While this situation brings some negativities such as pollution and pressure on the one hand, it also creates a good opportunity for educating and raising awareness of people who visit these areas without any age, gender etc. Important natural areas in our country are protected with 18 different protection statuses. Sometimes more than one protection status is given to a single area. While some of these protection statuses are declared according to national legislation, some are established based on international agreements. However, there are limited opportunities to implement all of these statuses and for this reason, the areas cannot be managed effectively. A total of 839,663 hectares of natural area, corresponding to 1.07% of Turkey, is protected with the National Parks Law No. 2873 dated 9 August 1983. Within the scope of this law, protection statuses such as national park, nature conservation area, nature monument and nature park are classified. National Parks are areas that have national and international importance in terms of scientific and aesthetics; They are areas with natural and cultural resource values and areas for protection, recreation and tourism. Nature Conservation Areas are areas that contain rare, endangered or endangered ecosystems and species that are important in terms of scientific studies and education. The areas must be absolutely protected and their use is allowed only for scientific and educational purposes. Natural Monuments include areas with extraordinary features and scientific values created by natural

events. Natural monuments must be protected within the principles of national parks. Natural Parks are natural areas with important vegetation and wildlife features, suitable for people to rest and have fun within the integrity of the natural landscape and are protected with this status. One of the most important tools for educating visitors and local people coming to protected areas, using the resource values without destroying them and promoting them and raising public awareness is undoubtedly the visitor center, information boards, walking paths, observation towers and cabins and other supporting services. In promotion, information and awareness-raising activities for visitors in protected areas, planning and implementation of park structures and services undertake important functions. There are also civil society organizations that have priorities and aim for protection. The Turkish Nature Conservation Association (TTKD), the Natural Life Conservation Association (DHKD and WWF Turkey), the Greenpeace Mediterranean Campaign Office, the Hunting and 160 Wildlife Protection and Development Foundation, the Turkish Environment Foundation (TCV), the Environmental and Cultural Values Protection Foundation (ÇEKÜL), the Turkish Erosion Combat and Afforestation Foundation (TEMA), the Coastal Areas National Committee (KAY), the Clean Sea Association (TURMEPA), the Marine Species Research Foundation (TÜDAV), the Rural Environment and Forestry Problems Association (KIRÇEV), the Underwater Research Association (SAD), the Mediterranean Seal Research Group (AFAG), the Bird Research Association (KAD), the Ecological Agriculture Organization Association (ETO), the International Union of Local Authorities (UNO for Local Authorities, IULA), the Aegean Natural Life Conservation Association (EgeDoğa), the Nature Association, and the Bird Bank are the main ones (Özesmi, 2000, 2002; Özesmi et al., 2003).

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