

Coastal Zone Problems and Environmental Strategies to be Implemented at Edremit Bay, Turkey

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ABSTRACT / This case study examines the coastal zone problems focusing on the existing conflicts between tourism and commercial activities on the coasts of Edremit Bay, Turkey, and attempts to suggest solutions to these problems. Edremit Bay is a characteristic example of such a conflict in

collective use of natural resources. The study area, with its 100-km-long sandy beach, naturally attracts different coastal user groups with different beneficial expectations: in terms of rest and recreation for one group and commercial gain offered in a variety of ways for another group. Significant coastal zone problems exist in the study area. Deterioration of shoreline due to tourism activities and illegal constructions, damage to the coastal ecosystem due to domestic/industrial wastewater discharges and some agricultural activities, and disordered urbanization are only a few of the many problems. The data presented here were partly derived from field study and partly collected from local state or private organizations. In this study, it is emphasized that there is a need for viable economic and environmental strategies to be designated in Edremit Bay, Turkey, in order to provide sustainable resource use. For this purpose, an integrated project together with a relevant planning chart including subprojects is also suggested. The success of a local environmental protection management project depends on active participation of all stakeholders including governmental organizations and nongovernmental organizations.

Coastal zones are valuable natural resources containing important ecosystems and supporting many organisms, whose extinction may affect the whole marine environment. The coastal zone is also a very important nesting and breeding ground for many resident and migrating birds. Littoral zones and their natural resources are strongly attractive to humans. The coastal zone in most countries has been subjected to severe and increasing pressure as a result of conflicting uses such as rapid urbanization, environmental pollution, tourism development, and other coastal activities as in Edremit Bay, Turkey. Serving mostly for recreational purposes and providing significant economical benefits, these activities have potential harmful outcomes for the coastal environment as well. Therefore, it is crucial to designate both environmen-

tally sound and economically viable coastal management strategies that would ensure minimum environmental deterioration and maximum attainable protection while benefiting from the blessing of nature (Widmer-Scherer 2001).

Coastal zones providing a natural environment for many living species also offer a central location for industrial and tourism-driven commercial activities. More than half of the population of Turkey lives in the coastal zones (Atalay 2000). Environmental deteriorations linked with aforementioned coastal activities are evident along the 8,333-km-long coastline that surrounds three sides of Turkey. Edremit is at risk of reaching an irreversible point where serious negative effects of environmental pollution are inevitable. Edremit Bay is one of the most interesting and dramatic examples of an area experiencing various environmental deteriorations mentioned above. Pollution from domestic and industrial discharges (mainly olive oil mill effluent), unprocessed disposal of municipal solid wastes, basin and coastal erosion, and destruction of olive trees as a result of disordered urbanization are believed to be the main environmental problems in the study area.

KEY WORDS: Edremit Bay; Coastal zone problems; Integrated project; Olive oil production; Tourism activities; Urbanization; Turkey

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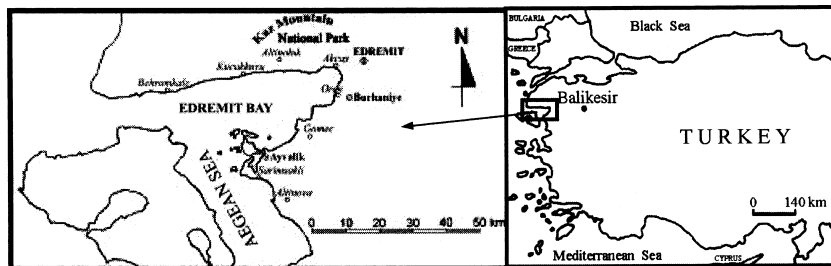


Figure 1. Location of the study area.

The main objectives of this paper are as follows: to identify coastal zone problems at Edremit Bay and to propose an integrated project and management structure.

Study Area

The study area which this paper investigates comprises a total shoreline of 145.5 km, stretching along the northeastern part of the Aegaeon Sea between Altınova in the south of Edremit Bay and the Behramkale boundary in the north (Figure 1). A 100-km-long sandy beach on this shoreline naturally attracts different coastal user groups with different beneficial expectations in terms of rest and recreation for one group and commercial gain offered in a variety of ways for another. Allocated to summer dwellings, holiday villages, and hotels, most of the residences in the study area increase the human pressure on the coast and the surrounding environment by occupying the landscape gradually.

Edremit Bay is also blessed with the existence of Kaz Mountain (Mt. Ida in Greek mythology), stretching all the way down from the southern tip of Canakkale between Ayvacık and Edremit. With its history of 5,000 years, this mountainous area, called Misyra in ancient times, reaches 1,774 meters at the summit. It is as popular as Olympus in mythology, since the first mythological beauty contest was believed to be held there. Kaz Mountain is known to shelter more than 800 species of plants belonging to over 100 families (Henderson 1961, 1969). Especially fir trees (*Abies nordmanniana* subsp. *qui-trojana*), which start to appear at 1300 m, are claimed to grow only on Kaz Mountain. Furthermore, Kaz Mountain is a unique home to 21 endemic species (Gemici and others 1993, Ozel 1998). All these rarities of Kaz Mountain inspired a \$5.1 million cost investment for the World Bank pilot project entitled “*In Situ Conservation of Genetic Diversity in Turkey*,” in which rare plant and animal taxonomic studies were carried out at seven different locations for 7 years. On April 17, 1993, this area was declared the 23rd national park by The Council of Turkish Ministry,

which provides official protection for the local flora and fauna.

Data and Methods

The data presented in this study were partly derived from field studies conducted at the study area and partly obtained from various state or private organizations. For this purpose, many state organizations such as the Directorate of Edremit Olive Oil Mills, the Directorate of State Tourism of Balıkesir, and local municipalities were visited for their technical support. Similarly, data concerning seawater quality were obtained from the results of the Blue Flag Project and periodic monitoring reports of a local wastewater treatment plant for discharge water quality. Data for Gomec and Kuzulu water basins were provided by DSI (Turkish Republic General Directorate of State Hydraulic Works).

Basin erosion measurements and delta formation estimations were carried out by the author and her research team during a research project supported by Gomec Municipality. In Gomec, to determine the oceanographic properties of the delta region, field measurements were carried out in summer and autumn at 10 points. An ANDERAA RCM 9 instrument was used to measure flow velocity, flow direction, turbidity, temperature, and conductivity. The coordinates were obtained by GPS. In addition, the texture of bottom sediment samples from islets, beach, river mouth, and upper basin were analyzed at the Geotechnic Laboratory of Balıkesir University. A numerical model was also applied to investigate the hydrodynamic factors that contribute to delta formation at the Gomec River mouth. The hydrodynamic modeling software AQUASEA was used.

Data regarding coastal erosion in the study area were obtained from another field research project carried out in Altınova. In order to evaluate bathymetric changes and shoreline movement on the Altınova coast near the Madra River mouth, depth measurements were made in this project. The wave climate of Ayvalık and Dikili was evaluated with SMB

Table 1. Categorization of coastal problems in Edremit Bay

Coastal zone problems in Edremit bay
Problems arising from olive oil production (deterioration of receiving media and nuisance of smell due to olive mill effluent discharges during the campaign period)
Problems arising from conflicts in tourism and environmental conservation
Urbanization
Deterioration of seawater and freshwater quality
Solid waste disposal
Damage to coastal ecosystem
Damage to river beds
Negative effects on Kaz Mountain National Park
Basin Erosion
Coastal Erosion

and CERC methods and the near-shore properties of waves were determined. Shoreline changes were evaluated by the numerical model of Hanson and Kraus. Coastal erosion has been clearly predicted by comparison of numerical model results and data obtained by field measurements.

Coastal Zone Problems in Edremit Bay

Coastal zones, with their fragile environment, are quite sensitive to increasing populations. Evidence of negative effects due to the rapid socioeconomic developments coupled with small-scale occasional natural disasters (flooding, etc.) exists (Clark 1996). Coastal problems in Edremit Bay including both anthropogenic and natural causes are categorized in Table 1.

Problems Arising from Olive Oil Production

The main agricultural activity in the study area, covered with olive trees as far as the eye can see, is olive production (Tunay and others 2002). According to recent statistics of the Turkish Foreign Trade and Export Promotion Center, Turkey, with its 90 million olive trees and an average annual olive oil production rate of 90,000 tons, ranks fourth, after Spain, Italy, and Greece, in the Mediterranean Basin, which represents roughly 97% of the worldwide olive production. A significant number of small- to medium-scale olive oil producers harvest 35,000 tons of olive on average seasonally, which results in approximately 35,000 m³ of olive oil mill effluent during the campaign period. The olive oil industry has a significant pollution potential, although olive oil mill effluent is totally natural. Olive oil mill waste water (OMW), called *alpechin* or black

water, is 300 times more concentrated than domestic wastewater in terms of organic matter, oil, and suspended solids, on average (Azbar and others 2002). In addition, OMW, which also causes extra reproduction of insects (*Anopheles* spp., Diptera, Itonididae, etc.) and odor nuisances, contains remarkable amounts of phenolics and polyphenol compounds, which are known to be responsible for their phytotoxic and antibacterial effects on the environment and biological treatment processes (Benitez and others 1997, Hamdi 1992, Nychas and others 1990, Tuncel and Nergiz 1993). Every other year, during the 100-day campaign period from November to the end of March, Edremit Bay is the scene of an environmental catastrophe due to the untreated discharges from olive oil mills.

The Turkish Water Pollution Control Act is in force to protect the receiving media from domestic and industrial discharges, which must go through an extensive and costly treatment process. The current disposal problem of OMW is in chaos, especially for small olive mills, because of the high initial and operating costs of disposal utilities. In order to avoid the economic and social problems leading to potential crisis in olive production and olive-related industries due to requirements of very expensive treatment investments, several provisory legislative and ministerial decrees were promulgated and strategic plans were applied in some Mediterranean countries. One of these approaches has foreseen spreading of wastewaters on land to benefit from the potassium and phosphorus content of OMW such as in Italy. Spain almost totally replaced the production techniques of traditional three-phase systems generating a high volume of OM effluent to two-phase systems with no OMW. Extensive field studies and research were carried out in Spain and Italy to demonstrate the high fertilizing value of olive oil wastes and their use as soil conditioners.

Even though three-quarters of the world's olive oil is produced in the European Union region with strict environmental regulations, there is still a need to establish international specifications to impose common behavior among the producer countries in the Mediterranean basin. Such regulation could contribute to safeguarding environmental values in the area without harming small producers and olive oil markets (Galli and Tomati 2002).

Another important aspect of OM wastes is the solid fraction or olive cake, called *pomace*, *prina*, or *alpeurujo*, that remains after oil extraction. This olive cake seems to contain almost no sulfur and a reasonably high BTU content that can be burned for a variety of uses. It appears that problems regarding hydrocarbon emissions due to the residual oil content and carbon

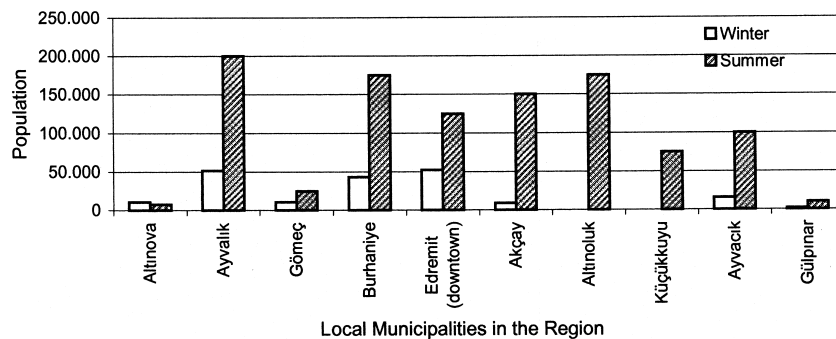


Figure 2. Population distribution of residential districts in winter and summer seasons.

monoxide due to incomplete combustion need to be solved before deciding to burn the olive cake (Bayram 2002).

Problems Arising from Conflicts Between Tourism and Environmental Conservation

Urbanization. Depletion of natural resources and degradation of the environment as a result of tourism activities create serious problems in these regions. In fact, coastal zones are directly or indirectly affected by coastal tourism and recreation (INECE 1995). In addition, dense and disordered urbanization caused by overpopulation is a threat to nature. As a result of excavation and replenishment caused by constructions threatening the natural landscape, wetlands, and forests, negative effects such as soil erosion and restriction of arable lands are becoming increasingly apparent (Mezek 1996). Especially Ayvalık coasts are under great pressure from intensive urbanization. Although a major part of the coastal zone is conserved as natural park, natural site, or archaeological site, dense urbanization is still under way (Tuncel and Nergiz 1993). Edremit Bay ranks among the most popular tourist areas in Turkey. However, the natural beauty of this region attracts not only tourists but also building contractors. It is estimated that the current number of houses between Edremit and Küçükkuyu is around 100,000, three times more than 10 years ago. Secondary houses now surround the coastal zones, which were covered with olive trees at that time, and this construction works spreads extensively, even reaching up to archaeological sites.

For example, according to the observations of the Edremit Olive Enterprise, more than 3 million olive trees have been wasted since 1990 in the coastal areas in Edremit Bay. More than 1.5 million of these trees have been sacrificed to urbanization. Whether for summer houses or tourism, all activities and hotel buildings have only served to destroy olive trees. There are about 1.5 million olive trees which are not cut and are reserved for decorative purposes among buildings. These trees have no economic value and they either

dry up with time or are cut by the owners of the buildings. The economic loss resulting from destruction of olive trees at the expense of real estate profits, which are three times less than olive oil income, is around \$27 million to \$30 million considering that 3 million trees wasted would yield 18,000 tons of olive oil, with a unit price of \$1.5–\$1.7 per kilogram of olive oil.

Coastal Law No. 3621 for the protection of coastal zones in Turkey was promulgated in 1990. Article 5 of this law states that “proximity of any building to the shoreline may not be closer than 50 m” (Turkish Republic Ministry of Public Works and Settlement 1990). In the study area, comprising 145.5 km of shoreline, it seems that none of the landowners comply with this Act. Their disregard creates a serious problem for law enforcement by state services, since there are countless examples of violations, most of which nearly touch the sea, especially in Ayvalık, Edremit, and Altınoluk.

In Edremit Bay, different coastal problems exist as a result of tourist activities and the seasonal population boom. The winter and summer populations in local towns studied in this paper are shown in Figure 2.

The demand for already limited natural resources is 10- to 15-fold higher during the summer season, which cause disputes between local administrators and residents due to the insufficiency of most municipal services (Karaman 2003). Moreover, the rapidly expanding coastal population experienced in recent years is further threatening the sustainability of coastal resources as well as causing degradation of water quality in coastal areas.

Summer tourism is naturally quite attractive to the local municipalities because of its positive contribution to the local economy (a total of \$11.5 million per season); however, the tourism sector has also been a source of environmental degradation including the nuisances of sewage discharges and solid wastes. Solid waste generation and domestic wastewater discharges are skewed parallel to the dramatic increase in the use of natural resources (water consumption, etc.) during the summer period due to the increase in population. Figures 3

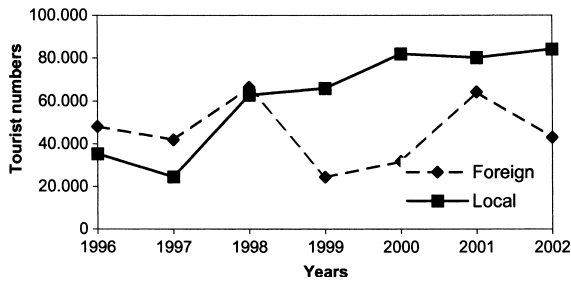


Figure 3. Average numbers of local and foreign tourists in the study area.

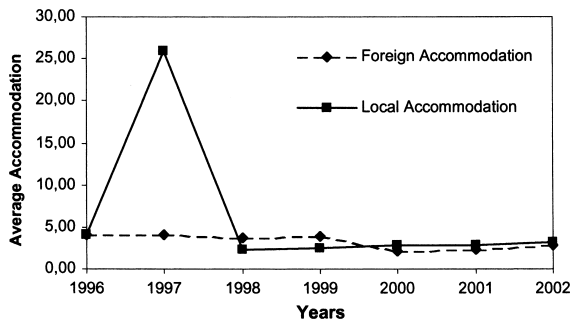


Figure 4. Average distribution of local and foreign tourist accommodation in the study area.

Table 2. Number of beaches in the study area complying with the Blue Flag bathing water standards in 2001

Sampling point	Appropriate	Inappropriate
Altinoluk	49	6
Gure	6	5
Akcay	14	8
Burhaniye	63	3
Gomec	31	2
Ayvalik	91	22

and 4 indicate that not only is the population increase in the study area connected with summer tourism, but also the recent earthquake in the Marmara region has had significant effects on the population movement from Istanbul and Gebze (north) to the study area (south). Even though the total number of foreign tourists visiting the country of Turkey has increased from 6 million to 12 million, there has been almost no change in the number of foreign tourists visiting the study area during the same period, 1996–2002.

Deterioration of seawater and freshwater quality. Edremit Bay participates in the European Blue Flag beach award. This award requires compliance with the current standards for total and fecal coliforms and fecal strep-

tococci, as specified in the EC Bathing Waters Directive (CEC 1997). Water samples whose results are inspected by the Turkish Republic Ministry of Environment are frequently collected and analyzed by the Laboratory of Balıkesir Public Health during the bathing season. There appears to be a deficiency of work with respect to the clarity of the results and their circulation among the public, since they are difficult to access and are considered classified. This fact raises questions about the trustworthiness and reliability of the work. Table 2 shows the compliance of seawater quality with respect to Blue Flag bathing criteria in 2001. Data in Table 2 were provided by the Altinoluk Treatment Plant and Akcay Medical Center (Karaman 2003).

The existing sanitary infrastructure fails to meet the needs of the excessive urbanization and the population boom during the summer season. As a result, a limited number of beaches qualified to erect the Blue Flag symbolizing compliance with EC standards for bathing in 2001.

Groundwater is the main resource for domestic use in the area. The excessive urbanization and steep population increase also apply serious pressure on these groundwater resources. Salt intrusion is a serious problem caused by overextraction during the summer period and closing-up of many existing wells. Also, contamination by sewage systems is becoming increasingly evident in the area. In this respect, the protection of groundwater resources is of especially vital importance in the long run. It is clear that the study area is getting closer to a point of no return in terms of the sustainable use of the natural resources in the area.

Damage to coastal ecosystems. Healthy coastal ecosystems are of vital importance for development of healthy coastal zones. Tourism activities in natural zones damage the existing ecosystem irreversibly, interfering with flora and wild life, which may be easily destroyed (Isobe 1998). Disordered urbanization aiming to satisfy the growing need for housing in coastal zones creates two kinds of effects on the coastal ecosystem; direct effects, which are visible (visual pollution, noise, water and air pollution), and biological effects, which are not visible and require detailed analyses to bring to light. The direct effects are the result of land use for building and the biological effects are a result of the insufficient sanitary infrastructure (Neto 2002).

Domestic and industrial wastes are released into the receiving media in the case of Gemidere, Mihli, Gomec, and Nikita in Edremit Bay. This situation causes pollution along the river beds and in the vicinity of river mouths, resulting in the nuisance of mosquitoes (Diptera, Itonididae), and destroys species at river mouths where other marine organisms get their food.

Moreover, utilities serving tourism and trade cause degradation of the ecosystem due to their liquid and solid wastes and the unprocessed chemicals discharged in coastal waters.

Forests and olive trees, either destroyed by construction activities or consumed for energy production, constitute a natural environment for many species in the region. These negative effects not only damage the local habitat and ecosystem but also speed up erosion and landslide processes.

Existing and planned highway work between Kucukkuyu and Assos also negatively affects the ecosystem in the region. A 20-m-wide (expropriation length, 40 m) and 31-km-long highway, 7 km of which was already constructed, has been under construction between Ayvacik-Kucukkuyu and Assos. This highway project was stopped temporarily by a court decision based on Coastal Law No. 3621, which bans any construction closer than 50 m to the shoreline, since 20,000 olive trees must be cut in order to complete the remaining 24 km. This highway project passes through the ancient settlements of Assos, Lamponi, and Gargara cities, which were declared a first-degree protection area in 1991. In the light of all these laws and decrees, this project must be modified to preserve both the coastal ecosystem and the historical assets.

Another threat to olive trees is looming, due to the mining act modification plans of the Turkish Government, which will allow mining work at the expense of olive trees. Serious civilian opposition to this plan is already growing in the region.

Damage to river beds. The river beds in the region, such as Zeytinli, Sahin, Manastir, and Mihli, are occupied by secondary houses built for the purpose of tourism. Although the construction of buildings closer than 100 m to a river is forbidden, the garden walls of the houses are built on the banks of the rivers.

This direct anthropogenic interference with nature received a harsh retort from nature itself. A flood occurred in December 2001, in which many blocks of flats damaged by muddy water.

Negative effects on Kaz Mountain National Park. Kaz Mountain National Park, stretching between Kucukkuyu and Edremit, has been experiencing deteriorations in the natural scenery, environment, fauna, and flora due to the intense visitor demand and hunting, for example, the number of vehicles traveling through the national park is estimated to be 27,000 per year.

Kaz Mountain is a region well-known for its clean air diffusing from 27-km-long Sahin Canyon, Altinoluk, therefore it is quite desirable for health reasons and ecotourism. Unfortunately, the national park is facing gradually increasing risk of environmental deteriora-

tion caused nonpurposefully. Every person (camper, mountain climber, hunter, etc.) who sets foot on Kaz Mountain causes environmental deterioration (Sarşbas 2003). In particular, solid wastes resulting from daily picnic activities are an escalating unsolved problem in the region (Soykan 2003).

Basin Erosion

Another important problem in Edremit Bay occurs at Gomec, at the southern end of the study area. In the 1950s and 1960s the upper basin of the Gomec and Kuzulu rivers was covered with woodlands. Since then, woodlands have been destroyed and converted to olive groves and agricultural areas. This increased the erosion potential in the basin (DSI 2000). As a result, fertile soils at the upper layer of the basin were transported to the sea via the Gomec River by the intense precipitation over the last 40 years, due to the lack of adequate soil preservation and river management strategies. Riverine sediment flows through the Gomec River mouth to the sea and accumulates at the coast, creating a shallow turbid region, 2 km long and 100 m wide, in the sea. This increased basin erosion changes the morphology of the coast and creates small islets. If the sediment transported from the upper basin is not reduced, by sediment-retaining dams on the Gomec River or afforestation and terracing works in the upper catchment, delta formation will continue. This situation highlights the need for coastal zone management to be integrated with river basin management (Irtem and others 2002).

Coastal Erosion

Coastal erosion is especially obvious at the southern end of the study area. Madra River, located between Altinova and Dikili, is the main sediment source of the coastline. The dam located on the Madra River, the erosion-control works in the Kozak region, and the sand taken from the Madra River bed together resulted in a significant decrease in the amount of sediment at the coast. In the last decade, the Altinova coastline has suffered from intense chronic and permanent erosion, and thus, the shoreline has retreated approximately 600 m during the last two decades and 18–20 m in the last year (Kabdasli and others 1996).

Bathymetric measurements in Altinova and the vicinity of the Madra River mouth reveal the existence of a deep pit, which prevents the feedback of sand removed from the region through storms and accelerates the erosion rate at the coast, because the sand input through the Madra River has decreased dramatically. This deep pit is a dominant morphologic factor causing coastal erosion (Irtem and others 2001).

Organizational Structure and Proposed Project for the Study Area

The coastal zone is a dynamic system. This is a result of interactions with atmospheric processes, the operation of different ecosystems and coastal processes, and up-catchment activities, as well as the different degrees of development present. The interaction between the coastal zone and the high seas is a further aspect of this dynamism, particularly in relation to living marine resources and the impact of pollution (OECD 1993).

Integrated coastal zone management is most simply understood as management of the coastal zone as a whole in relation to local, regional, national, and international goals. It implies a particular focus on the interactions between the various activities and resource demands that occur within the coastal zone and between coastal zone activities and activities in other regions. In practical terms this might mean the integration of environmental protection goals into economic and technical decision-making processes, management of the impacts of agricultural runoff on coastal zone water quality, coordination of tourism policies with nature conservation policies, coordination of pollution control policies within different parts of a particular coastal zone, or—most probably in practice—all of these and more simultaneously. Successful integrated management will also require “integration over time,” with short-term, day-to-day management objectives (which may involve local- and regional [state]-level administrations) being coordinated with long-term (national and international) policy goals.

Integrated coastal zone management can be distinguished from the management of particular activities that may occur within the coastal zone, such as the provision of recreation facilities and the disposal of waste, or particular aspects of coastal zone management, such as pollution control and physical planning. The operational specifics of these activities and functions will be relevant to integrated management only insofar as they impact (in some positive or negative way) other activities and functions that take place within the coastal zone (or the same activities and functions in other coastal zone management jurisdictions) (OECD 1993).

Allocation of authority for coastal management is very complicated in Turkey. There are 22 planning and management authorities and 24 associated laws for coastal management in Turkey. For example, the coastal wetlands are under the authority of the Ministries of Environment, Public Works and Housing, Forestry, Agriculture and Rural Affairs, and Culture,

the Directorate of Protection of Special Areas, and the General Directorate of State Hydraulic Works (Berberoğlu 2003). The uncertainty in the allocation of duty and authority among different ministries of the central government causes chaos among local administrations, resulting in a lack of a viable coastal management.

Environmental deterioration and environmental pollution in coastal zones in Turkey are among the critical problems with the highest priority, requiring urgent solutions. Thus the Turkish Republic Ministry of the Environment (1996) has, for the first time, initiated a project for integrated planning for the coastal zones in Mersin City, which is experiencing these problems at a critical level.

The integrated planning project (Figure 5) offered in this paper was inspired by the project mentioned above. The main components and methods involved in this project are discussed below.

Data collection. Data on the population structure in the region, rate of urbanization, index of socio-economic development, water resources, geography and morphology, flora/fauna, and land use were derived mostly from updated documents obtained from local authorities and private or state organizations. All these data classifications were proposed to be the levels of the database in the geographic information system.

Analysis of the existing system; interaction of ecology–society–development. Environmental stresses on the region are scrutinized in the framework of cause-and-effect relations. Loss of agricultural fields, environmental deterioration, and environmental pollution resulting from the lack of a suitable infrastructure are some of today’s consequences that will affect the quality of life in the future.

Synthesis. Conservation limits are determined by the natural synthesis. Appropriate research and evaluations have been conducted by considering the soil resources (forests, agricultural fields, archeological areas, inclined land, coastal habitat, etc.) and water resources (wetlands, groundwater resources, surface water resources, sea and sea habitat, etc.).

Scenarios. The main goal in establishing scenarios must be to prepare for an uncertain future and achieve much healthier conditions. For this reason, scenarios for conservation, accessibility, and availability of these environmental resources are developed through consideration of the potential development trends in the region.

Strategy and policy. Strategies can be classified into two main groups:

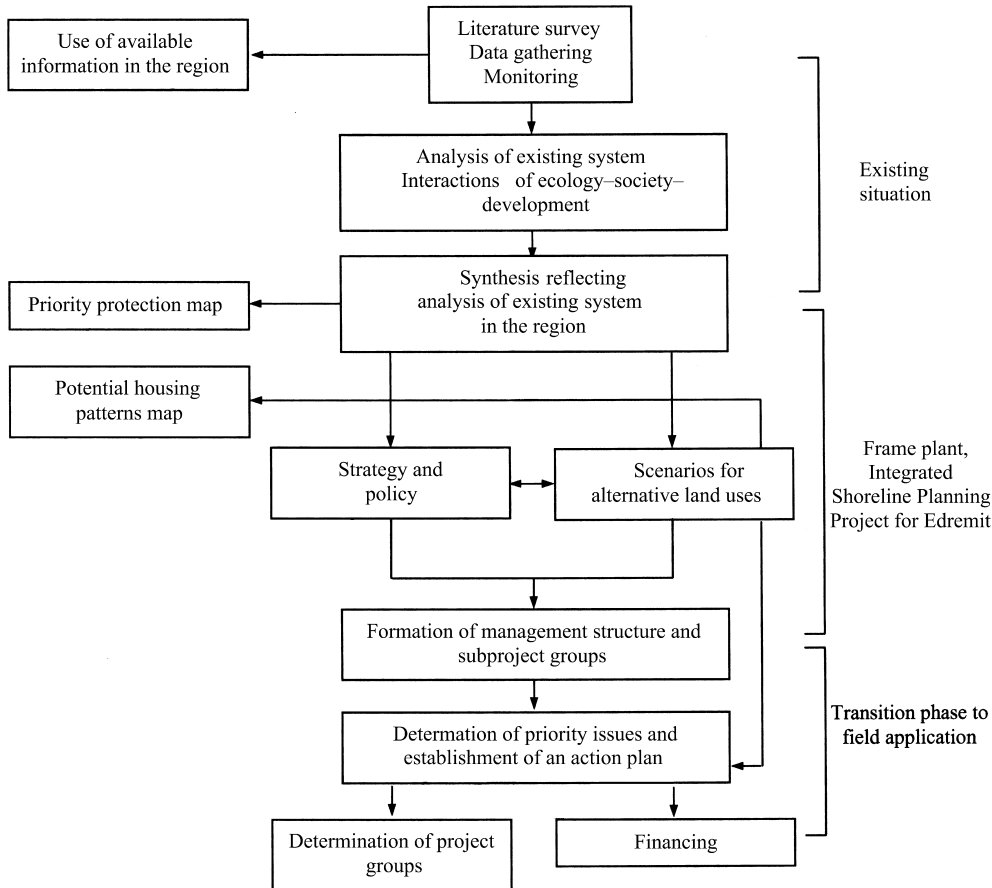


Figure 5. Integrated planning project for Edremit Bay.

- (1) policy and strategies for management of land use and
- (2) policy and strategies for management of the environmental infrastructure.

Development of a management structure and subproject. The fact that coastal zone management depends largely on central administration, and voluntary civilian organizations do not participate in this management, deepens the existing problems in the study area. The success of local environmental protection management requires the active participation of all stakeholders, including government organizations (GOs) and nongovernment organizations (NGOs).

It is evident that common management strategies are not adequate for coastal zones with site-specific problems. In this case, it may be necessary to elaborate a plan devoted to solving the specific problems in the region. Members of central and local government (e.g., state organizations and the Edremit Municipalities Union), Balikesir University representatives, and representatives of professional groups and civil society

organizations must gather and form the “Council of Edremit Bay Integrated Coastal Zone Management.” Figure 6 depicts the Integrated Project Management Structure of Edremit Bay.

Cooperation among the environmentally injured party, industry owners, and local residents is crucial for avoiding environmental pollution. This cooperation should be immediately realized in Edremit Bay by establishing a management plan for coastal zones. There is disagreement regarding the allocation of authority among local municipalities in the region. The Edremit Municipalities Union was founded to eliminate disagreements regarding issues such as infrastructure, land use, and authority domain. An organization aimed at establishing relations of the Union with civilian society for the preservation and development of environmental quality, cooperation among local administrations, industrial regulations, and management of coastal conflicts through unifying studies involving people is urgently needed.

In the study area there are two main active civilian organizations, the South Marmara Association for the

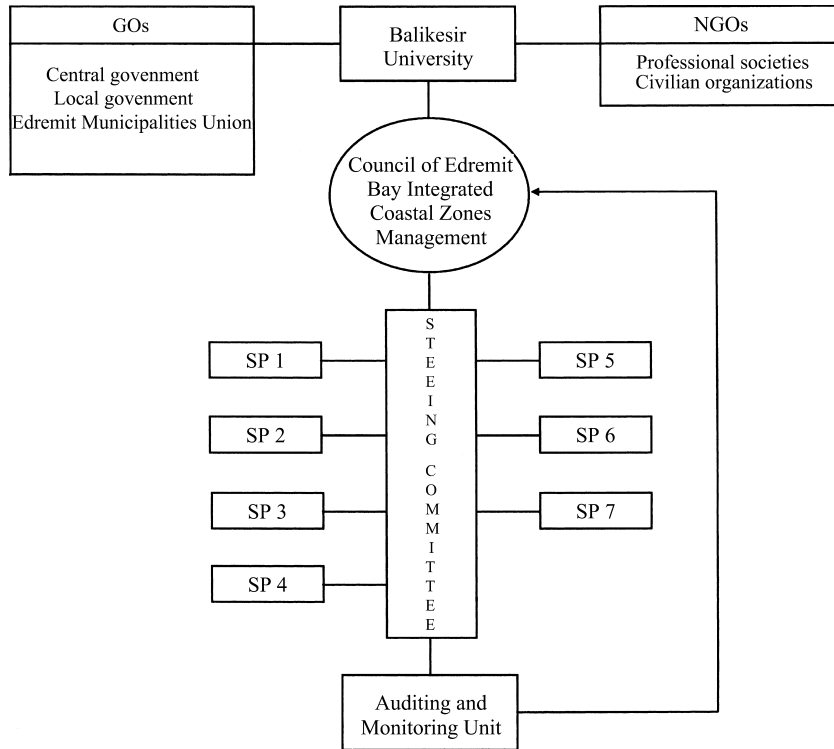


Figure 6. Integrated project management structure for Edremit Bay.

Protection of Natural and Cultural Environment (GUMCED), established in 1992; and the South Marmara and Trakya Platform for the Protection of Environment (MARCED), established in 2002. Local people, civil engineers, architects, environmental engineers, and geographers, for example, are members of these organizations.

The proposed project, composed of seven high-priority subprojects, was designed to include all prospective projects. These seven subprojects focus on determination of conservation policy, programs for the protection of critical water basins, secondary housing management, strategic plans for the protection of historical buildings and works, and management of domestic and industrial wastewater and solid wastes in the region.

Intercommunication among the partners and communication of subcommittees with the coordinator will be managed by a steering committee and a secretary. The steering committee will be responsible for organizing periodic meetings, disseminating meeting reports to the public, maintaining contact with national and international financial establishments, finding expert groups or personnel for associated project work packages, and public relations as depicted in Figure 6. The subprojects are as follows.

Subproject 1

Focus: Beach management

Objective: To establish the necessary management plan and conservation policy

Subproject 2

Focus: A regulation project for Zeytinli, Manastır, Şahin, and Mihli creeks

Objective: To establish the necessary protection plans and management policy for the creeks under question, which have been under serious environmental pressure due to the increasing urbanization around Edremit

Subproject 3

Focus: Projection of the development of secondary housing

Objective: To prevent and waylay illegal urbanization, to modernize the urban infrastructure

Subproject 4

Focus: Preparation of a strategic plan for Altinoluk Town

Objective: To reevaluate the Master Plan prepared for Kaz Mountain and convert this plan into a strategic plan that includes Altinoluk

Subproject 5

Focus: Wastewater management in the study area

Objective: To find the most effective and economical solution for the management of both domestic and

industrial wastewaters arising in the study area

Subproject 6

Focus: Management of industrial and agricultural pollution

Objective: To control and minimize industrial and agricultural pollution in the study area

Subproject 7

Focus: A regional management plan for solid wastes

Objective: To create an effective and economical disposal and reuse alternative for the solid wastes arising in the study area

Discussion and Conclusions

Edremit Bay is a characteristic example of a conflict in collective use of natural resources. The dimension of the existing coastal zone problems in Edremit Bay reveals that there is a need for a management strategy that provides a reasonable balance between economical development and conservation of the environment.

Coastal problems in Edremit Bay due to both anthropogenic and natural causes can be categorized as problems arising from olive oil production, problems arising from conflicts between tourism and environmental conservation, basin erosion, and coastal erosion.

The management structure in the study area is proposed to be formed by central and local authorities, university representatives, representatives of professional organizations, and members of civilian societies. There is disagreement about the allocation of authority among local municipalities in the region. The Edremit Municipalities Union was founded to eliminate disagreements over issues such as infrastructure, land use, and authority domain.

The Council of Edremit Bay Integrated Coastal Zone Management actually already exists in the study area but it is not effective because of the lack of management and technical skills, financial constraints, and accountability, lack of coordination between subgroups, and poor institutional support. The government needs to introduce relevant policies that would promote and encourage the participation of NGOs, GOs, and other private organizations in environmental conservation activities. At the national level there are no explicit coastal resource management policies. It is difficult to determine which ministries or agencies carry the main responsibility for implementing policies for coastal areas and for coastal resources. Confusion over ministry or agency responsibility for coastal zone management is sometimes exacerbated when natural disasters occur (e.g., floods).

A sustainable coastal zone management plan, which permits the current generation to utilize natural resources while bearing the next generation's needs in mind, is needed. To achieve this sustainable management, current users of nature should pay for restoration of the damage resulting from their use and for protection of the next generation's rights to benefit from the same limited resources.

In Edremit Bay, existing laws and regulations related to the protection of coastal zones and control of coastal activities should be enforced; also, penalties and sanctions must be implemented.

We understand from the example of Edremit Bay that the mainland boundaries of coastal zones should include river basins. In this manner, archaeological sites, tourist areas, agricultural lands, and river beds must be classified as different featured zones, and the interaction among them reduced to a minimum by buffer zones.

The findings of this study indicate that even though the majority of the population residing in the area seems to agree that the environment must be protected and has a common environmental awareness, there has been no collaborative action toward this goal. Despite some successful management approaches being implemented at the local level, much remains to be done to effect ecologically sustainable development in coastal zone management, to improve policy development, and to implement and enhance international cooperation and national policies for Edremit Bay coastal zone management.

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