THE SCIENTIFIC AND TECHNICAL COUNCIL OF TURKEY

MARMARA RESEARCH CENTRE

**CHEMISTRY AND ENVIRONMENT INSTITUTE**

# NATIONAL ACTION PLAN FOR THE LAND BASED SOURCES FOR TURKEY

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# 1. OVERVIEW ON NATIONAL ACTION PLAN

In late 80's, a period of rapidly switching to the industrial economy broke out in Turkey. As highest priority was attached on production in this period, a great increase in environmental pollution has been experienced in parallel to the rapidly growing production rates and diversification. Concentration of the majority of newly established industrial facilities in Aegean and Mediterranean Regions has revealed crucial environmental problems as well as the urbanization problems suffered.

Intensive human activities, especially in enclosed or semi-enclosed seas, have considerable contribution to the formation of coastal and marine devastation as well as more severe devastation risks. Mediterranean is a semi-enclosed sea being under similar risks due to long-term residences, intensive population on its coasts and regularly growing touristic activities. Rapid urbanization, household and industrial wastes, agricultural activities, stockbreeding, touristic activities and motor vehicles are the most crucial environmental factors having decisive nature on Mediterranean.

In line with these facts, especially over the last twenty years, Mediterranean countries have been initiating and implementing several environmental programs via various regional and international organizations devoted to safeguarding Mediterranean. Likewise, UNEP has been coordination the "Mediterranean Action Plan (MAP)" and implementing scientific, socio-economic and legal programs devoted to protecting Mediterranean since 1975. In 1976, Mediterranean countries have established the first legal document on regional basis destined to protecting the Mediterranean (Barcelona convention). This document, to which Turkey is also a party, was put into effect in 1978. Later, while striving to develop and finalize the legal framework on one hand, the Mediterranean countries have commenced to establish programs for monitoring the marine pollution on the other hand.

The Protocol on Protecting Mediterranean from Land Based Pollutants (the LBS-protocol) has been put into effect in 1983 as an annex to the Barcelona Convention.

In an inter-government conference held in 1995 for the same purpose, "Global Program of Action (GPA)" has been adopted. This program is one of the most crucial steps taken in the protection of marine environment and is in the nature of a practical guide for national and regional authorities in fulfilling the targets and goals of sustainable development.

At this point, in conformity with the sense of this conference, modifications in both the Barcelona Convention itself and its Annex, the Land Based Pollutants Protocol, have been foreseen and the Land Based Pollutants Protocol that was updated as a conclusion of the studies implemented has been finalized. Later in 1996, new protocol, updated to cover the protection of Mediterranean from land based pollution sources and activities, has

been signed in 1996 in Syracuse. Turkey, one of the parties to the Barcelona Convention has adopted these modifications.

In addition to such national efforts devoted to protecting Mediterranean, countries encircling Black Sea have gathered to ensure centralized management and protection of live resources in the common sea. First step taken within the framework of establishing common strategies for harmonizing legal regulations and policies together with controlling pollution has taken as basis the "Regional Marine Conventions" established in parallel to the "Stockholm Conference" that was held with the agenda of "environment and development" in 1972. In this regard, representatives of the countries located along with the Black Sea coast have formulated the "Convention on Preventing Black Sea from Pollution". Said draft convention has been executed in Bucharest on April 1992 and approved in the beginning of 1994 by the legal legislators of six countries.

"Bucharest Convention" encompasses three special protocols in addition to the basic framework of the convention. These protocols embody the conduct of common action for the control of land based pollutants, waste dumping and any accident (such as petroleum spillage). A permanent Commission Secretariat was established in Istanbul for the goal of implementing the Bucharest Convention and its annexed protocols. Such commission has been named as "Istanbul Commission".

In 1993, the "Ministerial Declaration on Safeguarding the Black Sea Environment" aimed at addressing the targets, priorities and schedules regarding the implementation of environmental actions has been executed by the Ministers of Environment of six countries along the Black Sea coast in Odessa. This declaration has taken the "Agenda for the 21$^{st}$ Century" as basis that was established in parallel to the "Leaders of World Countries Summit" held in 1992 in Rio.

The significance of issues such as outlining the profile of Black Sea environment, developing common environmental policies, prioritising actions and investments, know-how transfer, monitoring the environmental status of hot spots and determining investments necessary for these spots by the Black Sea countries have been remarked as chief requirements in the course of time. For this purpose, the necessity to bring together scientists, engineers, economists, legal men and national and regional decision-making bodies on environment in the Black Sea countries has arisen for issues regarding Black Sea.

The Committee has designated the three fundamental objectives of Black Sea Environmental Plan (BEP) as follows:

Elevating the capacities of Black Sea countries in environmental management and assessment,

Supporting the implementation and development of new environmental laws and policies,

Encouraging new major environmental investments for Black Sea.

To ensure a rapid recovery in the damaged natural environment of Black Sea requires a swift preparation and commencement period. Therefore the need to elaborate a careful planning and especially to ensure a favourable coordination between the governments and local governments has arisen.

In June 1996, under the coordination of top-level experts and five PKB officials from 14 different countries, principally from 6 Black Sea countries, and with the participation of 100 Black Sea experts, the "Transboundary Diagnosis Analysis" (TDA) has been formulated. In TDA, which person or factor gives how much damage to the environment, which industrial activities give damage to environment to what extent, the deficient and awry environmental policies as well as the deficient points in researches conducted to date have been identified.

Our country has also liabilities within the framework of the Barcelona Convention established as the first legal document on regional basis by the Mediterranean countries in 1976 for the goal of protecting Mediterranean. Said document has been put into effect in 1978. Later, while striving to develop and finalize the legal framework on one hand, the Mediterranean countries have commenced to establish programs for monitoring the marine pollution on the other hand. In our country, studies in this regard have been being implemented under the coordination of the Ministry of Environment and Forest and with the participation of related organizations and agencies. Protocol on Protecting Mediterranean from Land Based Pollutants (LBS-protocol) has been put into effect in 1983 as an annex to the Barcelona Convention. In 1996, Protocol on Land Based Pollutants has been updated and finalized in Syracuse. Turkey, one of the parties to the Barcelona Convention, has accepted such modifications.

## 1.1 LAND BASED POLLUTANTS

Majority of pollutant substances giving rise to pollution in marine environments are conveyed via rainwater after getting dissolved in water during the periods of atmospheric conveyance and the rest are conveyed by streams that pass through the residential areas and agricultural lands and subsequently flow into sea.

It is possible to group pollutants according to their biological behaviours in aqueous environments as degradable, non-degradable and accumulating pollutants (Uslu and Türkman, 1987). Among these, degradable pollutants are the type of contaminants that can be biodegraded by aerobic or anaerobic bacteria. These are mostly organic substances. Non-biodegradable pollutants are composed of inorganic and some organic substances. Such kind of pollutants are type of contaminants that can be accumulated in living beings, conveyed from variety to variety and therefore have potential of halting the reproduction of some living beings, drastically impact the way of reproduction of living beings in water mass and give rise to the occurrence of aesthetic problems. Mainly under this group are petroleum and oils, some industrial wastes and toxic substances. Chief pollutants sources of marine environments are household-based wastewaters, industrial wastewater, oil and petroleum leakages occurring due to accidents in tanker and petroleum pipelines, acid rains, artificial or natural fertilizers and pesticides employed in

agricultural activities, thermal pollution stemming occurring due to use of sea water as chilling agent in thermal power plants and radioactive process residues occurring after power generation from nuclear power plants. Biologically accumulating pollutants deposit especially in varieties and conveyed in increasing rates from variety to variety via food chain. Under this group are heavy metals such as mercury, cadmium and lead as well as agricultural pesticides.

Production or use of another group of biologically-accumulating chemicals such as polychlorinated biphenyls (PCB) and dioxins are prohibited in Black Sea countries. Production and use of such chemicals in Bulgaria, Georgia, Romania, Russian Federation and Turkey have been prohibited as at 1988 and 1996 respectively (Commission for Protecting Black Sea from Pollution, 2002a)

Infectious organisms such as bacteria, virus etc generally stemming from sick animals and human excrement and urine that are conveyed to the marine environment via sewers or streams cause microbial pollution in seas. Indicators of such pollution are coliform bacteria (Kennish 1992).

Almost all elements exist in marine environment in various quantities. The reason underlying the continuous accumulation of pollutants in organisms is the fact that physicochemical characteristics of metals entering in the marine environment via industrial wastes are different from those in the nature. For instance mercury is generally expelled in the form of alkyl mercury chloride or phenyl mercury chloride after industrial processes. Mercury in such form can directly be intaken by marine organisms and remain in the bodies of such organisms, leading to accumulation.

Experimental studies show that metal concentrations in organisms vary from region to region. For instance concentration of heavy metals is relatively higher in coastal regions and semi-enclosed seals such as Black Sea when compared to open seas. As elements such as Hg, Cd, Pb, Cu, Ni, Zn, Cr and As impose toxic effect at higher concentrations and as their concentration may increase during their migration from one organism to the other, they are of particular interest and constitute the subject matter of plenty of researches (Uslu and Türkman 1987).

Detergents reach marine environment through either directly discharging household and industrial wastes to such environments or conveyance by streams. As they are in the nature of surfactant agents, they are concentrated in air and interfacial surface. Dissolved detergents decrease the superficial tension of water. Phosphate content in detergents acts an agent that increases phosphorus input in the marine environment upon the depletion of detergent and that therefore introduces eutrophic impact.

Phosphorus content in aqueous environment varies according to the population density in the region, methods of agricultural fertilization employed and frequency of fertilization, stockbreeding, vegetation, pedologic characteristics of soil, type of detergents used and methods of wastewater treatment and discharge.

Today, many fresh water sources on earth and enclosed sea are under the crucial risk of intensive phosphorus inflow from agricultural lands, residential areas and industrial agents such as detergent, toothpaste, pharmaceuticals etc. Necessary measures should promptly be taken in this regard.

Point nitrogen sources for surface waters are the outflow waters of urban wastewater treatment plants and their direct discharge through by-pass systems in some cases without treatment, and outflow waters of some of the industrial plants such as coking facilities, some chemical industrial facilities such as artificial fertilizer and nitrocellulose, intensive stockbreeding facilities, textile, food, milk and tanning industry facilities, breweries, heat transfer fluids, glass and explosives production plants and slaughterhouses (Kennish 1992).

On the other hand, non-point nitrogen sources are wastewaters discharged from agricultural lands and marine vehicles during maritime transportation. Nitrogen sources from agricultural activities consist of the excrements of live organisms, use of artificial or natural nitrogenous fertilizers, irrigation and decomposition of dead plants.

Some of the nitrogen in fresh water undergoes denitrification in the course of its travel until reaching the marine environment. Therefore, nitrogen load in fresh water drops until reaching the sea. But the same mechanism does not apply to phosphorus. Phosphorus that accumulates in the sediments of fresh water environment during the arid summer months, is completely dragged into the marine environment upon the rise of water level and appearance of rains.

Gases, aerosols and particle agents having nitrogen content that arises out of the incineration of fossil fuels and industrial and agricultural wastes contribute to the nitrogen load of the atmosphere. The impact of the atmospheric accumulation of nitrogen in the gulf and marine environments directly or through rains, and the nitrogen load introduced is higher when compared to fresh waters (Paerl 1988).

## 1.2. LAND BASED POLLUTANTS WITHIN THE SCOPE OF THE BARCELONA CONVENTION

So as to address within the project the sources of land based pollutants that give rise to pollution in Marmara Sea and the potential extent of such pollution, sectors specified in Annex 1 to the Barcelona Convention – LBP Protocol (1996) have been taken into account (Table 1.1).

**TABLE 1.1:** The priority sectors in "Protection of Mediterranean Sea from Land Based Pollution Sources Protocol (LBS Protocol, 1996)"

| **Sectors** | |
|---|---|
| Production of energy | Manufacture of other organic chemicals |
| Manufacture of fertilizers | Manufacture of other inorganic chemicals |
| Manufacture of formulation of biocides | Tourism |

| | |
|---|---|
| Manufacture of pharmaceuticals | Agriculture |
| Manufacture of refined petroleum products | Farming of animals |
| Manufacture of paper | Food packing |
| Manufacture of cement | Aquaculture |
| Training and dressing of leather | Treatment and storage of hazardous waste |
| Manufacture of metals | Treatment of urban wastewater |
| Mining and quarrying | Management of urban solid waste |
| Building and repairing of ships and boats | Treatment of sewage sludge |
| Port services | Waste management activities |
| Textile | Waste incineration and management of its residues |
| Manufacture ofelectronics products | Factories that cause physical changes to the environment |
| Recycling activities | Transport |

Sectors given in Table 1.1 can be classified into following subheadings by pollution sources:

Pollution stemming from industrial activities,
Pollution stemming from residential areas,
Pollution stemming from touristic activities,
Pollution stemming from marine transportation,
Pollution stemming from diffused sources,
Aquaculture,
Hazardous and Special Wastes,
Crude oils and petroleum-origin hydrocarbons,

## 1.3. OBJECTIVE

Pursuant to the Annex "Land Based Pollutants Protocol" to the Barcelona Convention that was updated with the latter in 1995, and further to the Annex "Protocol for the Control of Land Based Pollutants" to the Bucharest Convention, studies are in progress since 1997 under the coordination of the Turkish Ministry of Environment and Forest. The implementation of the project of "Elaboration of the National Action Plan for the Land Based Pollutants" has been entrusted to the TÜBİTAK-Marmara Research Center – Institute for Chemistry and Environment. The goal of the said project is to address the sources of land based pollutants giving rise to pollution in our country's coasts, the extent of such pollution and further the priorities on region and sector basis. Another objective of the project is elaborating a "National Action Plan" devoted to controlling and preventing such pollution. The National Action Plan will yield valuable benefits in the most effective utilization of the resources, directing the investments in the most rational way and preventing pollution.

Within the scope of this study, a national action plan with respect to the land based pollutants on a wide scale embodying all coasts of our country has been elaborated in the light of data derived in previous stages of the project.

## 1.4. LEGAL FRAMEWORK AND RELATED PARTIES

In Turkey, there is a rapid growth in energy, industry, transportation and tourism sectors and correspondingly a massive migration from rural areas to cities and coasts. In parallel to the imposition of higher pressure by all such developments on environment, the importance of environmental protection and combating with environmental pollution has augmented. As a consequence, legal and organizational structuring efforts in this area have gained acceleration. The 1982 Constitution stipulates that every citizen has the right to live in a healthy and balanced environment and further defines the mission of developing the environment, safeguarding environmental health and preventing pollution as a duty of both the government and citizens. The Environmental Law enacted in 1983 has established the framework of environmental management and environmental legislation and further adopted fundamental principles such as “polluter pays”.

Within the framework of the Environmental Law, some of the regulations, including but not limited with the following, have been formulated and put into effect:
- Regulations for Controlling Hazardous Wastes (2005)
- Revision of Regulations for Controlling Water Pollution (2004)
- Regulations for Controlling Industrial-based Air Pollution (2004)
- Regulations for Controlling Waste Oils (2004)
- Regulations for preserving water against agriculture-based nitrate pollution (2004)
- Regulations for Controlling Waste Batteries and Accumulators (2004)
- Regulations for the Removal of Wastes from Ships and Management of Wastes (2004)
- Regulations for Environmental Impact Assessment (2003)
- Regulations for Controlling Hazardous Chemical Agents and Products
- Regulations for Controlling Medical Wastes (1993)
- Regulations for Controlling Solid Wastes (1991)
- Regulations for Controlling Noise (1986)

The Organization of the Ministry of Environment and Forest is comprised of the Central and Provincial Organization and the Affiliated Agencies. Central organization consists of the chief service units, consultancy and inspection units as well as supplementary service units, and the provincial organization is comprised of “Provincial Directorates” and Directorates directly affiliated to the Central Organization. Among the activities of the Ministry of Environment and Forest are appropriate land utilization; safeguarding natural resources, vegetal and bestial varieties, preventing pollution; ensuring the protection, development and improvement of forests; circumscribing forests; taking every sort of measures to avoid erosion and raising public awareness. On the other hand among its duties are establishing environmental policieis and strategies; ensuring the coordination of environmental activities on national and international levels; regulating environmental permits; collecting data and holding training programs. All such activities are implemented in close collaboration with other line ministries, related organizations, local governments and non-governmental organizations.

So as to ensure efficient utilization of environmental resources, a new legal regulation is being drawn up devoted to utilization of collecting revenues through environmental funds for Municipal Administrations. This draft bill stipulates that revenues acquired out of environmental funds be assigned to the municipal budgets and such funds be solely employed for environmental expenditures. In the current situation, revenues acquired out of environmental funds are being assigned to municipal or governmental master budget.

State Planning Organization that formulates development plans constituting the basis of governmental policies with respect to the efficient utilization of resources and further to the economical and social matters has been incorporating the issue of environmental planning into development plans since the Third Five-year Development Plan (1973-1977).

The Sixth Five-year Development Plan has adopted the sustainable development concept and during the term of the Seventh Five-Year Development Plan, the National Environmental Action Plan (NEAP) has been formulated under the coordination of State Planning Institute along with the technical assistance of the Ministry of Environment and Forest and broad participation of the related agencies and organizations. To this end, (i) taking particular actions to develop an efficient environmental management system, (ii) importance of the need to environmental knowledge and environmental consciousness, (iii) new investment proposals in different thematic areas, (iv) adopting of EU environmental standards and regulations have been emphasized.

Issues regarding Environmental Management are handled not only by the Ministry of Environment and Forest but also by other Line Ministries, agencies and organizations. Activities of such agencies can entirely or partly relate to the environmental protection and prevention of pollution.

General Directorate of State Water Works (SWW) is responsible for the management and development of water resources; the Ministry of Health for the environmental health services; Ministry of Health for National Parks and other protected areas (Excluding Thirteen Private Environmentally Protected Regions managed by the Private Environmental Protection Agency); Ministry of Culture for some of the natural environmentally protected areas; Ministry of Agriculture and Rural Affairs for the protection of natural resources including the control of water pollution and fishing; Ministry of Energy and Natural Resources for the sustainable production and consumption of energy and natural resources; and Ministry of Industry and Trade for the formulation of national industrial policies.

General Directorate of Rural Services are carrying out works on water supply, irrigation and water treatment in rural areas; and Municipalities are performing works relating to the building of environmental infrastructure, potable water and sewer services, rubbish collection and disposal as well as land utilization plans in this regard.

The General Directorate of the Banks Association of Turkey aid municipalities in drawing up projects and implementing projects regarding urban infrastructure, and is also

engaged in mapping, formulation of reconstruction plan, surveys on potable and usable water, sewer, solid waste and other various geological and geotechnical surveys as well as the construction of municipal service buildings and various facilities.

Details of the regulations is included in the Annex I

## 1.5. OTHER RELEVANT NATIONAL ACTION PLANS

### 1.5.1. National Environmental Action Plan (NEAP)

The first comprehensive National Environmental Action Plan (NEAP) study in Turkey was initiated in 1995 and issued in 1998. Technical assistance has been rendered by the Ministry of Environment and Forest for the National Environmental Action Plan (NEAP) financed by the World Bank and coordinated by the State Planning Institute. NEAP studies have been implemented in the form of group works, pursuant to the United Nations' principle of bureaucratic partnership established between private sector and non-governmental organizations, with the participation of representatives and experts from such sectors.

To this end, emphasis has been given on

conduct of particular actions to develop an effective environmental management system,
need to the environmental knowledge and importance of environmental consciousness,
proposals for new investments in different thematic areas,
adoption of EU environmental standards and regulations

The flow chart for the process of NEAP's formulation has been provided in Figure 1.1 below.

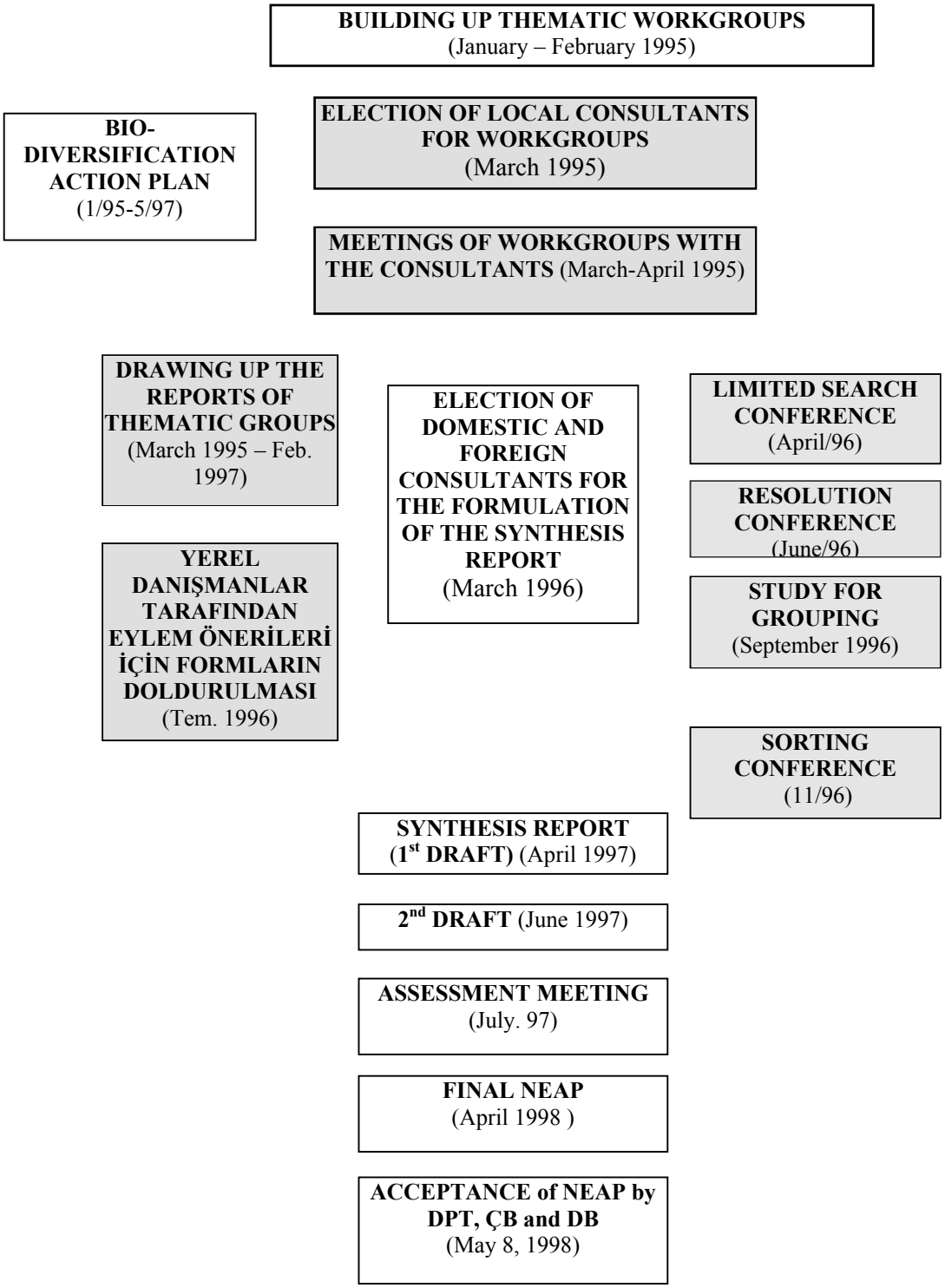


**Figure 1.1.** Process Flowchart for the formulation of NEAP

### 1.5.2. Turkish National Program for Undertaking the Acquis Communautaire

Turkish National Program is a document specifying how to implement the priorities drawn up by the member countries to the European Union, submitted to the European

Commission and then included in the Accession Partnership Document, as well as which kind of preparations are to be made for integration into the European Union.

In the National Program, regulations to be effected in the legislation of member countries to ensure harmonization with the Acquis Communautaire, human and financial resources necessary for such harmonization, the member countries' own priorities in addition to those laid down in the Accession Partnership Document, administrative structure that should be developed to undertake the Acquis Communautaire and the schedule for short and long-term priorities for all such matters are inorganizationald.

Turkish National Program for undertaking the Acquis Communautaire was approved the Cabinet on March 19, 2001 and published in the Official Journal conc. no 24352 of March 24, 2001. In parallel to the New Accession Document approved by the EU Council on April 14, 203, the National Program has been revised, approved by the Cabinet on June 23, 2003 and then published in the Official Journal conc. no 25178 of July 24, 2003.

Membership to the European Union shall be realized upon strictly fulfilling all stipulated criteria in this regard and further in accordance with fundamental principles laid down in the Constitution of the Republic of Turkey. Membership to the European Union both matches with our national ideals and objectives and also offers a tool for making a conscious preference as well as for entering into new horizons destined to modernization. For this purpose, harmonizing the training and education of all citizens with the EU standards in both quantitative and qualititative terms will ease the achievement of the targets specified in the National Program.

Turkey shall be a party to all essential international conventions, primarily in the field of human rights and democracy, so as to ensure better harmonization with the global norms in the nature of Acquis Communautaire together with the practices of the EU Countries, and shall take all necessary measures to ensure their effective implementation. As a matter of fact Turkey is already a party to most of such conventions.

In the national program, environmental issues are handled under the Heading no 7.23. Under this section; current situation in Turkey, in the Acquis Communautaire, differences between the practices of Turkey and Acquis Communautaire and the proposed duration of regulations regarding the environmental impact assessment, access to environmental information, European Environmental Agency, air quality, waste management, water quality, protection of the nature, chemical agents and genetically transformed organisms, noise arising out of vehicles and machines, nuclear security and protection against radiation and climatic changes are inorganizationald.

### 1.5.3. Preliminary National Development Plan (2004-2006)

In the Helsinki summit of the European Union (EU) in 1999, it was resolved to accept Turkey as a candidate nation to the EU membership and offer it a pre-accession strategy to accelerate and foster its reforms in line with the current European Strategy. After the said resolution, the EU Council has approved the Turkey – EU Accession Partnership

Document in 2001 and the Turkish Government has accepted the National Program (NP) with respect to undertaking the Acquis Communautaire.
The European Commission has asked in October 2001 Turkey, like all other candidate countries, to formulate a Preliminary National Development Plan (PNDP) covering the 2004-2006 period aimed at establishing a strategic framework for programming pre-accession financial aids devoted to ensuring Turkey's Economical and Social Harmonization with EU. Then in the Progress Reports for 2002 and 2003, this matter has been emphasized. In these documents, it is further stipulated to transform PNDP into a further qualified plan for the Target 1 areas in the EU member countries. Furthermore it has further been laid down that PNDP should be harmonized with the planning and programming documents as employed within EU and further be updated in parallel to the progress in Turkey's strategy regarding its Economical and Social Harmonization with EU.

Such initial PNDP of Turkey has been formulated as a basis to the utilization of pre-accession financial aids devoted to the Economical and Social Harmonization to be provided by EU during the 2004-2006 period within the framework of Turkey-EU relationships. Pre-accession financial aid for Turkey is governed by the Council Regulations no 2500/2001/EC of December 17, 2001 and further by the Council Regulations no 390/2001/EC of February 26, 2001.

Effective utilization of pre-accession financial aids during the PNDP period and initiating the building up of the infrastructure regarding the utilization of structural funds after membership are targeted to this end.

In this regard, considering the matters provided in the Progress Reports and the Accession Partnership Document for the year 2003, it was studied in PNDP to formulate a nation-wide Economical and Social Harmonization Policy and build up a strategic framework for ensuring convergence with EU.

Having examined Turkey's population and geographical size and the volume of problems in the field of Economical and Social Harmonization as well as the capacity to develop projects and programs to bring remedies therefor, financial aids to be provided by EU during the 2004-2006 period in the field of Economical and Social Aids are seen to be very limited. On the other hand, dates to initiate negotiations for full membership and accession have not been fixed yet. In parallel to the progress in these areas, it will be possible to clarify the process for realizing the Economical and Social Harmonization, in other words to plan this period more reliably.
The need to convergence with EU in the field of Economical and Social Harmonization and the general framework of Turkey's development strategy as a privileged policy for EU is provided under the following main headings:

Long-term Strategy,

Five fundamental objectives and priorities of the medium-term strategy,

PNDP Strategy's development axes around the Economical and Social Harmonization with EU.

Three out of the four development axes built up for the medium-term objectives and priorities of Turkey bear sectoral nature. Priorities within the scope of development axes are provided below:

**i) Development Axis 1:** Raising the competitive power of enterprises
- Increasing the competitive power of Small and Medium-Scale Enterprises,
- Augmenting the competitive power of agricultural and industrial enterprises through boosting their technological and quality level, observance of environmental EU norms

**ii) Development Axis 2:** Developing human resources and raising employment
- Active employment policies,
- Reinforcing the education system

**iii) Development Axis 3:** Improving the infrastructure services and protecting the environment
- Raising the highway traffic safety
- Conducting a technical survey to ensure the integrity of Trans-Europe and Europe-Middle East transportation networks together with national networks and thereby addressing major projects to be financed by the EU structural funds in the subsequent period,
- Enhancing port capacities, building primary ports and ensuring marine traffic safety to assure efficient service within the EU transportation network,
- Raising quality and efficiency in local transportation services,
- Assigning the maintenance and repair services for vehicles within the framework of restructuring the railway sector to the private sector,
- Protecting water resources, raising the efficiency of potable water and sewer systems as well as the solid waste management.

**iv) Development Axis 4:** Raising the economical power of the regions, alleviating inter-regional differences in terms of development and accelerating the rural development,
- Fostering and reinforcing Small and Medium-Scale Enterprises,
- Fostering small-scale infrastructure constructions,
- Fostering local initiatives,
- Building up of and reinforcing organizational capacities

Among the development axes detailed above, the 3rd axis that is incorporating the environmental issue is crucial. In the Development Axis for Improving Infrastructure Services and Protecting the Environment, rather the feasibility studies and projects devoted to raising the highway and marine traffic safety have been focused due to the fact that Turkey is still unable to utilize infrastructural funds. Infrastructural projects that require great financing have been handled in a way where Turkey's plans are introduced only for 2006 and later, however they have not been included into the 2004-2006 financing schemes.

It is foreseen to allocate a funding of 116 million Euro for the projects to be financed in parallel to this Development Axis. 86 Million Euro out of such financing will be covered out of EU resources. The year 2004 will be focused on the formulation of technical assistance and feasibility studies for the projects included in the development axis and

further on the mobilizing institutions in charge of the project. Therefore, majority of the funds will be utilized in 2005 and 2006.

Major problematic fields in environmental management have been addressed as insufficient institutionalization (inadequate technical personnel, uncertainties in the allotment of tasks and duties, lack of information & communication systems), and infrastructural inadequacies regarding sanitary and sufficient potable water, sewer and solid waste services.

As a result of the concentration of business activities in metropolitan cities, the geographical distribution of the Turkish population has somewhat gone into an imbalance. Migration from rural sites to metropolitan cities has increased, leading to increased demand to already limited transportation services. Disorder urbanization has made it difficult to raise the capacities of arteries linking the city centre to the residential areas or industrial centers around, and traffic jam in such arteries has reached unacceptable levels. As there is no available comprehensive study scrutinizing the externalities stemming from traffic jam in metropolitan cities of Turkey (value of the time lost, wasted fuel in idle motion, adverse impacts of exhaust emissions on the environment and people etc), the time and resource loss cannot fully be recognized. In addition to the demand to local transportation, demand to passenger and cargo transportation between cities where especially the business activities are concentrated can merely be fulfilled via highways as the service quality of railways is highly ignored in economical terms.

Key objective in the environment sector is to alleviate the pressure of human settlements on environment thanks to economical and social development as well as to preserve natural resources, appropriately dispose of household and industrial wastewaters and raise efficiency in environmental management with a view to building up healthy living conditions.

Need to the urban infrastructure services especially in connection with the preservation of water resources and raising the efficiency of potable water, sewer services and solid waste management is swiftly growing as a result of rapid urbanization. In municipalities, planning works required for the construction of infrastructure facilities such as potable water, sewer and treatment systems as well as solid waste disposal systems are ignored, and qualified personnel cannot be employed in operating such activities. With a view to supplying nation-wide health and sufficient potable water and disposing of solid wastes in an environment-friendly fashion, administration should be established in local governments capable of managing the demand, allocating resources for necessary investments, building up functional systems in technical and economical terms and ensuring the conformance of the services supplied to the designated national standards. Considering the scale of nation-wide investments to be made in potable water and sewer as well as solid waste treatment plants required, the resources to be allocated for these investments should efficiently be employed. Taking into consideration the fact that initiating costly investments in potable water, sewer and solid waste treatment systems without having improved the organizational infrastructure does not make any sense and

further considering the limited availability of resources, it will be appropriate to prioritize projects devoted to raising the level of institutionalization and efficiency in the environment sector. For this purpose, both nation-wide and local-scale planning and project development studies are required.

In the formation of solid wastes, first reducing the amount of wastes produced and providing households, that are in the status of primary waste-producers, with sufficient information to on-site classify wastes and thereby rendering them ready for collection; controlled on-site classification of recyclable matters such as glass, metal, plastic and paper in urban dumps will both bring a valuable input into the economy and also reduce the amount of solid wastes to be stored.

The organizational capacities of administrations that will function within the period from the stage of planning to the actual realization and running of the investment should be raised to enable them perform such activities effectively and efficiently. On the other hand, central administrations in addition to the local bodies also undertake crucial tasks in drafting policies for water management, establishing standards and other important investment and coordination issues. In connection with these tasks, the organizational capacities of central organizations should also be raised. Therefore, the following measures shall be taken in this regard:

The first measure to be taken in this matter is the conduct of required planning works with a view to protecting water resources and supplying sewer services more effectively, improving the monitoring infrastructure and contributing to reinforcing the organizational capacities of central and local administrations taking part in the supply of such services.

The following efforts can be counted within the scope of the secondary measure to be taken: on-site classification of wastes and thereby reducing their amount and rendering them ready for collection with a view to supplying solid waste management services more effectively, raising consciousness of households that are in the status of primary waste-producers and fostering the process of reinforcing organizational capacities to this end.

### 1.5.4. National Strategic Action Plan

Each country located around Black Sea coasts is formulating its own National Black Sea Strategic Action Plan that outlines the exhaustive plans for implementing the Strategic Action Plan on national-level.

Strategic Action Plan for the Rehabilitation and Protection of Black Sea, signed by the ministers of environment of the countries located around Black Sea coasts, serves as a basis to the National Black Sea Strategic Action Plans (NBSAP).

Current status of the National Black Sea Strategic Action Plans is being monitored by the Black Sea Commission.

To this end, NBSAP – Report of Technical Recommendations (GEF-BSEP, 1998b) with the assistance of the GEF-Black Sea Environmental Program has been formulated in 1998 in Turkey. Studies in this regard are still in progress.

The “Integrated Management Of Coastal Zones” Concept And Practices In Our Country is included in Annex II.

# 2. ESTABLISHING THE OBJECTIVES AND TARGETS OF THE NATIONAL ACTION PLAN

Fundamental targets of Turkey's formulating the National Action Plan (NAP) regarding the Land Based Pollutants are as follows:

To safeguard the human health

To prevent devastation in marine environment and coasts

To restore areas suffering devastation

To maintain/develop the productive capacity and bio-diversification of the marine environment

In the formulation of NAP regarding the land based pollutants, the methodologies established by Global Plan of Action (GPA) that coordinates the worldwide regional marine programs as well as the methodologies established by Mediterranean Action Plan (MAP) implemented under the umbrella of such regional programs will be taken as basis. Even though Black Sea is not discussed within the scope of the Mediterranean Action Plan, it will be incorporated into the same methodology on the strength of developments addressing that similar studies will be conducted within the scope of works implemented by the Black Sea Secretariat. The GPA methodology and MAP methodologies described below are suggested as the methodologies to be followed in the formulation of NAP.

## 2.1 METHODOLOGY OF THE GLOBAL ACTION PROGRAM

Primary causes underlying the activities of GPA for the land based pollutants:

Protecting the marine environment and

Maintaining/developing the productive capacity and bio-diversification of the marine environment

GPA has established a methodology comprised of six phases for the national and regional action plans to be formulated for protecting the marine environment against land based activities:

Identifying and assessing the problems

Establishing the high-priority actions

Establishing the targets and management plan objectives

Identifying, assessing and electing the strategies and actions

Identifying the criteria necessary for assessing the efficiency of actions

Developing program-supporting components

**Identifying and assessing the problems**

In this section, the current situation and significance of impacts exerted by land based activity resources and discussed. For this purpose, assessments will be made on all coasts of our country within the scope of sectors addressed in MAP-SAP.

While identifying and assessing the land based activities, GPA specifies that impacts of such activities on fields listed below should be taken into consideration:

Food safety and prevention of poverty

Public health

Safeguarding the ecosystem embodying the bio-diversification as well as the health of provincial coastal and marine resources

Taking into account the cultural merits, developing the economical and social benefits

**Establishing the high-priority actions**

In establishing the priorities in accordance with the approach suggested by GPA, two primary principles have been adopted. The first principle is the assessment of current and/or potential impacts in terms of the risks they bring to the human health and/or environment. On the other hand, the second principle is the assessment of the adequacy of current control measures. In this regard, any need to improvement, if found necessary, in issues such as legal regulations, guidelines, collaborations and public participation should be established.

Within the scope of said principles, land based actions have been classified as high, medium and low-priority actions.

In establishing the national priorities, high-priority pollutants and issues included on regional basis within the scope of SAP have been taken into consideration.

**Establishing the targets and management plan's objectives**

After establishing the national priorities, objectives of the management plan should be defined for each domain. For this purpose both resources and receiving environments should be taken into consideration.

**Identifying, assessing and electing the strategies and actions**

NAP has been prepared in accordance with two fundamental strategies:

Preventing pollution and

Management of integrated coastal areas and basins.

In this regard, actions implemented or stipulated to be implemented in priority order have been defined. While establishing the actions, targets specified in SAP particularly for reducing the pollutant loads have been taken into consideration.

In formulation of NAP, most benefit yielded by adopting an integrated management and planning process is the development of initiatives supporting new economic instruments and fruitful actions for appropriate cases.

**Identification of criteria necessary for assessing the efficiency of actions**

Taking into account that priorities may change in the course of time, strategies and actions should periodically be reviewed and updated. This is only possible by defining the review criteria. Measurement of actions should be practical and cost-effective.

## 2.2. NAP METHODOLOGY AND STUDIES FOR FORMULATION OF NAP IN TURKEY

The Strategic Action Plan (SAP) addresses the land based pollution problems in Mediterranean and specifies the targets required to be attained to solve such problems.

For this purpose SAP addresses the measures to be taken on national and regional level for controlling, alleviating and eliminating pollution and establishes a general program and time frame for implementing such measures. While formulating NAP, targets and activities established by SAP shall be taken into consideration. According to SAP, NAP should have been put into effect in 2005, and SAP is expected to be implemented in long term, namely until 2025.

National Diagnostic Analysis that was prepared in 2002 (NDA) has been defined by SAP as one of the two fundamental data necessary for formulating NAP. In NAP, national conditions and issues including the environmental problems, the polluted items, physical changes in and demolition of natural living areas, sources of deterioration, significance of impacts and concern areas have been addressed and assessments have been made.

The most basic reason lying behind the formulation of NAP is the formulation of the process of reducing the SAP target pollutant loads. In SAP, the first phase of formulating NAP has been defined as the preparation of National Diagnostic Analysis (NDA) and Baseline Budget (Reference Budget) and this phase has been completed by TÜBITAK MAM in 2003. Under the coordination of the Ministry of Environment and Forest, TÜBİTAK MAM has designated the scope of NDA and BB as coastal basins for the integrated management of the coastal and river basins. The following issues have generally been discussed in NDA and BB:

- The problems and their intensity
- Pollutants
- Demolition of natural environment and physical changes
- Sources of demolitions
- High-priority regions

With the preparation of NDA, Turkey completed the stage of filling in the event/impact matrix.

The third stage is establishing the high-priority actions in NAP for each basin for the year 2010 according to the updated matrix.

The fourth stage is, taking into account the priorities on basin basis, to formulate sectoral plans covering the issues such as regional plans, general measures, environmental quality criteria, emission limits and capacity development.

In our country it was given a start to formulate sectoral programs in 2004. In this regard, sectoral programs for the sectoral groups listed below by the experts within SAP will be formulated:

sewer management
urban solid waste
air pollution due to mobile sources
pollution due to Hg, Cd and Pb
organohalogens: halogen aliphatic hydrocarbons, chlorinated phenol compounds, organohalogen pesticides

organic compound wastewater and solid wastes stemming from industrial plants

In the fifth stage, NAP will be formulated on the basis of the NDA, BB and sectoral programs and further submitted to the official approval.

The sixth stage is the formulation of the list of national prioritized actions for 2010. On this matter, there are some already defined criteria in SAP. The most important of those is the one for industrial activities. Whether industrial organizations have employed the best available technologies or not to reduce the pollutant loads stemming from industrial activities by 50% as at 2010 has been established as a criterion. Accordingly, companies conforming to the national or international emission/discharge standards should only be monitored, and those failing to conform should take necessary measures to ensure conformance to the standards.

## 2.3. FUNDAMENTAL OBJECTIVES OF THE NATIONAL ACTION PLAN FOR LAND BASED POLLUTANTS

The fundamental objectives of the National Action Plan are the formulation of principles, approaches, measures, high-priority actions and last realization dates for the implementation of SAP on national level, formulation of the result investment portfolio, identification of high-priority actions for boundaries and for boundary-exceeding issues/actions, identification of NGOs (Non-governmental organizations) taking part in the process together with their bodies concerned, and identification of different monitoring and reporting systems.

While formulating the NAPs, the integrated environmental management approaches have been adopted, the Integrated Coastal Areas and River Basins Management (ICARM) methodology has been employed, and Best Available Technologies (BAT) and Best Environmental Practices (BEP) have been taken as basis within the framework of pollution prevention plans.
After the formulation of NAP, it will be submitted to official approval. Tracking, assessing and reporting the progress of the acceptance period will be integrated into NAP as a part of the NAP procedure.

SAP targets have been provided in Table 2.1 below under two categories namely Urban-based and Industrial-based pollution.

For the time frame of the targets, when the current situation of Turkey and the targets of National Action Plan are considered, changing the timeframe for implementation from 2010 to 2015 will be more realistic.

**Table 2.1** NAP Targets

| **Issue** | **Targets** | |
|---|---|---|
| | **2010*** | **2025** |
| **URBAN ENVİRONMENT** | | |

| | | |
|---|---|---|
| **1.1 Municipal Sewage** | dispose sewage from cities >100000 in conformity with LBS | Dispose all sewage in conformity with LBS |
| **1.2 Urban solid waste** | solid waste management system in cities >100000 | solid waste management for all urban agglomerations |
| **1.3 Air pollution** | cities >100000 ambient air quality conform to standarts | cities ambient air quality conform to standarts |
| **INDUSTRIAL POLLUTION** | | |
| **2. Industrial pollution** | % 50 reduction of industrial emmisons and discharges | Industrial point sources discharge and emmisions conformity with LBS and standards |
| **2.1 TPB** | | |
| - Twelwe priority POPs | % 50 reduction of inputs | Collection and disposal of all PCB waste and 9 prior pesticides in a safe and environmentally sound manner |
| - Other POPs | % 25 reduction of inputs of PAHs | phase out to the fullest possible extent inputs of PAHs |
| - Heavy metals | %50 reduction of discharges, emissions and lossed of heavy metals (mercury, cadmium and lead) | Phase out to the fullest possible extent discharges and emmisions and losses of heavy metals |
| - Organometallic compounds | %50 reduction of discharges, emissions and lossed of organomercury compounds | Phase out to the fullest possible extent discharges and emmisions and losses of organometallic compounds |

**Table 2.1** NAP Targets (continued)

| Issue | Targets | |
|---|---|---|
| | **2010** | **2025** |
| **2.2. Other heavy metals** | | |
| -Zinc, copper, chrome | reduction of discharges of zinc, copper and chrome | Phase out the discharges of zinc, copper and chrome |
| **2.3. Organohalogen compounds:**<br>-Halogenated aliphatic hydrocarbons<br>-Halogeneted aromatic hydrocarbons<br>-Chlorinated phenolic compunds<br>-Organohalogenated pesticides | reduction of discharges of organohalogen compounds | Phase out the discharges of organohalogen compounds |
| **2.4 Radioactive substances** | | Eliminate to the possible fullest possible extent inputs of radioactive substances |
| **2.5 Nutrients and suspended solids** | | |
| -Industrial wastewater | % 50 reduction of BOD, nutrients nad suspended solids from ind. installations | Dispose all wastewater from industrial installations which are sources of BOD, nutrients and suspended solids, in conformity with the provisions of the LBS protocol |
| -Agriculture | | Reduction of nutrient inputs, from agriculture and aquaculture practices into areas whre these inputs are likely to cause pollution |
| **2.6 Hazardous wastes** | To reduce as far as possible by %20 the generation of hazardous waste from industrial installations<br>To dispose %50 of the hazardous waste generated, in a safe and environmentally sound manner and in conformity with the provisons of the LBS protocol and other internationally agreed provisons | Dispose all hazardous wastes in a safe and environmentally sound manner and in conformity with the provisions of the LBS protocol and other international agreed provisions. |
| **-**Obsolote chemicals | To collect and dispose all obsolote chemicals in a safe and environmentally sound manner | |
| -Used lubricating oil | To collect and dispose %50 of used lubricating oil in a safe and environmentally sound manner | |
| -Batteries | To reduce by %20 the generation of used batteries,<br>To dispose %50 of used batteries in a safe and environmentally sound manner | To dispose all used batteries in a safe and environmentally sound manner |

***** When the current situation of Turkey and the targets of National Action Plan are considered, changing the timeframe for implementation from 2010 to 2015 will be more realistic.

# 3. METHOD OF FORMULATING THE NATIONAL ACTION PLAN

So as to establish the background for the formulation of the National Action Plan, the following projects have been prepared by the TÜBİTAK Marmara Research Center under the coordination of the Ministry of Environment and Forest since 2001.

Project of Formulating the National Action Plan for Land Based Pollutants, Phase I: Report of Conclusions for the Mediterranean Region, 2001

Project of Formulating the National Action Plan for Land Based Pollutants, Phase II: Report of Conclusions for the Aegean Region, 2002

Project of Formulating the National Action Plan for Land Based Pollutants, Phase III: Report of Conclusions for the Black Sea Region, 2001

National Diagnostic Analysis, 2003

Baseline Budget, 2003

Baseline Budget Revised, 2005

within the scope of formulating the National Action Plan, the data have been taken from the revised Baseline Budget and National Diagnostic analysis which were produced from national projects described above..

In the course of formulating the National Action Plan, the training documents elaborated by UNEO/MAP for the training on Formulating the National Action Plan (UNEP(DEC)/MED WG.212/3, UNEP(DEC)/MED/GEF WG. 245/3-7) (UNEP/MAP 2002), Regional Plans and guidelines elaborated by UNEP on the Implementation of SAP for Pollution due to Land Based Pollutants (UNEP/MAP Guidelines, 2004) have been taken as basis.

## 3.1 METHOD OF ADDRESSING THE HIGH-PRIORITY ENVIRONMENTAL PROBLEMS

The high-priority environmental problems of basins have been detailed under this section. High-priority environmental problems of basins and the priority sequence of such problems have been established in consideration of the results of prioritization matrix according the pollutants on basin-basis as well as the distribution of the pollution loads by basins and sources.

## 3.2 METHOD OF ESTABLISHING HIGH-PRIORITY ACTION LIST ACCORDING TO THE BASINS

### 3.2.1 Management of Household Wastes

Environmental priorities specified in NAP have been established in accordance with, criteria such as investment costs and investment portfolios, whether a sewer network and a wastewater treatment plant is available in the county, county's population, and whether sensitive regions or hot spots exist or not.

Accordingly, in accordance with the targets addressed in SAP;

**Wastewater management for residential areas with population over 100.000**

as the minimum action for residential areas with population over 100.000;

- completion of the sewer network and
- removal of organic matters

have been prescribed and biological treatment has been chosen.

**Wastewater management for sensitive regions and hot spots**

So as to control the environmental problems in sensitive regions, it is necessary to remove the nitrogen (N) and phosphorus (P) parameters as well as the elimination of organic matters from wastewaters, as laid down in the water framework directives (Orhon D., NEAP Wastewater Management, 1998)

For treatment requirements of the sensitive regions and hot spots, advanced treatment has been stipulated unlike other regions. Accordingly, as the minimum action for sensitive areas and hot spots;

- completion of the sewer system and
- elimination of organic matters, nitrogen and phosphorus

have been stipulated, biological treatment has been elected for the elimination of organic matters and nitrogen, whereas chemical sedimentation has been chosen for the removal of phosphorus.

**Wastewater management for wastewater pollution stemming from tourism**

Pollution stemming from tourism has been handled in a similar way with household wastewater pollution due to residence. The need to promote significant levels of wastewater due to the close proximity of summer houses and accommodation facilities to the coast has been taken into account and it was agreed to stipulate that a treatment plant separate from the municipal plant should be built. The alternative of ensuring the treatment of wastewaters from summer houses and accommodation facilities that can be connected to the municipal sewer network through centralized system has been ignored.
In some of touristic areas, even though the population in normal period is less than 100.000 inhabitants, more efforts should be spent since the population fluctuations is very high. Competent authorities should consider the modular treatment systems, which could be worked, in intense seasons for touristic places as priority technologies.

### 3.2.2 Industrial Wastewater Management

Industrial activities threaten coastal systems in plenty of different ways. Noteworthy threats among those are industrial wastewaters discharged to the sewer system, uncontrolled dump areas, rivers or directly to sea; emission gasses stemming from processing or combustion-related activities; solid dangerous wastes and treatment sludge. Industrial wastewaters including grease, heavy metal, detergent, solvent, organic chemicals and hot chilling waters are the most crucial pollution carriers leading to the conveyance of said pollutants to the enclosed or semi-enclosed marine environments.

In line with the targets addressed in SAP, enterprises failing to meet the national discharge standards have been considered at the stage of formulating the list of high-priority actions.

As there are plenty of enterprises located along with the Mediterranean and Aegean coasts, it has not been possible to establish the action plan on enterprise basis.

Considering the environmental priority of basins in terms of pollutants as well as the state of risk, predominant pollutant sector groups in the basin have been established. Every sort of pollutant source in RCWP (Regulation for Controlling Water Pollution) has been subjected to approval and industries have been categorized in sixteen groups in terms of discharge to the receiving environment. For high-priority sectors determined, construction of wastewater treatment plants has been stipulated for industries lacking wastewater treatment plants or for those failing to meet the RCWP discharge standard whereas improvement of current wastewater treatment plants has been stipulated for companies failing to provide the sufficient output as an action plan.

### 3.2.3 Persistent organic pollutants

Usage of PCB's as raw material has been forbidden since 1st January 1996. The regulation concerning on that is the Hazardous Chemicals Regulation that is promulgated in 11th July 1993 and amended in 20th April 2001. Exporting of PCB's are also forbidden at the same date by the Communiqué on the Standardization of Trade about Controlled Materials and Wastes for the Protection of Environment. But still PCB's are used within the country, because of inadequate inventory information about forbiddance of PCB containing mixtures.

Production and usage of accumulated chemicals such as Polychlorinated biphenyls (PCBs) and dioxins are prohibited in Bulgaria, Georgia, Romania, Russian Federation And Turkey since 1988, and 1996 respectively. (The Commission on the Protection of the Black Sea against Pollution)

Stockholm Convention regarding the "Persistent Organic Pollutants" implemented within the framework of the United Nations Environmental Program (UNEP) and opened for signature on May 22, 2001, has been signed by the Ministry of Environment and Forest on behalf of our country. For the purpose of formulating the national implementation plan with respect to 12 persistent organic pollutant chemicals by the Ministry of Environment and Forest that constitute the "National Focus" of the Convention, studies for utilizing the GEF resources and realizing the project for "Addressing High-Priority Actions within the framework of Implementing the Stockholm Convention about the Persistent Organic Pollutants" have been initiated.

In this regard, "National Implementation Plan for Turkey on Persistent Organic Pollutants" is being formulated by a consortium, in which the TÜBİTAK MRC Chemical and Environmental Institute is also involved, under the coordination of the Ministry of Environment and Forest. The project will be completed in 2005. Within the scope of this project, historical formation of POPs, POPs' production and distribution in Turkey and the prospective level of production and distribution of POPs as at 2025 will be specified in the implementation plan. In the national implementation plan, also the high-priority actions of Turkey with respect to the POPs issue will be listed and submitted first to the Ministry of Environment and Forest and then to the Prime Ministry for approval. The

project's stage of formulating national inventory has already been completed and the "Coordination Committee for the POPs National Implementation Plan" has been constituted with the participation of experts from different organizations. In line with the meetings to be held and decisions to be taken, the "National Implementation Plan for Turkey on Persistent Organic Pollutants" will be established.

### 3.2.4 Reducing pollution from diffused sources

The "Regulations for Protecting Waters against Nitrate Pollution stemming from Agricultural Activities" no 2872 devoted to addressing, reducing and preventing the pollution caused in water by agriculture-based nitrate in line with the provisions of the Environmental Law no 2872 was published in the Official Journal no 25377 on February 1,2004 and thereby put into effect. The Regulations lay down the technical and administrative procedures with respect to addressing and controlling the nitrogen and nitrogen compounds causing pollution in underground and surface waters and lands as well as prevention of pollution.

**Reducing pollution from agricultural areas**

In addition to the conscious utilization of agricultural inputs, our lands that are under the risk of erosion (73.9%) should be handled in accordance with the Classification of Land Utilization Capabilities and erosion-preventive measures should simultaneously be implemented. Such a listing of actions devoted to reducing pollution stemming from agricultural areas can be elaborated:

Prevention of water erosion; in this regard, sowing of sloping lands should be prohibited or otherwise if allowed for sowing such lands should be reconsidered as forest or pasture areas. Meanwhile, it is also necessary to effect legal arrangements that will not injure the enterprise owner. Measures encouraging farmers to apply appropriate plowing methods that contribute to minimizing the risk of erosion should be taken. It should be prohibited to use more sloping lands, except for those that will provide the optimum benefit for various plant types, for agricultural purposes.

Prevention of wind erosion; in this regard, excessive grazing of pastures should be avoided, measures such as fences, screens to reduce the speed of wind in areas under the risk of high wind erosion, should be taken.

Avoiding the misuse of lands; areas to be employed for residence, industry or highway should carefully be chosen (data for the year 1995 suggest that 454.748 ha of agricultural areas that constitute the 1,6% of the overall land have been used for non-agricultural purposes due to mistaken applications, Cangir, 1995).

In no way allowing pasture areas for any other uses or practices,

Holding trainings for farmers and thereby ensuring the conscious utilization of fertilizers and industrial pesticides.

**Reducing pollution from stockbreeding**

Stockbreeding activities in Turkey gain more significance along with the increase in population. The measures that should be taken to reduce bestial wastes stemming from agricultural enterprises are can be listed as:

composting
biogas generation
use of fertilizers

studying on an sustainable treatment model (natural treatment) for washing waters used in cleaning operations and other liquid wastes

### 3.2.5 Urban Solid Waste Management

As the method of final disposal in Turkey, technologies that are cleaner and also more suitable with the conditions of Turkey such as recycling of wastes or regularly storing of non-recyclable wastes and sterilization of medical wastes are found appropriate (Circular no 1999/8 of 22.3.1999 issued by the Ministry of Environment on the Utilization of Clean Technologies in Disposing of Solid Wastes).

In line with the targets addressed in SAP, regular solid waste storage plants have been stipulated for all counties with population over 100.000 whereas it was accepted to forward solid wastes stemming from residences in sensitive regions with population below 100.000 and other hot spots to the nearest regular storage plant..

Increase in the summer and winter populations in touristic regions has also been taken into account in establishing environmental priorities.

### 3.2.6 Air Pollution

The main institution responsible for air quality management is the Ministry of Environment and Forest, and its provincial offices. The Ministry of Health grants industrial emission licenses. The State Planning Organization deals with overall planning as well as programming public investment initiative relating to air management, including those for energy sector. The State Institute of Statistics is a focal point for collection and publication of air- related data.
Ambient air quality standards exist for a range of pollutants. Warning levels have been established for $SO_2$ and particulates. Turkey has also developed limit values for ambient air concentrations of chlorine, hydrogen chloride, hydrogen fluoride, gaseous inorganic fluoride, hydrocarbons and hydrogen sulphide, and for the lead, cadmium and thallium content of dust deposits. According tot the Regulation on Air Quality Protection, places where limit values are exceeded, action plans should be prepared locally.

Vehicle emission standards currently in force are similar to those of the EU. Regular pollution checks of all motor vehicles, mandatory since 1992, are carried out in almost 70 cities.

There are studies for improving air quality by raising solid (coal) and liquid (diesel fuel and unleaded gasoline) fuel qualities.

**Policies, legislation, and regulations to control air pollution in Turkey**

The legislative and regulatory framework for air management is defined in the 1983 Environment Law and its 1986 Regulation on Air Quality Protection which provides ambient air quality standard for the main atmospheric pollutants, as well as industrial emission standards and related requirements such as stack heights.

The purpose of this regulation is to bring under control emissions in the form of soot, smoke, dust, gases, steam and aerosols diffused into the atmosphere as a result of activities of any kind; to protect human beings and their environment from the hazards arising from pollution of the air as a receptor medium; to eliminate the adverse environmental effects of air pollution which cause important harm to the public and to neighborly relations; and, to ensure that such effects are not created.

Other recent regulations on air pollution control in Turkey are "2004 Regulation on Industrial based Air Pollution Control and "2005 Regulation on Heating based Air Pollution Control".

According to EC directives of 2003/73/EC and 1999/94/EC as source, "2003 Availability of Consumer Information on Fuel Economy and CO2 Emissions in respect of the marketing of New Passenger Cars" was promulgated. ( Entry into force: January 1, 2008).

According to directive 97/68/EC as source, "2003 Directive on the measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery was promulgated (entry into force: April 5, 2003 Phase I, January 1, 2005 Phase II)

**Monitoring of air pollution for control of air pollution**

The air pollution in Turkey stems from domestic heating where low quality domestic fuels are used for heating purposes. The increase in the density of the population in larger cities, rapid growth of population, inappropriate location of cities in terms of topographical and meteorological conditions play a significant role in increasing the levels of air pollution in major cities. At the end of each winter season the Ministry of Environment and Forest assesses the measurement results, classifies the cities in terms of their pollution levels and determines the measures to be taken in each pollution class.

Air quality monitoring began in the 1960s. The national monitoring system is under the responsibility of the Ministry of Health and its Refik Saydam Center of Hygiene, which operates 175 stations in urban areas.

The air pollution is monitored in all the provinces using automatic or manual devices by the Ministry of Health. The Ministry of Environment and Forest is responsible to control and check if the pollution levels are in compliance with the Regulation or not. All the indicators to control the air pollution is defined in the Regulation. Ambient air quality standards and the emission standards are given in the said regulation.

## 3.3 ADDRESSING THE INSTRUMENTS SUPPORTING THE NATIONAL ACTION PLAN

In the process of implementing and adapting the National Action Plan for reducing the Land Based Pollutants; studies for harmonizing the legal and corporate structure, enhancing the systems for raising consciousness and information systems, as well as developing environmental management are the most remarkable items of the process of program's implementation.

Actions devoted to harmonizing the legal and corporate structure, enhancing the systems for raising consciousness and information systems as well as developing environmental management that are included in NEAP and that still preserve their significance are provided below:

Such actions are also provided under the section of "listing of high-priority actions" and "investment portfolio, and the time schedule has been set as short, medium and long term.

### 3.3.1 Harmonizing the Legal and Corporate Structure (NEAP,1998)

*Comparative Analysis of Working Method and Scope of Corporate Authority and Responsibility*

In Turkey, plenty of institutions and organizations carry out various activities directly or indirectly relating to protecting and developing environment. There are contradictions and repetitions on various levels in issues such as the objectives, scopes, principles, methods, instruments and timings of such activities. Addressing all aspects of such activities that are largely not integrated with each other is necessary to establish an efficient environmental management mechanism as well as to prevent resource extravagance.

Comparatively establishing the features such as subject, objective, method, source, location, time etc. of various activities implemented by line ministries and related institutions and organizations, universities, public sector, local governments, occupational organizations and voluntary organizations; scrutinizing the functional integration, efficiency and productivity levels, problems and outcomes of such activities constitute the scope of the said action.

*Comparative Analysis of Legal Regulations*

There are plenty of legal regulations in force in Turkey that are directly or indirectly relating to protecting and developing environment in Turkey. Levels at which such regulations are effective, their interrelations and practical problems are not known. Such regulations which were put into effect at different times and for different objectives give rise to authority and responsibility conflicts between the related organizations and agencies. Furthermore, some of these regulations are outdated and some directly or indirectly lead to various problems for false or incomplete sanctions they include, and some cannot be implemented for some reasons. Therefore, they need to comparatively be analyzed with an integral and multidimensional approach.

Comparative analysis of all laws and codes in force such as the Environment and Forest, Reconstruction, Coast, Mineral, Culture and Tourism, Public Health, Municipalities, Civil and Tax Laws, laws of incorporation, codes of establishment, related regulations, legislations and circulars; subject, location, establishment, incentive and dissuasion scopes together with language and their terminologies constitutes the framework of the said action.

*Classification of Land Utilization Capabilities, Establishing the Opportunities and Forms of Use and Elaboration of the Land Utilization Plans*

Establishing the actual capability classes and forms of use by means of employing the techniques within the scope of geographical information systems for Turkish territories; elaboration of land utilization plans; developing corporate governance model and formulating legal regulations to assure the utilization of lands in line with the targets of such plans constitute the scope of this action.

### 3.3.2 Developing Systems for Raising Consciousness and Information Systems (NEAP,1998)

*Management/Regulation of Environmental Data*

Organizations that pick up environmental data employ their own monitoring and recording systems and these systems conflict with each other. Therefore bodies entitled to make decisions and analysts confront a contradiction between data derived from different sources.

Objective is to incorporate and assess the environmental databases of each organization and to make these data available to the decision-making bodies, colleagues and public. Developing common standards applicable to the compilation of environmental data, compilation and presentation of data on a dynamic groundwork; making data available to the regional branches of related agencies and local environmental boards; presenting the summarized environmental data to the public through Web site and in the form of printed reports.

*Environmental training*

Increasing the efficiency of training works devoted to environmental protection and development is the most major stage of the public participation and awareness step within the process of adaptation and implementation of the national action plan.

Considering the age, gender, social identity, educational background and cultural aspects of individuals and the composition, function and efficiency level of organizations; first developing programs and appropriate instruments for introducing the regional environmental items and their importance as well as local, regional, national and global environmental problems and their reasons, for preventing and solving such problems, and further for ensuring public participation in the prevention and solution of problems; widespreading and institutionalizing foregoing programs and instruments through pilot practices; and establishing mechanisms for progressively training the trainers constitute the scope of said action.

### 3.3.3 Developing Environmental Management (NEAP,1998)

*Encouraging towards Clean Technologies and Energy Resources*

Preventing and reducing wastes at source before they get their final waste form is more cost-effective when compared to cleaning the wastes resulting from a particular process (end of pipe), and reducing pollution before its actual formation naturally contributes to the prevention of pollution.

Employment of ineffective industrial technologies gives rise to excessive air pollution, wastewater and solid waste, culminating in a series of negative environmental conclusions. Use of low-quality and high-pollutant fuels is the foremost reason of air pollution in addition to its costs in the areas of health, economy and ecology.

It is possible to list actions for encouraging the use of clean technology and energy resources as follows:

- Supporting training programs to ensure switching to clean production technologies,
- Enhancing the collaboration of technology groups, industrial and governmental agencies for researching, developing and increasing the transfer of clean production technologies,
- Encouraging private sector and non-governmental organizations to enhance their economy and environment-oriented collaborations,
- Strengthening the efforts of the current national agencies for assessing, developing, managing and implementing new environment-friendly technologies,
- Giving technical consultancy and easing access to aid resources in particular resource categories and sectors,
- Encouraging clean production techniques and practices for production processes, products and services,
- Supporting the coding of good environmental practices embodying all stages throughout the product's life.
- Encouraging voluntary projects on awarding products with eko label that have less environmental impacts,
- Elaborating programs that give priority to energy efficiency and sustainable energy resources,

Relevant sections of the guidelines (UNEP MAP Technical Reports, no.142, 2004) relating to the Best Available Techniques (BAT) and Best Environmental Practices (BEP) formulated by UNEP MAP to provide clear understanding of current BAT and BEP for textile and leather industries that are among high-priority sectors in the Mediterranean and Aegean coasts as well as to provide guidance for said sectors have been translated into Turkish and submitted as an annex to the report.

*Enhancing the Management of Coastal Areas*

There are around 10 thousand km of marine and lake coasts and nearly one third of Turkey's population is situated at coastal regions. Household and industrial wastes are largely discharged to sea directly and/or indirectly. Particularly settlement in localities experiencing intensive marine tourism exerts negative impacts in various forms and sizes. The Coast Law and relevant Regulations cannot provide sufficient support to efforts undertaken for preventing and removing such negative conditions; high level of unearned incomes and deficiencies in administration to the benefit of public neutralize measures taken. In spite of all such negative conditions, a management model that will allow the administration of coasts in Turkey with an integrated approach has not been developed.

Establishing the nature, dimensions and sources of environmental problems in sea and river coasts of Turkey; establishing the authorities and responsibilities of related organizations and agencies in direct and indirect connection with the prevention and solution of such problems, the personnel and tools-equipment hardware employed during their works, the constraints confronted, relevant legal regulations and the scope of the

programs and projects implemented; developing democratic management models allowing the participation of the representatives of segments making use of coasts in different forms and levels to the decision-making processes; formulating legal regulations necessary for implementing such management model; formulating and implementing action plans and programs for coast management constitute the scope of said action.

## 3.4 METHOD FOR ELABORATING THE INVESTMENT PORTFOLIO

### 3.4.1 Phases of Elaborating Investment Portfolio

First step of elaborating the investment portfolio is to establish and develop fundamental criteria. Accordingly, criteria to be taken as basis to the elaboration of investment portfolios have been established as benefit, economical development, feasibility, financial sustainability and estimated cost.

The second step of elaborating the investment portfolio is the assessment of information about the criteria. Accordingly, the following scoring system prevailing in training notes and guidelines has been applied:

***The weights***

– Benefit (5 )
– Economical development (4)
– Financial sustainability (3)
– Feasibility (2)
– Cost (1)

The third step of elaborating the investment portfolio is to establish and develop scaling. Accordingly, the following scaling system prevailing in training notes and guidelines has been applied in establishing the investment portfolio matrix:

***The scales***

| | |
|---|---|
| Benefits | Human health (5)<br>Other benefits (3)<br>General (1) |
| Development | Contribution to the economical sector (5)<br>Less important sector (3)<br>General (1) |
| Financial Sustainability | Opportunity to implement economic instruments (5)<br>Potential applicability of economic instruments (3)<br>Difficulty in applying the economic instrument (1) |
| Feasibility | Easy implementation (5)<br>With minimum changes (3)<br>With big changes (1) |
| Cost | Low cost (5)<br>Medium cost (3) |

High cost (1)

The scoring systems proposed in the stage of reviewing the final scoring, the fourth step of elaborating the investment portfolio, which identifies the priority of project investment, has been found appropriate, the sample has been discussed, investments have been reviewed and the investment portfolio has been elaborated.

After establishing the investment portfolios matrix, projects have been listed as sorted by priority. Projects have been sorted by priority according to the results of the investment portfolio matrix as list of high priority projects (projects with score higher than 70 according to the investment portfolio matrix), list of medium priority projects (projects with score higher than 60 and lower than 70 according to the investment portfolio matrix), list of low-priority projects (projects with score below 60 according to the investment portfolio matrix)

### 3.4.2 Establishing Costs of Wastewater Management

**Establishing the Costs of Disposing of Household Wastewaters**

Sewer network cost and wastewater treatment costs have separately been calculated to be able to establish the cost of disposing of wastewaters.

*Calculation of the Costs of Sewer Network*

The total length of the network to be laid and the network diameter designates the overall cost of the sewer network. Distribution of the dimensions of pipes employed in the network is dependent on population density. Therefore, unit cost of sewer network should be analyzed in connection with population. In the specialty thesis of State Planning Organization formulated for the purpose of addressing the investment requirements of Turkey for the urban environmental infrastructure (Esen S., 2002), distribution of the total lengths of networks in 118 projects designed by the Bank of Provinces by diameters has been examined and unit costs have been calculated. In the same study, it is specified that such unit costs have been established by the inclusion at particular rates of areas both hosting and not hosting settlements, and it is emphasized that the cost of sewer network will be higher in areas hosting settlements.

The situation of current sewer networks of districts located on the Mediterranean and Aegean coasts and that were designated in line with SAP targets, has been elaborated through utilizing the data of Provincial Environmental Inventory and data of State Statistics Institute. Initial investment cost of the sewer network has been calculated in consideration of the unit network need per capita and the unit network cost. Figures provided in Table 3.1 have been taken as unit costs of sewer network. For areas with denser residence, in unit network costs provided in Table 3.1 have been increased by 25% in calculations.

**Table 3.1** Distribution of unit cost of sewer network by population (Esen S., 2002 )

| Population | Unit cost of sewer network $/person |
|---|---|
| < 20.000 | 90 |
| 20.000-100.000 | 105 |
| >100.000 | 130 |

*Calculation of the Household Wastewater Treatment Costs*
In calculating the household wastewater treatment costs, population data and unit cost of wastewater treatment per capita have been employed.

In calculating the initial investment costs of household wastewater treatment plants for sensitive regions and hot spots, prospective nitrogen and phosphorus elimination was taken into account in addition to carbon elimination.

Unit biological wastewater treatment costs have been taken as average unit costs of treatment established upon the research made in consideration of the characteristics, capacities and costs of current wastewater treatment plants in Turkey (Table 3.2) (Alpaslan, M.N., Dölgen, D., 2005,).

**Table 3.2** Investments and costs for Urban Wastewater Treatment Plants (WTP) (Alpaslan, M.N., Dölgen, D., 2005)

| WTP Capacity (person) | Investment cost | Unit cost |
|---|---|---|
| P<100.000 | <5 M USD | <USD 50/person |
| 100.000<P<500.000 | <20 M USD | < USD 50/person |
| P>500.000 | <30 M USD | <USD 30/person |

For residential areas equipped with wastewater treatment plants but that require improvement, calculation of costs have been done by utilizing the unit cost rates and unit cost of biological wastewater treatment as provided in Table 3.3 (Odegaard H, Henze M., 1992.)

**Table 3.3** Costs of investments for wastewater treatment plants (equivalent to 100.000 persons) (Odegaard H, Henze M., 1992)

(Units are given in US $/m$^3$, unit water consumption Q=400l/person*day)

| **Type of Treatment** | **Investment Cost US $/m$^3$** |
|---|---|
| Mechanical Treatment | 0,110 |
| Chemical Treatment (Primary Sedimentation) | 0,133 |
| Biological Treatment (Low loaf) | 0,180 |
| Biological/Chemical Treatment (Preliminary Chemical Sedimentation) | 0,167 |
| Biological/Chemical, N-elimination (Preliminary denitrification) | 0,283 |

**Establishing the Costs of Industrial Wastewater Treatment Plants**

In calculation the costs of industrial wastewater treatment plants built for reducing pollution stemming from industrial activities, two approaches have been taken as basis;

- person equivalent of industrial wastewater load including conventional pollutants have been calculated. Taking person equivalent as 60 g $BOD_5$/person-day (EU Article 2, Urban Wastewater Treatment Directive, 1991) has been taken as basis. After establishing the person equivalent of industrial wastewater including conventional pollutant load, initial investment cost has been calculated by means of the method adopted in calculating the initial investment cost of treating household wastewaters.
- Industrial wastewater including non-conventional pollutant have been handled under two categories such as industrial wastewater including only inorganic pollution such as heavy metals etc, and industrial wastewaters including high organic pollution and inorganic pollution. For industrial wastewaters including only heavy metals and inorganic pollutants, chemical treatment has been proposed as the treatment method and initial investment costs have been calculated by utilizing the initial investment unit cost of chemical treatment. On the other hand, for the treatment of wastewaters including both heavy metals and inorganic pollution as well as high organic pollution, first chemical treatment and then biological treatment has been proposed to be effected and the initial investment cost has been established by calculating costs of chemical preliminary treatment and biological treatment.

### 3.4.3 Cost Approach in terms of Urban Solid Waste Management

Costs of regular storage plants stipulated for districts chosen in consideration of the SAP criteria have been calculated. Unit cost of urban regular solid waste storage has been taken as $\$10/m^3$, inclusive of the design or regular storage site, construction works and works for preparing the site. Cost of the regular storage site has not been included in the calculation.

Increases in summer and winter populations in touristic regions have also been considered and taken into account in calculating the investment cost.

# 4. ADDRESSING RISK AREAS AND RISK MANAGEMENT

Prior to assessing risk areas via the project reports drawn up, it is essential to understand the concepts of risk, risk estimation and risk management for the goal of positioning the final assessment on a sound foundation. Accordingly;

*Risk:* The probability of the potential adverse effect to be imposed by a matter or event under particular conditions. Risk encompasses the effects on the environment or human health and appears in case of lack of defense and leaving things to chance. No risk occurs or mentioned if no undesired matter or event is experienced. Risk is scrutinized along with two components:

- Negative (undesired): an event's probability to occur
- Implications of the negative event

*Risk estimation:*
Estimating hazardous matters or events that threaten the health of the individuals or communities who have suffered them through utilizing the results of real events (Moolenaar, 1986)

•***Risk analysis*:** An exhaustive examination incorporating the risk assessment, risk judgment and risk management options. Such examination is performed to address the undesirable implications to the human health, life and environment. This is an analytical process that provides information when undesirable events are confronted, and a numerical assessment of probabilities and expected results of risks defined in this process is effected. Risk assessment is the process of building up the content that addresses an acceptable risk level for the individual, group, society or environment.

Explanations with respect to the addressing of risk areas and risk management arising out of the national action plan embodying the Mediterranean and Aegean regions regarding the land-based pollutants are provided below.

Addressing of the risk areas and risk management has been handled under 4 headings namely household-based pollutant loads in regional and basin level, industrial-based pollutant loads, pollution stemming from agriculture and petroleum pollution, and results have again been handled in regional level.

## 4.1 MEDITERRANEAN BASINS

This project was the first leg of the series of projects implemented in all basins located along the Turkish seas coasts for the purpose of formulating the national action plan for land-based pollutants. Studies implemented in the Mediterranean region have been split into 6 basins. These basins are West Mediterranean, Antalya, Doğu Akdeniz, Seyhan, Ceyhan and Asi basins. On the other hand, hot spots in these basins have been defined as İçel gulf (Erdemli, Silifke, Tarsus), Adana (Ceyhan), Antalya (Alanya/Side, Manavgat), Antakya (İskenderun, Dörtyol, Kırıkhan), Bodrum Peninsula (Marmaris, Datça) (Final report on land based pollutants in Mediterranean, 2001).

In 16% of the industries in basins both household and industrial wastewater treatment plants, in 35% only household wastewater treatment plants and in 49% only industrial wastewater treatment plants are present. Such treatment plants are mostly involved in the paper and paper product, food, chemical, textile and metal industries. The outcomes of the examination conducted show that iron, steel, paper, non-ferrous metals and milk products give rise to water pollution; non-ferrous metal, iron, steel, fertilizer and petroleum refineries cause toxic pollution; and non-ferrous metal, iron, steel and processed metal products cause toxic metal pollution.

In six basins in the Mediterranean region, there are a total of 301 industrial facilities (Final report on Land Based Pollutants in Mediterranean, 2001). Numerically food industry is ranked the first, followed successively by the textile, petroleum products and line industrial institutions.

A general overview on 6 basins in the Mediterranean region shows that the Ceyhan basin bears the utmost environmental risk. Ceyhan basin is ranked higher than other basins in terms of the amount of COD, BOD, TSS, total nitrogen and total phosphorus loads it accommodates. Seyhan and east Mediterranean basins follow the Ceyhan basin. In Ceyhan basin, there is only one treatment plant of located in Kahraman Maraş, however there are twenty of provinces/counties within the boundaries of this basin. Having examined the average population rates, the Ceyhan basin is ranked the first in terms of population density. Construction of new treatment plants to reduce the organic waste will play a major role ın lessening the household based pollution loads in the region. The abundance of the organic load may give rise to the decline of oxygen at dangerous rates. The risk occurring leads to aesthetic pollution in coasts and rise in phytoplankton population due to the input of excessive food elements. This change imposes an effect increasing fish production based on phytoplankton production in coasts, yet underwater life can adversely be impacted due to the degradation of water's light permeability due to the excessive amount of suspended solid materials.

The basin under uppermost risk basin in terms of industrial wastewater and heavy metal loads are seen to be the Batı Akdeniz and Asi basins. Total chromium amount is 14.300 kg/year for the Asi basin and 14.100 kg/year for the Doğu Akdeniz basin. It is reported in plenty of international studies and in UNEP (1991; 1993) reports that especially chromium $Cr^{+6}$ is toxic for living beings. Accordingly, only the $Cr^{+3}$ and $Cr^{+6}$ valence forms of Chromium are biologically appropriate (USPHS 1997, Kimbrough *et al.* 1999). Chromium in +3 valence form of Chromium rapidly precipitates and absorbs in sediments and suspended solid matters. $Cr^{+3}$ and $Cr^{+6}$ valence forms may be transformed into each other depending on the physical and chemical characteristics of water (Richard & Bourg 1991). Discharged chromium in +3 valence form may have a different chemical composition (kherjee 1998, Outridge & Sheuhammer 1993, UNEP 1991, Richard & Bourg 1991). Cr+3 and Cr+6 accumulate in hydrophytic organisms (Kimbrough *et al.* 1999). $Cr^{+3}$ is a trace element necessary for the glucose, protein and fat metabolism of animals in particular quantities, however $Cr^{+6}$ is toxic even in low concentrations and corrosive regardless of its dose, particular reactions occur in the skin after contact.

Furthermore in the researches of the international cancer research agency, chromium +6 compounds are classified as carcinogen agents. $Cr^{+3}$ may be hazardous for animals only in high doses (USPHS 1997). In line with all these information, it is conspicuous that chromium constitutes a major risk especially for hydrophytic organisms and therefore for other organisms via the food chain (plankton-fish-human).

In the Mediterranean Region, the basin that exposes environmental risk stemming from agricultural activities is again the Ceyhan basin where an agricultural land of 849441 hectares is employed. The agriculture sector hosting annually 425 tons/year of nitrogen and 42 tons/year of phosphorus load is ranked top among pollutant sectors in this basin. Quantities of pesticides employed in agricultural activities give rise to considerable levels of environmental risks (Mediterranean Final Report on Land Based Pollutants, 2001). In Ceyhan basin, agricultural products in great demand both in domestic and foreign markets such as greenhouse vegetables, watermelon etc are produced. It is known that pesticides such as DDT, HCB and Mirex etc are generally employed in agriculture and impact other ecosystems through accumulation or conveyance. It is further known that use of pesticides for a long term inflicts damage on ecosystem, adversely impacts human health, reduces agricultural sustainability and deteriorates flora and fauna (Wilson and Tisdell, 2001). Total nitrogen and total phosphorus stemming from agricultural activities and the accompanying pesticides again constitute considerable risk in this basin.

There is also a considerable pollution risk due to petroleum in Ceyhan basin into where the Iraqi and southeast region oils are pumped. Leakages during filling operations may give rise to crucial destruction especially in coastal ecosystems in the region. Spread of oil in marine environment causes many adverse impacts physically and micro-pollutants within their content (polyaromatic hydrocarbons (PAH)) are conveyed via food chain from single-cell microorganisms, extending to the fish and finally to the human. Given the bioaccumulation cumulatively increasing by up to 1000 times in each stage of the chain, the dimensions of the risk is more clearly revealed. 16 of the micro-pollutants are considered as hazardous pollutants by EPA as they have high-priority carcinogenic and mutagenic impacts (Adamo and Ark, 1997)

It has been emphasized that there are 51 industrial institutions in the West Mediterranean Basin showing activity in 9 different industrial lines which are sea products, solid-liquid oils, ground cereals, feedstuffs, textiles, non-metallic mineral products, processed metal products, agricultural machines and equipment as well as power generation. It is observed that, among such institutions, those engaged in sea products give utmost contribution to water pollution when compared to the others in terms of BOD and T-TSS loads. Table 4.1 shows that there are different basins in the Mediterranean Region that inflict various risks depending on their pollutant sources hosted.

**Table 4.1**: Addressing risky basins for the Mediterranean Region

| Basin | Residential Pollution | Industrial Pollution | Heavy metals | Agricultural Pollution |
|---|---|---|---|---|
| **West Mediterranean** | + | | | |
| **Antalya** | | | | |
| **Doğu Akdeniz** | | + | + | |

| | | | | |
|---|---|---|---|---|
| **Seyhan** | | | | |
| **Ceyhan** | + | | | + |
| **Asi** | | + | + | |

## 4.2 AEGEAN BASINS

Aegean Region has been split into 4 basins (Kuzey Ege, Gediz, Küçük Menderes and Büyük Menderes) and assessments have been made on basin basis. The basins have been compared general terms such as household, industrial, agricultural, organic pollutants and heavy metals, and the basin that inflicts the utmost risk has exhaustively been studied.

The household wastewater pollutant load is ranked the top in the Büyük Menderes basin in terms of COD, $BOD_5$ and TSS. COD and $BOD_5$ are assessed as the indicators of household pollution (Polak and Haffner, 1978). There are 38 counties in this region and majority of inner residential areas probably dump their wastes without preliminary treatment into the Büyük Menderes River. Therefore the COD, $BOD_5$ and TSS loads have been found at exorbitant rates due to the high volume of industrial loads. It is envisaged to alleviate the load in this region by establishing appropriate treatment plants and thereby reducing the risk. Drop of oxygen level in receiving environments adversely impact the active life in that region. Even the prevalence of such oxygen deprivation for a long term can reach substantial levels, causing the living beings in that region abandon or disappear (Carlson and Parsons, 2003).

The Büyük Menderes basin takes the first rank in terms its COD, $BOD_5$ and TSS loads, however the Küçük Menderes basin is much more risky in terms of the T-N and T-P loads. It is suggested that excessive rainfall in this region may raise the nitrogen and phosphorus loads due to bathing effect. High amount of food elements may trigger higher reproduction of planktons in coastal sections. Depending on the concentration and prevalence of the load, seasonal or local autrophication risk may arise as well. Autrophication occurring in areas such as coasts and estuaries seriously give rise to both economical and ecological problems (Lowery, 1998). Excessive phytoplankton concentration owes to the excessive input of food elements, leading to the inevitable occurrence of anaerobic zones at the bottom (Lowery, 1998).

The textile sector accounts for the greatest amount of COD load in industrial wastewaters and mixed industries are ranked lowest in this standing. The Gediz basin shares the first rank with the textile sector in terms of COD load and the same basin again shares the first place with the tanning industry in terms of total nitrogen load. Risk inflicted by the COD and TN loads defined on sectoral and basin basis give rise to substantial destructions in this basin and receiving environment (such as sea). Having examined the Aegean basins in terms of the amounts of industrial wastewaters and heavy metal loads, the Gediz basin constitutes the first priority risk area, followed by the Büyük Menderes Basin. In the Gediz Basin accommodating an annual wastewater volume of 39935897 cubic meters, total lead amount has been calculated as 27700 kg/year, Cadmium as 1080 kg/year, and Zinc as 55770 kg/year (Table 3.16). Büyük Menderes basin also carries an environmental risk among the Aegean basins with its Chromium load of 152540 kg/year and Mercury load of 312 kg/year accommodated. Heavy metals, in the form of industrial wastes, mix into the receiving environments in great volumes and adversely impact the water quality

and active life. It has been established through various studies that even very minor amounts of some metals may impose toxic effect on living organisms, especially on the hydrophytic organisms. Chromium, as a highly employed metal in plenty of industrial lines (chromium coating, corrosion-preventive agent in cooling towels, tanning operations etc) has been established in studies performed on fish to have acute and chronic toxic effects (Sastry and Tyagi, 1982). Such a great volume of heavy metal input dumped into the Büyük Menderes and Gediz basins cause substantial health risks for the living organism in the receiving environment and also for human through nutrition. Sea organisms intake metals directly from water or indirectly from food or suspended solid matters. Some organisms (mussels, shrimps, fish etc) accumulate heavy metals in their bodies (100-1000 times) and augment the damaging effect of the metal. Again, the heavy metal influx give rise to the death of newly hatched water organisms and/or to anatomic disorders (USPHS 1997; Hashmi et al., 2002). Quantities of Cr, Cd, Pb, Zn and Hg exceeding 0.1 mg/l in the organism may inflict potential toxic effect (Hashmi et al., 2002).

The individual risks inflicted by metals measured in the Büyük Menderes and Gediz basins can be listed as follows: Cadmium, when compared to many other metals, is much more active, stable (half life of 10-30 years) and bioaccummulative in the water environment (USPHS 1997). Cadmium has no biochemical or food-element function for the organism. Cadmium is highly toxic both for plants and animals (USPHS 1997, WHO 1993; Alloway 1990).
The organ that is mostly impacted by cadmium toxicity in human and animals is kidney (USPHS 1997; Elinder & Jarup 1996; Goyer 1996; Iwata *et al.* 1993; WHO, 1993; Mueller et al., 1992). Phytoplanktons are very susceptible to cadmium, and at concentration rates over 1 ug/l, inhibition is diagnosed (Bryan & Langston 1992). In another study, in invertebrates and fish exposed to a cadmium concentration around 5 ug/l, deceleration in the rate of reproduction, alterations in the immune systems and suppressed growth has been detected (Bryan & Langston 1992; Thuvander 1989). The Gediz basin is exposed to Cd pollution in volumes that are 10 times greater than others. Sources of Cd are generally textile sector and mixed industries. These two sectors produce 10-100 times higher Cd pollution than other sectors and constitutes the major metal risk for the Gediz basin.

Lead Pollution has been found at very high rates in the Gediz and Büyük Menderes basins. Sectors having the most amount of lead wastes are the mixed industries, leather and textile industries (Table 3.17). When lead is dumped into the environment it has a higher persistency than many of other metals. Therefore it tends to accumulate in the soil and sediments. Due to low concentration, it may remain for a long time in the food chain and human metabolism. The stable forms of lead are the $Pb^{+2}$ and $Pb^{+4}$ forms. The free +2 ion form of lead is generally more toxic than the inorganic complexes of lead and therefore the free +2 lead ion concentration diminishes by the effect of any factor impacting the formation of the complex and its toxicity effect also drops. The toxic organic forms of lead are also present in the nature. They may be formed by direct inflows (leaded oil production, handling and storage and exhaust emissions) and by the chemical/biological reaction of the inorganic lead in the anaerobic sediment (Sadiq 1992,

Forsyth *et al.* 1991). Quantities of dissolved lead in surface waters is low depending on pH and salinity (USPHS 1997). Lead's behavior in soil and sediment is similar, they often tend to form organic-metal complexes. Lead is a commonly available toxic metal. The lead-food is not an essential element for the biochemical or physiological functions (Goyer 1996). Among the toxic effects of lead are the nervous system disorders, anemia and reduction in hemoglobin synthesis, pulmonary and arterial diseases, bone mechanism disorders and kidney disorders (Pirkle et al., 1998; USPHS 1997; Bernard et al., 1995; Goyer 1993; Nriagu 1988). Lead is toxic for also all water organisms and there is also quantitative evidence that lead bound to the sediment is intaken by species living in deep water and accumulated there (Bryan & Langston 1992). Lead may accumulate in marine and fresh waters especially in organisms living on gill intake (Sadiq 1992). In studies effected on invertebrates at ug/l concentrations; deceleration in growth, suppressed reproduction and fertilization and death are often reported (WHO 1989).

As mercury is the sole metal that can be in both liquid and gaseous form at ambient temperature, its environmental behavior is quite distinctive than other toxic elements (USPHS 1997, WHO 1989). Civa appears in the +3 valance form, Hg (0), Hg (I) and Hg (II). The most widespread and abundant form in the atmosphere is the elemental mercury and it accounts for mercury's transformation for long in the form of steam (USPHS 1997, WHO 1993). In aqueous environment, the mercury II form is the most widespread one and when discharged, it is controlled through rapid absorption in the organic matter dissolved in aqueous environment and being in particularized form, and further through flocculation, precipitation and accumulation in deep sediments. As mercury bonds are intense in the sediment, its transition into the liquid phase is generally slow, however in the event of phosphorus content in saline water and at high concentrations (anoxic conditions), transition to the liquid phase may be accelerated (USPHS 1997, Bryan &Langston 1992). Most common form of organic mercury is the methyl-mercury (MeHg) form that is dissolved, active and that rapidly enters into the food chain in water environment. Duration of methyl-mercury's stay in food chain in each phase is associated, depending on the mercury form, with high solution in oil, long biological half life and conveyance to top levels via the food chain. For instance, concentration in a carnivore fish, positioned at the top of the food chain in fresh and saline water environment is 10.000-100.000 times greater than that in the water environment (USPHS 1997). Mercury has a very high toxicity level and is not an essential trace element for living organisms. Removal of mercury by biological means is very low and it is the sole metal that gives rice to substantial accumulation in the food chain and concentration increase in the body (biomagnification) (WHO 1989). In case of exposure to metal salts at high concentrations or in the case of chronic exposure at lower concentrations, it is directly toxic to kidneys (Zalups and Lash 1994). In case of exposure to methyl-mercury, it damages kidneys and the evolving fetus (USPHS 1997).

Studies performed on mercury's toxicity in water environment have shown that methyl mercury is much more toxic than other inorganic forms. In studies effected on invertebrates, an obvious slowdown in the mussel's rate of growth at concentrations of 0,3 ug/l, halt in growth at the concentration of 1,6 ug/l and acute death at 25 ug/l has been reported (WHO 1989). Even the lower concentrations of inorganic mercury are toxic for

fish (Bryan and Langston 1992, WHO 1989). A substantial mercury pollution is evident in the Gediz and Küçük Menderes basins. Among the sectors where mercury is employed, the paper industry and chloralkaline industry may be manifested (Fimreite, 1970; Boening, 2000).

Gediz and Küçük Menderes basins are risky in terms of zinc pollution. Sectors where zinc is highly employed are mixed industries and textile sector. Zinc occurs in the environmental generally in +2 oxidation form or free zinc ion form or dissolved or non-dissolved complexes or compounds (USPHS 1997). Zinc is a trace element present in bestial and vegetal tissue. The researches have shown that, if discharged in acceptable fashion, zinc is not toxic to organisms (UNEP 1993). Nevertheless, in studies implemented in aqueous environments, zinc may inflict damage not only at high concentrations but also in the case of long-terms exposure at low concentrations. For instance it has been observed that, at a concentration of 15 ug/l, the phytoplankton population was suppressed and at a concentration of 20 ug/l, the growth of culture diatoms was inhibited (Bryan & Langston 1992).
Chromium pollution has again been found at substantial volumes in the Great Menders and Gediz basins that constitute environmental risk. Especially leather and subsequently the textile sector, mixed industries and food industry are the leading sources of Chromium pollution.

In the light of all these information, the Gediz Basin has been addressed as the priority risk area in terms of the volume of industrial wastes as well as lead, cadmium and zinc pollution. It exposes a considerable risk for organisms living in the receiving environment and other living beings that live on these organisms such as bird, human etc that represent the last ring of the food chain. The Büyük Menderes Basin has also been addressed as another risky basin in this regard.

Small Mederes basin that embodies a major part of İzmir accounts for the most substantial risk in the volume of hazardous wastes in the Aegean basin.

Basins constituting environmental risk in terms of agricultural pollution are again the Büyük Menderes and Gediz basins. The volume of TN and TP loads in the agricultural fields is 4076 and 3220 tons p.a respectively (Table 3.23).

The İzmir-Aliağa region carries the utmost risk of oil pollution. The presence of the Aliağa refinery constitutes substantial environmental risk in terms of oil leakages and accidents. As Aliağa is located within the Gediz basin, the critical risk of the latter has much more been fostered.

As overview on Aegian basins assessed in four different categories reveals that high-priority measures should be taken for the Gediz basin (Table 4.2). It is considered to be the highest-priority risk basin in terms of both environmental risk, preservation of natural life and human health, then follows the Büyük Menderes basin as the second-priority risk basin. Water employed by the Yatağan Thermal Power Plant in Büyük Menderes as a

chilling agent and then discharged to the receiving environment in hot form constitutes risk for the hydrophytic environment (Table 3.28).

**Table 4.2** Addressing risk basins for the Aegean Region

| Basin | Residential Pollution | Industrial Pollution | Heavy metals | Agricultural Pollution |
|---|---|---|---|---|
| **Kuzey Ege** | | | | |
| **Gediz** | | + | + | + |
| **Küçük Menderes** | + | | | |
| **Büyük Menderes** | + | | + | + |

# 5. IDENTIFICATION OF HIGH-PRIORITY ENVIRONMENTAL PROBLEMS

The high-priority problems of basins are detailed in this section. The high-priority environmental problems of basins and the sequence of priority of environmental problems have been established in consideration of the results of the prioritization matrix scaling over basin-based pollutants (ANNEX 2) and the distribution of pollution loads by basins and sources.

**Distribution of Total Pollution Loads by Sources**

Total pollution load of the region is provided in Figure 5.1. Having studied the distribution of the total load, around 65% of the COD (Chemical Oxygen Requirement), BOD (Biochemical Oxygen Requirement) and TSS (Suspended Solid Matter) loads seem to be stemming from residential household wastewater, and around 30% from industrial-based pollution. Having distribution of total T.Nitrogen load in the basin by pollution sources, it is possible to suggest that around 65% of the T.Nitrogen load stems from residential household wastewater and 25% from diffused sources due to agricultural practices. (Figure 5.2).

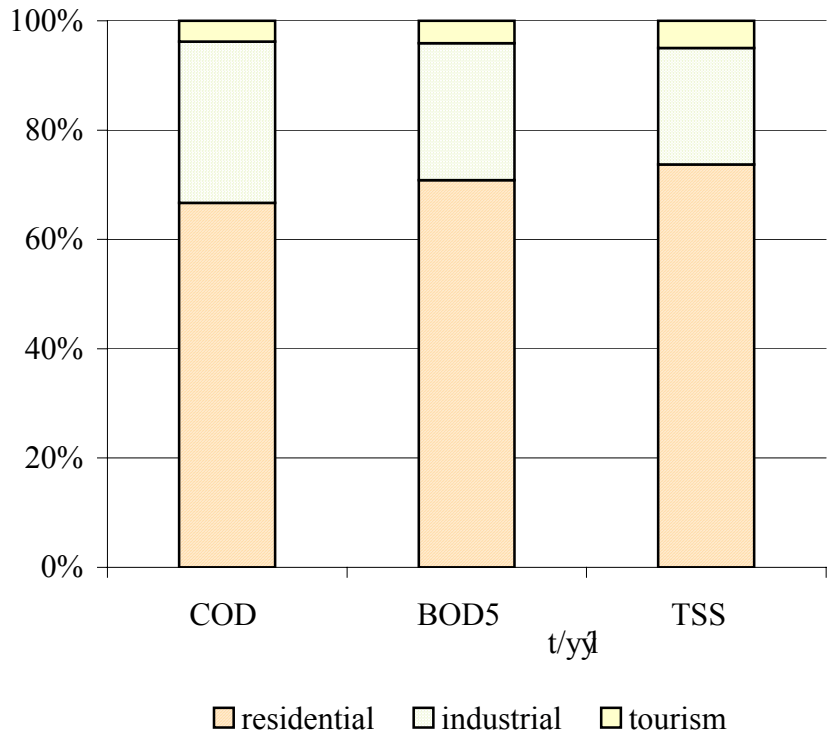


**Figure 5.1** Distribution of Total COD, $BOD_5$ and TSS loads in the Mediterranean and Aegean basins by pollutant sources

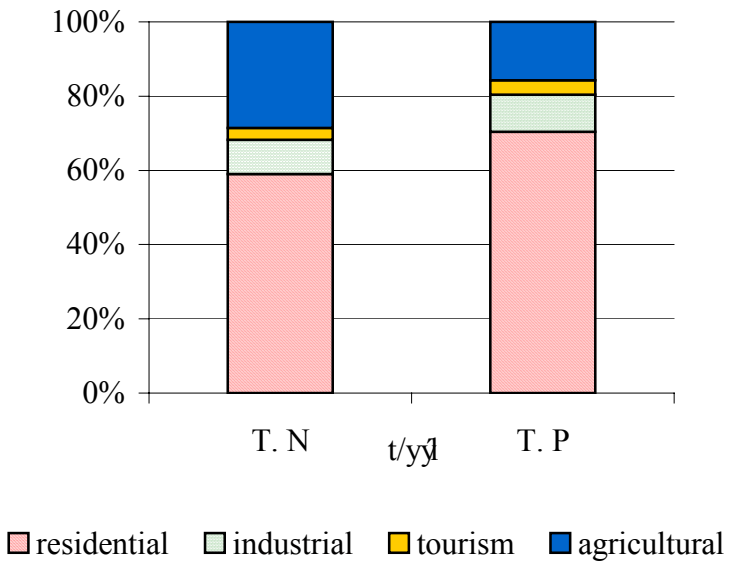


**Figure 5.2** Distribution of Total Nitrogen and Total Phosphorus loads in Mediterranean and Aegean Basins by pollutant sources

## 5.1 HIGH-PRIORITY ENVIRONMENTAL PROBLEMS OF THE BATI AKDENİZ BASIN

It is possible to sort the environmental problems in the basin by ascending priority order as household wastewater pollution, urban waste solid pollution and industrial pollution.

For the Batı Akdeniz basin, the distribution of COD, BOD and TSS loads by pollutant source is provided in Figure 3.16 (Annex III). Having studied Figure 3.16, majority of COD pollution (around 73%) seems to be stemming from residence-based household wastewater and 24% from tourism where COD pollution stemming from industrial activities represents only 1% of the total COD load. Having studied the distribution of total nitrogen and phosphorus load by pollutant source (Figure 3.17 III), majority of the pollution (57%) seems to be stemming from residence where the total agriculture-based nitrogen load is around 16%.

The figures of the Batı Akdeniz river basin is given in Annex III

## 5.2 HIGH-PRIORITY ENVIRONMENTAL PROBLEMS OF THE ANTALYA BASIN

It is possible to sort the environmental problems in the basin by ascending priority order as urban waste solid pollution, household wastewater pollution and industrial pollution.

For the Antalya basin, the distribution of COD, BOD and TSS loads by pollutant source is provided in Figure 3.18 (Annex III). Having studied Figure 3.18, majority of COD pollution (around 68%) seems to be stemming from residence-based household wastewater followed by 22% from industrial activities and around 11% from tourism. Having studied the distribution of total nitrogen and phosphorus load by pollutant source (Figure 3.19, Annex III), majority of the pollution (75%) seems to be stemming from residence where the total tourism-based nitrogen load is around 13% and total agriculture-based nitrogen load is around 10%.

The figures of the Antalya river basin is given in Annex III

## 5.3 HIGH-PRIORITY ENVIRONMENTAL PROBLEMS OF THE DOĞU AKDENİZ BASIN

It is possible to sort the environmental problems in the basin by ascending priority order as household wastewater pollution, urban waste solid pollution and industrial pollution.

For the Doğu Akdeniz basin, the distribution of COD, BOD and TSS loads by pollutant source is provided in Figure 3.20 (Annex III). Having studied Figure 3.20, it is seen that, unlike other regions, the rates of residence-based and industry-based COD load are close to each other where around 49% represents pollution stemming from residence-based household waster and around 48% represent pollution due to industrial activities, and tourism-based COD load is around 3%. Having studied the distribution of total nitrogen and total phosphorus load by pollutant source (Figure 3.20), majority of the Total Nitrogen load (70%) seems to be stemming from residence where the total industry-based nitrogen load is around 14% and the total agriculture-based nitrogen load is around 10%. Having studied the distribution of the Total Phosphorus load, it is seen that 60% stems from residence and 38% from industry.

The figures of the Doğu Akdeniz river basin is given in Annex III

## 5.4 HIGH-PRIORITY ENVIRONMENTAL PROBLEMS OF THE SEYHAN BASIN

It is possible to sort the environmental problems in the basin by ascending priority order as urban waste solid pollution, household wastewater pollution and industrial pollution.

For the Seyhan basin, the distribution of COD, BOD and TSS loads by pollutant source is provided in Figure 3.22, (Annex III). Having studied Figure 3.22, majority of COD pollution (around 60%) seems to be stemming from residence-based household wastewater followed by 40% from industrial activities. Having studied the distribution of total nitrogen and phosphorus load by pollutant source (Figure 3.23, Annex III), majority of the pollution (81%) seems to be stemming from residence where the total industry-based nitrogen load is around 9% and total agriculture-based nitrogen load is around 11%.

The figures of the Seyhan river basin is given in Annex III

## 5.5 HIGH-PRIORITY ENVIRONMENTAL PROBLEMS OF THE CEYHAN BASIN

It is possible to sort the environmental problems in the basin by ascending priority order as household wastewater pollution, urban waste solid pollution and industrial pollution.

For the Ceyhan basin, the distribution of COD, BOD and TSS loads by pollutant source is provided in Figure 3.24 (Annex III). Having studied Figure 3.24, majority of COD pollution (around 87%) seems to be stemming from residence-based household wastewater followed by 13% from industrial activities. Having studied the distribution of total nitrogen and phosphorus load by pollutant source (Figure 3.25), majority of the pollution (76%) seems to be stemming from residence where the total industry-based nitrogen load is around 13% and total agriculture-based nitrogen load is around 10%. Having studied the distribution of Total Phosphorus load, 63% seems to be stemming from residence and 33% from the industry.

The figures of the Ceyhan river basin is given in Annex III

## 5.6 HIGH-PRIORITY ENVIRONMENTAL PROBLEMS OF THE ASİ BASIN

It is possible to sort the environmental problems in the basin by ascending priority order as household wastewater pollution, urban waste solid pollution and industrial pollution.

For the Asi basin, the distribution of COD, BOD and TSS loads by pollutant source is provided in Figure 3.26. Having studied Figure 3.26, majority of COD pollution (around 88%) seems to be stemming from residence-based household wastewater followed by 12% from industrial activities. Having studied the distribution of total nitrogen and phosphorus load by pollutant source (Figure 3.27), majority of the pollution (76%) seems to be stemming from residence where the total agriculture-based nitrogen load is around 6%.

The figures of the Asi river basin is given in Annex

## 5.7 HIGH-PRIORITY ENVIRONMENTAL PROBLEMS OF THE KUZEY EGE BASIN

It is possible to sort the environmental problems in the basin by ascending priority order as household wastewater pollution, urban waste solid pollution and industrial pollution.

For the Kuzey Ege basin, the distribution of COD, BOD and TSS loads by pollutant source is provided in Figure 3.28 (Annex III). Having studied Figure 3.28 (Annex III), majority of COD pollution (around 74%) seems to be stemming from residence-based household wastewater followed by 14% from industrial activities. It is further seen that 11% represents COD pollution due to touristic activities.

Having studied the distribution of industrial pollution by sectors (Figure 3.29, Annex III), majority of the COD load seems to be stemming from the food industry and the majority of the T.Nitrogen load from the tanning industry. Accordingly, the high-priority sectors in terms of conventional pollution in the Kuzey Ege region are seen to be the food industry and tanning industry.
The figures of the Kuzey Ege river basin is given in Annex III

## 5.8 HIGH-PRIORITY ENVIRONMENTAL PROBLEMS OF THE GEDİZ BASIN

It is possible to sort the environmental problems in the basin by ascending priority order as household wastewater pollution, urban waste solid pollution and industrial pollution.

For the Gediz basin, the distribution of COD, BOD and TSS loads by pollutant source is provided in Figure 3.30 (Annex III). Having studied Figure 3.30, 58% of COD pollution seems to be stemming from industrial activities where 42% represents COD pollution due to residence-based household wastewater.

Having studied the distribution of industrial pollution by sectors (Figure 3.31, Annex III), majority of the COD load seems to be stemming from the textile industry where the pollution loads of the food and tanning industry are relatively lower. Having studied the distribution of T.Nitrogen load by sectors, majority of the T.Nitrogen load is seen to be stemming from the tanning industry and further that textile and food industries have relatively lower rates of T.Nitrogen load. Accordingly, it is possible to suggest that the high-priority sectors in the Gediz basin are textile industry, tanning industry and food industry.

The figures of the Gediz river basin is given in Annex III

## 5.9 HIGH-PRIORITY ENVIRONMENTAL PROBLEMS OF THE KÜÇÜK MENDERES BASIN

It is possible to sort the environmental problems in the basin by ascending priority order as urban waste solid pollution, household wastewater pollution industrial pollution.
For the Küçük Menderes basin, the distribution of COD, BOD and TSS loads by pollutant source is provided in Figure 3.32. Having studied Figure 3.32, majority of COD pollution (around 89%) seems to be stemming from residence-based household wastewater followed by 8% from industrial activities. It is further seen that 3% represents COD pollution due to touristic activities.

Having studied the distribution of industrial pollution by sectors (Figure 3.33), majority of the COD load seems to be stemming from the textile industry followed in order by the paper and food industry. Having studied the distribution of the T.nitrogen load by sectors,

majority of the T.Nitrogen load is seen to be stemming from the tanning industry where the textile and food industries have relatively lower T.Nitrogen loads. Accordingly, it is possible to suggest that high-priority sectors in the Gediz basin are textile industry, tanning industry, food industry and paper industry.
The figures of the Küçük Menderes river basin is given in Annex III

## 5.10 HIGH-PRIORITY ENVIRONMENTAL PROBLEMS OF THE BÜYÜK MENDERES BASIN

It is possible to sort the environmental problems in the basin by ascending priority order as urban waste solid pollution, household wastewater pollution industrial pollution.

For the Büyük Menderes basin, the distribution of COD, BOD and TSS loads by pollutant source is provided in Figure 3.34. Having studied Figure 3.34, majority of COD pollution (around 79%) seems to be stemming from residence-based household wastewater followed by around 29% from industrial activities.

Having studied the distribution of industrial pollution by sectors (Figure 3.35), majority of the COD load seems to be stemming from the textile and leather industries and mixed industries are seen to be ranked third in this standing. Having studied the distribution of the T.nitrogen load by sectors, majority of the T.Nitrogen load is seen to be stemming from the tanning industry where mixed industries, textile industry and food industry are seen to be having relatively lower T.Nitrogen loads. Accordingly, it is possible to suggest that high-priority sectors in the Büyük Menderes basin are textile industry and tanning industry.

The figures of the Büyük Menderes river basin is given in Annex III

## 5.11 HIGH-PRIORITY ENVIRONMENTAL PROBLEMS OF THE MEDITERRANEAN AND AEGEAN BASINS

For all Mediterranean and Aegean coasts, the high-priority environmental problems of basins and the sorting of environmental problems by ascending priority are summarized in Table 5.1 under the Residence-based Wastewater, Residence-based Solid Waste and Industry-based pollution headings.

**Table 5.1** Sorting of the high-priority environmental problems for the Mediterranean and Aegean basins

| **Basin** | **High-priority environmental problem*** | | | |
|---|---|---|---|---|
| | **Residence-based** | | **Industry-based** | |
| | Household Wastewater | Solid Waste | Industrial-based pollution | Predominant sectors |
| Batı Akdeniz | 1 | 3 | 2 | Aquaculture Production, Mining, Energy Generation, Food Sector, |
| Antalya | 2 | 1 | 3 | Textile Industry, Aquaculture Production, Food Sector, Mining, |
| Doğu Akdeniz | 1 | 2 | 3 | Food Sector, Mining, Textile Industry, Petroleum Refineries and Petroleum Products, Metal Industry, Paper Industry |

| | | | | |
|---|---|---|---|---|
| Seyhan | 2 | 1 | 3 | Textile Industry, Food Sector, Other Organic Chemical Industries, Paper Industry |
| Ceyhan | 1 | 2 | 3 | Textile Industry, Other Organic Chemical Industries, Aquaculture, Food Sector |
| Asi | 1 | 2 | 3 | Metal Industry, Food Sector |
| Kuzey Ege | 1 | 2 | 3 | Tanning industry, Food Sector |
| Gediz | 1 | 2 | 3 | Textile Industry, Tanning industry, Food Sector |
| Küçük Menderes | 2 | 1 | 3 | Textile Industry, Tanning industry, Food Sector, Paper Industry |
| Büyük Menderes | 1 | 2 | 3 | Textile Industry, Tanning industry |

* 1: source of the most important environmental problem, 2: source of the second important environmental problem, 3: source of the third important environmental problem

# 6. HIGH-PRIORITY ACTION LIST

## 6.1 HIGH-PRIORITY ACTION LIST FOR BASINS

Action lists covering the high-priority problems of basins, pollutant sources, anticipated reduction rates, time schedules and stakeholders have been prepared for each basin and provided below in tabular form.

In the high-priority action lists for basins have been assessed under two categories namely residence-based pollution wastewaters and urban solid wastes, and industry-based pollution has been assessed under a separate heading. Furthermore sensitive regions and hot spots have been discussed under a separate heading in the residence-based pollution section.

High-priority action list for residential based pollutants is given below in Table 6.1, high-priority action list for industrial based pollutants is given below in Table 6.2

**Table 6.1** High-priority action list for the residential based pollution

| Basin | Region Province-district | Pollutant | Stakeholders | Term | Management of Control |
|---|---|---|---|---|---|
| **RESIDENCE-BASED POLLUTION / WASTEWATER** | | | | | |
| **Hot spots lacking Household Wastewater Treatment Plants** | | | | | |
| Batı Akdeniz | Muğla-Datça | Household Wastewater (COD, TSS, $BOD_5$, T.N, T.P ) | Decision makers, public, non-governmental organizations etc. | 2010 | Monitoring |
| Doğu Akdeniz | İçel-Erdemli | | | | |
| Ceyhan | Adana-Ceyhan | | | | |
| Asi | Hatay-Dörtyol | | | | |
| Kuzey Ege | Balıkesir-Ayvalık<br>Balıkesir-Gömeç | | | | |
| Küçük Menderes | İzmir-Çeşme | | | | |
| **Sensitive areas lacking Household Wastewater Treatment Plants** | | | | | |
| Seyhan | Adana-Karataş | Household Wastewater (COD, TSS, $BOD_5$, T.N, T.P ) | Decision makers, public, non-governmental organizations etc. | 2010 | Monitoring |
| Asi | Hatay-Samandağ | | | | |
| Kuzey Ege | İzmir-Bergama | | | | |
| Gediz | İzmir-Menemen | | | | |
| **Counties with population over 100.000 lacking Household Wastewater Treatment Plants** | | | | | |
| Batı Akdeniz | Muğla-Milas | Household Wastewater (COD, TSS, $BOD_5$, T.N, T.P ) | Decision makers, public, non-governmental organizations etc. | 2010 | Monitoring |
| Antalya | Isparta-Yalvaç | | | | |
| Seyhan | Adana-Seyhan<br>Adana-Yüreğir | | | | |
| Ceyhan | K.Maraş-Merkez<br>K.Maraş-Elbistan<br>Osmaniye-Kadirli | | | | |
| Gediz | Manisa-Salihli<br>Manisa-Turgutlu | | | | |
| Küçük Menderes | İzmir-Buca<br>İzmir-Ödemiş | | | | |
| Büyük Menderes | Denizli-Merkez<br>Uşak-Merkez | | | | |

**Table 6.1** High-priority action list for the residential based pollution (continued)

| Basin | Region Province-district | Pollutant | Stakeholders | Term | Management of Control |
|---|---|---|---|---|---|
| **Counties with treatment plants in need of improvement** | | | | | |
| Batı Akdeniz | Muğla-Dalaman<br>Muğla-Ortaca<br>Muğla-Bodrum<br>Muğla-Fethiye | Household Wastewater (T. Nitrogen, T. Phosphorus) | Decision makers, public, non-governmental organizations etc. | 2010 | Monitoring |
| Antalya | Antalya-Merkez<br>Antalya-Alanya<br>Antalya-Manavgat | | | | |
| Doğu Akdeniz | İçel-Mersin,<br>İçel-Silifke,<br>İçel-Tarsus | | | | |
| Ceyhan | Adana-Yumurtalık | | | | |
| Asi | Hatay-İskenderun | | | | |
| Kuzey Ege | Balıkesir-Edremit<br>Balıkesir-Burhaniye | | | | |
| Gediz | İzmir-Foça | | | | |
| Küçük Menderes | İzmir-Selçuk | | | | |
| **Wastewater pollution stemming from tourism** | | | | | |
| Batı Akdeniz, Antalya, Doğu Akdeniz, Seyhan, Kuzey Ege, Gediz, Küçük Menderes, Büyük Menderes | Summer housing complexes and accommodation facilities | Household Wastewater (COD, TSS, $BOD_5$ ) | Owners of facilities, Decision makers, public, non-governmental organizations etc. | 2010 | Monitoring |

**Table 6.1** High-priority action list for the residential based pollution (continued)

| Basin | Region Province-district | Pollutant | Stakeholders | Term | Management of Control |
|---|---|---|---|---|---|
| **RESIDENCE-BASED POLLUTION / URBAN SOLID WASTE** | | | | | |
| *Counties with population over 100.000 lacking regular solid waste storage facilities* | | | | | |
| Batı Akdeniz | Muğla-Milas<br>Muğla-Fethiye<br>Muğla-Bodrum | Solid Waste | Decision makers, public, non-governmental organizations etc. | 2010 | Monitoring |
| Antalya | Antalya-Serik<br>Antalya-Merkez<br>Antalya-Alanya<br>Antalya-Manavgat<br>Isparta-Merkez<br>Isparta-Yalvaç | | | | |
| Doğu Akdeniz | İçel-Mersin,<br>İçel-Silifke<br>İçel-Tarsus<br>İçel-Erdemli | | | | |
| Seyhan | Adana-Seyhan<br>Adana-Yüreğir | | | | |
| Ceyhan | Adana-Ceyhan<br>Adana-Kozan<br>K.Maraş-Merkez<br>K.Maraş-Elbistan<br>Osmaniye-Merkez<br>Osmaniye-Kadirli | | | | |
| Asi | Hatay-Dörtyol<br>Hatay-İskenderun<br>Hatay-Samandağ<br>Hatay-Antakya | | | | |
| Kuzey Ege | İzmir-Bergama | | | | |
| Gediz | İzmir-Menemen<br>Manisa-Salihli<br>Manisa-Turgutlu | | | | |
| Küçük Menderes | İzmir-Ödemiş | | | | |
| Büyük Menderes | Denizli-Merkez<br>Uşak-Merkez | | | | |
| | | | | | |

**Table 6.2** High-priority action list for the industrial based pollution

| Basin | Sector | Rate of BOD reduction % | Rate of Heavy Metals Reduction % | Stake-holders | Term | Manage-ment of Control | BOD load t/y | | Heavy metals load t/y | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Non treated | Final | Non treated | | | Final | | |
| | | | | | | | | | Hg | Cd | Pb | Hg | Cd | Pb |
| **INDUSTRY-BASED POLLUTION** | | | | | | | | | | | | | | |
| **Enterprises lacking wastewater treatment plants or equipped with the latter in need of improvement** | | | | | | | | | | | | | | |
| Batı Akdeniz | Aquaculture Production | | | Industry, public, Decision makers, non-govern. organizations | 2010 | Monitoring | | | | | | | | |
| | Mining | | | | | | | | | | | | | |
| | Energy Generation | | | | | | | | | | | | | |
| Antalya | Textile industry | | | | | | | | | | | | | |
| | Aquaculture Production | | | | | | | | | | | | | |
| | Food industry | | | | | | | | | | | | | |
| | Mining | | | | | | | | | | | | | |
| Doğu Akdeniz | Gıda Sektörü | | | | | | | | | | | | | |
| | Mining | | | | | | | | | | | | | |
| | Textile industry | | | | | | | | | | | | | |
| | Petroleum industry | | | | | | | | | | | | | |
| | Metal industry | | | | | | | | | | | | | |
| | Paper industry | | | | | | | | | | | | | |
| Seyhan | Textile industry | | | | | | | | | | | | | |
| | Food industry | | | | | | | | | | | | | |
| | Other Organic Chemical Industries | | | | | | | | | | | | | |
| | Paper industry | | | | | | | | | | | | | |

**Table 6.2** High-priority action list for the industrial based pollution (continued)

| Basin | Sector | Rate of BOD reduction % | Rate of Heavy Metals reduction % | Stake-holders | Term | Manage-ment of Control | BOD load t/y | | Heavy metals load t/y | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Non treated | Final | Non treated | | | Final | | |
| | | | | | | | | | Hg | Cd | Pb | Hg | Cd | Pb |
| **INDUSTRY-BASED POLLUTION** | | | | | | | | | | | | | | |
| **Enterprises lacking wastewater treatment plants or equipped with the latter in need of improvement** | | | | | | | | | | | | | | |
| Ceyhan | Textile industry | | | Industry, public, Decision makers, non-govern. organizations | 2010 | Monitoring | | | | | | | | |
| | Food industry | | | | | | | | | | | | | |
| | Aquaculture Production | | | | | | | | | | | | | |
| | Other Organic Chemical Industries | | | | | | | | | | | | | |
| Asi | Metal industry | | | | | | | | | | | | | |
| | Food industry | | | | | | | | | | | | | |
| Kuzey Ege | Food industry | | | | | | | | | | | | | |
| | Tannery industry | | | | | | | | | | | | | |
| Gediz | Textile industry | | | | | | | | | | | | | |
| | Tannery industry | | | | | | | | | | | | | |
| | Food industry | | | | | | | | | | | | | |
| Küçük Menderes | Paper industry | 60- | | | | | 253 | 101 | - | | | | | |
| | Textile industry | 50 | - | | | | 181 | 91 | - | | | | | |
| | Food industry | 30 | - | | | | 107 | 75 | - | | | | | |
| | **Others** | 20 | - | | | | 11 | 9 | - | | | | | |
| | Other Organic Chemical Industries | - | 50 | | | | - | - | - | 0,008 | 0,376 | | 0,004 | 0,188 |
| | **Metal industry** | - | 50 | | | | - | - | - | 0,002 | 0,01 | | 0,0012 | 0,006 |

**Table 6.2** High-priority action list for the industrial based pollution (continued)

| Basin | Sector | Rate of BOD reduction % | Rate of Heavy Metals Reduction % | Stake-holders | Term | Manage-ment of Control | BOD load t/y | | Heavy metals load t/y | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Non treated | Final | Non treated | | | Final | | |
| | | | | | | | | | Hg | Cd | Pb | Hg | Cd | Pb |
| **INDUSTRY-BASED POLLUTION** | | | | | | | | | | | | | | |
| **Enterprises lacking wastewater treatment plants or equipped with the latter in need of improvement** | | | | | | | | | | | | | | |
| Büyük Menderes | İnd. organized district | 20 | 55 | Industry, public, Decision makers, non-govern. organizations | 2010 | Monitoring | 312 | 250 | | 0,062 | 13,42 | | 0,028 | 1,25 |
| | Tannery industry | 60 | 40 | | | | 3390 | 1356 | | | 5,39 | | 0,000 | 5,39 |
| | Other Inorganic chemicals industry | - | - | | | | | | | 0,0003 | 0,0036 | | 0,000 | 0,0016 |
| | Other Organic Chemical industries | - | - | | | | | | | 0,0002 | 0,025 | | 0,000 | 0,0012 |
| | Metal industry | - | - | | | | | | | 0,0002 | 0,026 | | 0,000 | 0,025 |
| | Food industry | 20 | - | | | | 296 | 237 | | 0,001 | 0,0078 | | 0,001 | 0,078 |
| | Textile industry | 50 | - | | | | 2754 | 1377 | | | | | | |
| | Paper industry | 20 | - | | | | 31 | 25 | | | | | | |
| Meriç-Ergene | Textile industry | | | | | | | | | | | | | |
| | Tannery industry | | | | | | | | | | | | | |
| | **İnd. organized district** | | | | | | | | | | | | | |

## 6.2 LIST OF ACTIONS FOR HARMONIZING THE LEGAL AND CODPORATE STRUCTURE

Actions that still preserve their significance and validity regarding the harmonization of the legal and corporate structure as set forth in National Environmental Action Plan (NEAP, 1988) are provided below in the list of high-priority action (Table 6.3). As the harmonization of the said legal and corporate structure is an integral part of the process at the stage of implementing the national action plan, time scale has been elaborated in short, medium and long terms.

**Table 6.3** List of actions for harmonizing the legal and corporate structure (NEAP, 1998)

| **ACTIONS** | **STAKEHOLDERS** | **TIME SCALE** |
|---|---|---|
| **Studies for Harmonizing the Legal and Corporate Structure** | | |
| Comparative Analysis of Corporate Authority and Responsibility – Working Method and Scope | Turkish Prime Ministry, Ministry of Environment and Forest, State Planning Organization, Universities, Ministries, Local Governments, Occupational Organizations, Voluntary Institutions | Short term |
| Comparative Analysis of Legal Regulation | Turkish Prime Ministry, Ministry of Environment and Forest, State Planning Organization, Ministries, Local Governments, Occupational Organizations, Voluntary Institutions | Short term |
| Classification of Land Utilization Capabilities, Establishing the Opportunities and Forms of Use and further Elaboration of the Land Utilization Plans | Ministry of Agriculture and Rural Works (Environment and Forest, Public Works and Housing, Energy and Natural Resources), State Statistics Institute, General Directorate of Rural Works, General Directorate of Agricultural Reform, Universities | Medium term |
| **Priorities in Systems for Raising the Public Awareness and Developing Information Systems** | | |
| Administration/Arrangement of Environmental Data | State Statistics Institute, State Water Works, Local Environmental Boards, Universities, Voluntary Institutions, Research & Development Institutions | Medium term |
| Environmental Training | Ministry of Environment and Forest, Ministry of National Education, Line Ministries, Private Sector, Voluntary Institutions, Universities | Short term |
| **Investments in Developing Environmental Management** | | |
| Promotion of Clean Technologies and Energy Resources | Ministry of Industry and Trade, Ministry of Environment and Forest, Private sector, Ministry of Energy, State Public Works, Turkish Treasury Local governments, universities, Voluntary Institutions | Medium term |
| Developing the Management of Coastal Areas | Ministry of Public Works and Housing, Ministry of Culture and Tourism, Ministry of Environment and Forest, Local Governments, Private Provincial Administrations | Short term |

# 7. ELABORATION OF THE INVESTMENT PORTFOLIO

The investment portfolio has two major components allowing the identification of investment priorities and discussing of investment priorities with decision makers, politicians and public. In forming basin-based investment portfolios, a scoring was made in consideration of items such as high-priority environmental problem of the basin, benefits of the project, being a hot spot, sensitive area and being a tourism area, its contribution to the development, financial sustainability, feasibility and estimated cost.

Elaboration of the investment portfolio has exhaustively been described in the method section. Accordingly, separate investment portfolios for each basin have been provided.

Elaboration of the investment portfolios are given in Annex IV.

## 7. 1 LIST OF PROJECTS IN INVESTMENT PORTFOLIO AS SORTED BY PRIORITY

After the formation of the investment portfolios matrix prepared on basin basis, ultimately projects have been listed as sorted by priority (Table 7.1, 7.2, 7.3). Such sorting of projects by priority have been effected according to the results of the investment portfolio matrix, and the sorting of projects pertaining to basins having equal total scores have been effected in consideration of the priority of pollutants for the basin in terms of their pollution capacities.

Projects with a total score below 60 according to the investment portfolio matrix have been considered as high-priority projects and further listed in Table 7.3 below.

Actions for harmonizing the legal and corporate structure have also been included in the investment portfolio embodying the financial resource situation as well (Table 7.4).

**Table 7.1** List of high priority projects (projects with score higher than 70 according to the investment portfolio matrix)

| Basin | List Of Projects | Estimated Cost | Resource Public/Private | Term |
|---|---|---|---|---|
| **Seyhan Basin** | Solid Waste Storage Plants for **Adana-Seyhan, Adana-Yüreğir** counties | $ 10.000.000 -20.000.000 | Public | 2010 |
| | Sewage and domestic wastewater treatment plant for **Adana-Karataş** county | $ 5.000.000 -7.000.000 | Public | 2010 |
| **Büyük Menderes Basin** | Solid Waste Storage Plants for **Denizli-Merkez, - Uşak-Merkez** counties | $ 10.000.000 -25.000.000 | Public | 2010 |
| **Antalya Basin** | Solid Waste Storage Plants for **Antalya-Serik, Antalya-Merkez (hot spot) Antalya-Alanya (hot spot), Antalya-Manavgat (hot spot), Isparta-Merkez** Isparta-Yalvaç counties | $ 20.000.000 -25.000.000 | Public | 2010 |
| **Küçük Menderes Basin** | Solid Waste Storage Plants for the **İzmir-Ödemiş** county | $ 6.000.000 -10.000.000 | Public | 2010 |
| | Sewage and domestic wastewater treatment plant for the **İzmir-Çeşme** county | $ 5.000.000 -8.000.000 | Public | 2010 |
| | Sewage and domestic wastewater treatment plant for the **İzmir-Buca, İzmir-Ödemiş** counties | $ 70.000.000 -100.000.000 | Public | 2010 |
| **Gediz Basin** | Solid Waste Storage Plants for **the İzmir-Menemen, Manisa-Salihli, Manisa-Turgutlu, İzmir-Bergama** counties | $ 10.000.000 -15.000.000 | Public | 2010 |
| | Sewage and domestic wastewater treatment plant for the **İzmir-Menemen** county | $ 25.000.000 -35.000.000 | Public | 2010 |
| **Doğu Akdeniz Basin** | Solid Waste Storage Plants for the **İçel-Silifke, İçel-Tarsus, İçel-Erdemli, İçel-Mersin,** (capacity improvement) * counties | $ 10.000.000 -25.000.000 | Public | 2010 |
| | Sewage and domestic wastewater treatment plant for the **İçel-Erdemli** county | $ 30.000.000 -40.000.000 | Public | 2010 |
| **Batı Akdeniz Basin** | Solid Waste Storage Plants for the **Muğla-Milas, Muğla-Fethiye, Muğla-Bodrum** counties | $ 6.000.000 -10.000.000 | Public | 2010 |
| | Sewage and domestic wastewater treatment plant for the **Muğla-Milas** county | $ 20.000.000 -30.000.000 | Public | 2010 |
| **Ceyhan Basin** | Solid Waste Storage Plants for the **Adana-Ceyhan, Adana-Kozan, K.Maraş-Merkez K.Maraş-Elbistan, Osmaniye-Merkez, Osmaniye-Kadirli** counties | $ 10.000.000 -15.000.000 | Public | 2010 |
| | sewage and domestic wastewater treatment plant for the **Adana-Ceyhan** county | $ 30.000.000 -40.000.000 | Public | 2010 |
| **Asi Basin** | Solid Waste Storage Plants for the **Hatay-Dörtyol, Hatay-İskenderun, Hatay-Samandağ, Hatay-Antakya** counties | $ 5.000.000 -10.000.000 | Public | 2010 |
| **Kuzey Ege Basin** | Solid Waste Storage Plants for the **İzmir-Bergama** county | $ 6.000.000 -10.000.000 | Public | 2010 |
| | Sewage and domestic wastewater treatment plant for the **Balıkesir-Ayvalık, Balıkesir-Gömeç** counties | $ 5.000.000 -8.000.000 | Public | 2010 |
| | Sewage and domestic wastewater treatment plant for the **İzmir-Bergama** county | $ 8.000.000 -12.000.000 | Public | 2010 |
| | Sewage and domestic wastewater treatment plant for the **Hatay-Dörtyol** county | $ 20.000.000 -30.000.000 | Public | 2010 |
| | Sewage and domestic wastewater treatment plant for the **Hatay-Samandağ** county | $ 20.000.000 -30.000.000 | Public | 2010 |

* Solid waste from tourism is included

**Tablo 7.2** List of medium priority projects (projects with score higher than 60 and lower than 70 according to the investment portfolio matrix )

| Basin | List Of Projects | Estimated Cost | Resource Public/Private | Term |
|---|---|---|---|---|
| **Seyhan Basin** | Sewage and domestic wastewater treatment plant for **Adana-Seyhan, Adana-Yüreğir** counties | $ 200.000.000 -300.000.000 | Public | 2010 |
| | Wastewater Treatment Plant for summer housing complexes and accommodation facilities | $ 1.000.000 -2.000.000 | Public | 2010 |

| | | | | |
|---|---|---|---|---|
| | Treatment of industrial wastewaters produced during the production activities of **Textile industry**,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 35.000.000 -55.000.000 | Private | 2010 |
| | Treatment of industrial wastewaters produced during the production activities of **Food Sector**,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 25.000.000 -35.000.000 | Private | 2010 |
| | Treatment of industrial wastewaters produced during the production activities of **other organic chemical industries**,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 20.000.000 -30.000.000 | Private | 2010 |
| | Treatment of industrial wastewaters produced during the production activities of **Paper Sector**,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 10.000.000 -20.000.000 | Private | 2010 |
| **Antalya Basin** | - Isparta-Yalvaç sewage and domestic wastewater treatment plant for the county | $ 15.000.000 -25.000.000 | Public | 2010 |
| | Wastewater Treatment Plant for summer housing complexes and accommodation facilities | $ 30.000.000 -50.000.000 | Public | 2010 |
| **Büyük Menderes Basin** | Treatment of industrial wastewaters produced during the production activities of **industrial organized district industry**,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 8.000.000 -12.000.000 | Private | 2010 |
| | Sewage and domestic wastewater treatment plant for **Denizli-Merkez, Uşak-Merkez** counties | $ 50.000.000 -70.000.000 | Public | 2010 |
| | Wastewater Treatment Plant for summer housing complexes and accommodation facilities | $ 2.000.000 -4.000.000 | Public | 2010 |
| | Treatment of industrial wastewaters produced during the production activities of **Textile industry**,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 40.000.000 -60.000.000 | Private | 2010 |
| | Treatment of industrial wastewaters produced during the production activities of **Tannery industry**,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 20.000.000 -40.000.000 | Private | 2010 |
| | Treatment of industrial wastewaters produced during the production activities of **Paper and Food industry**,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 15.000.000 -25.000.000 | Private | 2010 |
| | Treatment of industrial wastewaters produced during the production activities of **other organic and inorganic industry**<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 20.000.000 - 40.000.000 | Private | 2010 |

**Tablo 7.2** List of medium priority projects (projects with score higher than 60 and lower than 70 according to the investment portfolio matrix ) (continued)

| Basin | List Of Projects | Estimated Cost | Resource Public/Private | Term |
|---|---|---|---|---|
| **Gediz Basin** | Sewage and domestic wastewater treatment plant for **Manisa-Salihli, Manisa-Turgutlu, Manisa-Akhisar** counties | $ 50.000.000 -80.000.000 | Public | 2010 |
| | Wastewater Treatment Plant for summer housing complexes and accommodation facilities | $ 2.000.000 -3.000.000 | Public | 2010 |
| | Treatment of industrial wastewaters produced during the production activities of **Tannery** industry,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 10.000.000 -20.000.000 | Private | 2010 |

| | | | | |
|---|---|---|---|---|
| | Treatment of industrial wastewaters produced during the production activities of **Food** Sector,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 2.000.000 -4.000.000 | Private | 2010 |
| | Treatment of industrial wastewaters produced during the production activities of **Textile** industry,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 40.000.000 -60.000.000 | Private | 2010 |
| **Asi Basin** | Treatment of industrial wastewaters produced during the production activities of **Metal** industry,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 10.000.000 -20.000.000 | Private | 2010 |
| | Treatment of industrial wastewaters produced during the production activities of **Food** Sector,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 8.000.000 -12.000.000 | Private | 2010 |
| **Küçük Menderes Basin** | Treatment of industrial wastewaters produced during the production activities of **Textile** industry,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 5.000.000 -10.000.000 | Private | 2010 |
| | Treatment of industrial wastewaters produced during the production activities of **Metal** industry,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 2.000.000 -4.000.000 | Private | 2010 |
| | Treatment of industrial wastewaters produced during the production activities of **Food** Sector,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 3.000.000 -5.000.000 | Private | 2010 |
| | Treatment of industrial wastewaters produced during the production activities of **Paper** Sector,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 5.000.000 -10.000.000 | Private | 2010 |
| | Treatment of industrial wastewaters produced during the production activities of **Other organic chemical** Sector,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 5.000.000 -10.000.000 | Private | 2010 |
| | Wastewater Treatment Plant for summer housing complexes and accommodation facilities | $ 3.000.000 -5.000.000 | Public | 2010 |

**Tablo 7.2** List of medium priority projects (projects with score higher than 60 and lower than 70 according to the investment portfolio matrix ) (continued)

| Basin | List Of Projects | Estimated Cost | Resource Public/Private | Term |
|---|---|---|---|---|
| **Kuzey Ege Basin** | Treatment of industrial wastewaters produced during the production activities of **Tannery industry**, -furnishing Wastewater Treatment Plants in areas in lack of the latter, -Improvement of current Wastewater Treatment Plants | $ 5.000.000 -10.000.000 | Private | 2010 |
| | Wastewater Treatment Plant for summer housing complexes and accommodation facilities | $ 8.000.000 -12.000.000 | Public | 2010 |
| | Treatment of industrial wastewaters produced during the production activities of **Food Sector**, -furnishing Wastewater Treatment Plants in areas in lack of the latter, -Improvement of current Wastewater Treatment Plants | $ 10.000.000 -20.000.000 | Private | 2010 |
| **Doğu Akdeniz Basin** | Treatment of industrial wastewaters produced during the production activities of **Food Sector**, -furnishing Wastewater Treatment Plants in areas in lack of the latter, -Improvement of current Wastewater Treatment Plants | $ 50.000.000 -80.000.000 | Private | 2010 |
| | Treatment of industrial wastewaters produced during the production activities of **Petroleum Sector**, -furnishing Wastewater Treatment Plants in areas in lack of the latter, -Improvement of current Wastewater Treatment Plants | $ 10.000.000 -20.000.000 | Private | 2010 |
| | Treatment of industrial wastewaters produced during the production activities of **Metal industry**, -furnishing Wastewater Treatment Plants in areas in lack of the latter, -Improvement of current Wastewater Treatment Plants | $ 15.000.000 -25.000.000 | Private | 2010 |
| | Treatment of industrial wastewaters produced during the production activities of **Paper Sector**, -furnishing Wastewater Treatment Plants in areas in lack of the latter, -Improvement of current Wastewater Treatment Plants | $ 5.000.000 -15.000.000 | Private | 2010 |
| | Wastewater Treatment Plant for summer housing complexes and accommodation facilities | $ 15.000.000 -25.000.000 | Public | 2010 |

**Tablo 7.2** List of medium priority projects (projects with score higher than 60 and lower than 70 according to the investment portfolio matrix ) (continued)

| Basin | List Of Projects | Estimated Cost | Resource Public/Private | Term |
|---|---|---|---|---|
| **Ceyhan Basin** | Treatment of industrial wastewaters produced during the production activities of **Textile** industry,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 8.000.000 -12.000.000 | Private | 2010 |
| | Treatment of industrial wastewaters produced during the production activities of **Food** Sector,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 8.000.000 -12.000.000 | Private | 2010 |
| | Treatment of industrial wastewaters stemming from **Aquaculture Production**,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 5.000.000 -7.000.000 | Private | 2010 |
| | Sewage and domestic wastewater treatment plant for **K.Maraş-Merkez, K.Maraş-Elbistan, Osmaniye-Kadirli** counties | $ 30.000.000-40.000.000 | Public | 2010 |
| **Batı Akdeniz Basin** | Sewage and domestic wastewater treatment plant for **Muğla-Datça** county | $ 2.000.000 -3.000.000 | Public | 2010 |
| | Treatment of industrial wastewaters stemming from **Aquaculture Production**,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 1.000.000 -2.000.000 | Private | 2010 |
| | Treatment of industrial wastewaters stemming from **mining activities**,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 1.000.000 -2.000.000 | Private | 2010 |
| | Treatment of industrial wastewaters produced during the production activities of **Energy production**<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 4.000.000 -6.000.000 | Private | 2010 |
| | Wastewater Treatment Plant for summer housing complexes and accommodation facilities | $ 30.000.000 -60.000.000 | Public | 2010 |

* Solid waste from tourism is included

**Table 7.3** List of low-priority projects (projects with score below 60 according to the investment portfolio matrix)

| Basin | List of projects sorted by priority | Estimated Cost | Financial resource Public/Private | Timeframe |
|---|---|---|---|---|
| **Doğu Akdeniz Basin** | Treatment of industrial wastewaters stemming from mining activities,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 10.000.000 - 20.000.000 | Private | 2010 |
| | Treatment of industrial wastewaters produced during the production activities of textile industry,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 15.000.000 - 25.000.000 | Private | 2010 |
| **Ceyhan Basin** | Treatment of industrial wastewaters produced during the production activities of other organic chemical industries,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 500.000-1.500.000 | Private | 2010 |
| **Antalya Basin** | Treatment of industrial wastewaters stemming from Aquaculture Production,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 200.000-600.000 | Private | 2010 |
| | Treatment of industrial wastewaters produced during the production activities of Food Sector,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 1.000.000 -2.000.000 | Private | 2010 |
| | Treatment of industrial wastewaters stemming from mining activities,<br>-furnishing Wastewater Treatment Plants in areas in lack of the latter,<br>-Improvement of current Wastewater Treatment Plants | $ 200.000-600.000 | Private | 2010 |
| **Gediz Basin** | - improving the current Household Wastewater Treatment Plant in İzmir-Foça (e.g: increasing capacity, transforming physical treatment into biological treatment etc.) | $ 1.000.000 -2.000.000 | Public | 2010 |

**Table 7.4** Investment plan for instruments supporting the National Action Plan

| List of projects | Estimated Cost | Financial Resource Public /Private | Time scale |
|---|---|---|---|
| **Works for Harmonizing the Legal and Corporate Structure** | | | |
| Comparative Analysis of Corporate Authority and Responsibility – Working Method and Scope | < $ 5.000.000 private | Public | Short term |
| Comparative Analysis of Legal Regulation | < $ 5.000.000 private | Public | Short term |
| Classification of Land Utilization Capabilities, Establishing the Opportunities and Forms of Use and further Elaboration of the Land Utilization Plans | $ 5-25.000.000 private | Public | Medium term |
| **Priorities in Systems for Raising the Public Awareness and Developing Information Systems** | | | |
| Administration/Arrangement of Environmental Data | < $ 5.000.000 private | Public | Medium term |
| Environmental Training | $ 5-25.000.000 private | Public | Short term |
| **Investments in Developing Environmental Management** | | | |
| Promotion of Clean Technologies and Energy Resources | $ 26-50.000.000 private | Public | Medium term |
| Developing the Management of Coastal Areas | $ 26-50.000.000 private | Public | Short term |

# 8. ECONOMICAL INSTRUMENTS

With a view to effectuating investments stipulated in the National Action Plan in line with the SAP targets, financial resources are needed. Support can be acquired from national or international resources through such financing. It will be favorable to provide the required financing from rather national resources. Being aware of the fact that the benefit to be derived out of implementing this national resource program will highly exceed the cost incurred, those to provide the resource necessary for the implementation of the program are the pollutant, consumer, user and state management.

Efficient utilization of international resources is crucial for an effective SAP in terms of achievement and cost. International collaborations have a central role in capacity planning, technology transfer and financial support.

It is necessary to seek foreign financial resources for SAP and in case national financial resources are limited, new financial plans should be effected. In such a case, there are two sorts of resources:

- National financial resources,
- International financial resources and other alternatives

Such financial resource obtained will be employed in 3 fundamental areas as detailed below:

- Design and implementation of various technical studies, demonstration and pilot projects, planning, training, corporate structuring, data collection and monitoring; addressing and formulating the project, feasibility studies
- Improving the fundamental investment and sectoral management for the plants facilities to be established with a view to alleviating and controlling pollution.
- Implementing the project, training, corporate structuring and monitoring, operation and maintenance

## 8.1 NATIONAL FINANCIAL RESOURCES

With a view to addressing the financial resources and economical instruments to be employed to implement the National Action Plan in line with the SAP targets, a project titled “Economic Instruments to Address Marine Pollution from Land Based Activities for National Action Plans, 2004” has been implemented by Istanbul Technical University with the support of PAP/RAC (Citil et all., 2004)

In this section, using the outputs of the project, the economical instruments foreseen for the year 2005-2010 year and the calculation of the costs to be necessary for formulating, implementing and encouraging such economical instruments will be provided

**Legal Framework**

Despite the large body of legislation, government agencies, and municipalities do not possess clearly defined powers of enforcement entailed by inspection. For example, existing legislation is not clear on the subject of inspecting municipalities which operate urban-scale sewage treatment works. In addition there is no 'Regulatory Body' responsible for the inspection duties of metropolitan municipality water and sewerage administrations. These administrations are charged with infrastructural investment, construction, operation, maintenance and also inspection.

On a national scale, companies operating in the industrial and tourism sectors are obliged to operate sewage treatment plants. Moreover, this obligation is backed by financial incentives. In the tourism sector, only projects which include a sewage treatment plant are granted incentive licenses.

**Institutional Framework**

The institutions in water supply and sewerage sector are divided in two groups, one responsible for investment and the other for inspection. Of these agencies, the State Hydraulic Works (DSI), the Bank of Provinces (Iller Bank) and the General Directorate of Rural Services ( KHGM) are the most important with respect to their investment capacity, operation and maintenance on a national scale.

**Investment Agencies**

There are more than ten governmental and municipal agencies in drinking water supply and sanitation sector in Turkey operating under specific laws and regulations for investment purposes. Of these agencies, the State Hydraulic Works (DSI), the Bank of Provinces (Iller Bank) and the General Directorate of Rural Services ( KHGM), the Ministry of Tourism are the most important with respect to their investment capacity, operation and maintenance on a national scale.

DSI is involved in water resources development on a national scale.

The General Directorate of the Bank of Provinces, which is a public institution, helps municipalities plan and build sewerage systems and wastewater treatment plants. It provides grants and credits, as well as technical assistance, to smaller municipalities for sanitation services and water supply. Municipalities are shareholders in the capital of the Bank, which can act as a loan guarantor.

The General Directorate of Rural Affairs, which reports to the Prime Minister's Department, contributes to water infrastructure development in rural areas by building potable water supply facilities and sewerage systems in villages (fewer than 2000

inhabitants) and surrounding settlements, as well as by developing small-scale irrigation schemes.

**Inspection Agencies**

There are several agencies responsible for inspection proceeding according to various laws and legislations. Out of these, the Ministry of Environment and Forestry and the Ministry of Health are directly responsible for the inspection of water supply and sanitation activities.

Overall planning of investment in water resources development and pollution control is carried out by the State Planning Organization, which reports to the Prime Minister's Department. The Ministry of Environment and Forestry has also a coordinating role, between public and private institutions. The Ministry of Environment and Forestry is responsible for international co-operation and agreements in the area of water resources management, pollution control and ensuring that EIA procedures are applied properly.

The responsibility for the hygiene control of drinking and utility water and control of related establishments was given to the Ministry of Health. By the Sanitation Act No.1593, the Ministry of Health undertakes the responsibility for public health. This act includes the protection of water resources against domestic and industrial wastewater discharges into water bodies.

In line with the legislative harmonization/transposition process with the EU, a few modifications will be necessary in the establishment law of these agencies.Normative acts for Water Sector in Turkey are presented in Table 8.1.

**Table 8.1** Normative Acts for Water Sector in Turkey

| Name of Act | In force from | Responsible Body |
|---|---|---|
| Regulation on Pollution Prevention Fund | 1985 | Ministry of Environment and Forestry(MoEF) |
| Regulation on Water Pollution Control | 2004 | MoEF |
| Regulation on Fines Imposed on Ships and Other Vessels | 1987 | MoEF |
| Regulation on Solid Waste Control | 1991 | MoEF |
| Regulation on Environmental Impact Assessment | 1993 as amended in 2003 | MoEF |
| Regulation on Hazardous Waste Control Management | 1995 | MoEF |
| Regulation on Oil Waste Control | 2004 | MoEF |
| Regulation on Implementation of Law of Coasts | 1990 | Ministry of Public Works and Settlement(MoPWS) |
| Regulation on Unhealthy Establishments | 1995 | Ministry of Health(MoH) |

Water-sea Polluting Actions and Penalties against them in Turkey are presented in Table 8.2.

**Definitions of the crimes against environment for Table 8.2.**

**1-a:** leaving, storing, transporting any kind of waste to environment without taking measures according to standards determined by the related law.
**1-b:** Potential polluter has to prevent pollution
**2:** Overuse and misuse of rural or urban land, putting ecological balance in danger
**3:** causing ecological deformation in air, land or water by ignoring precautions during the transportation of chemicals
**4:** Producig noise over related standards
**5-a:** Working without purifying systems
**5-b:** Anyone producing waste has to take necessary measures to save environment
**6:** Increase in scale of production has to be reported to the related local authority
**7:** Businesses has to report the type of energy, and wastes related to it
**8:** Violation of Pollution bans related to shores, seas, bays, rivers, etc.
**a:** Unloading nautical ballast
**b:** Unloading solid or liquid waste into the from a marine vehicle
**c:** Nautical vehicles polluting the sea

**Table 8.2** Water-sea Polluting Actions and Penalties against them in Turkey (Thousand TLs)

| **Crime** | **Type of actor** | **Artical of law** | ***Years*** | | | | |
|---|---|---|---|---|---|---|---|
| | | | **1999** | **2000** | **2002** | **2003** | ***2004*** |
| 1-a | Individual | 8/1 | 196,500 | 298,870 | 714,260 | 1,135,673.4 | *1,459,340* |
| | Business, institution | 8/1 | 589,500 | 896,620 | 2,142,830 | 3,407,099.7 | *4,378,123* |
| 1 –b | Individual | 8/2 | 982,500 | 1,494,380 | 3,571,440 | 5,678,589.6 | *7,296,988* |
| | Business, institution | 8/2 | 2,947,500 | 4,483,140 | 10,714,330 | 17,035,784.7 | *21,890,983* |
| 2 | Individual | 9/2 | 196,500 | 298,870 | 714,260 | 1,135,673.4 | *1,459,340* |
| | Business, institution | 9/2 | 589,500 | 896,620 | 2,142,830 | 3,407,099.7 | *4,378,123* |
| 3 | Individual | 13 | 1,965,000 | 2,988,760 | 7,142,880 | 11,357,179.2 | *14,593,975* |
| | Business, institution | 13 | 5,895,000 | 8,966,290 | 21,428,710 | 34,071,648.9 | *43,782,069* |
| 4 | Individual | 14 | 98,250 | 149,430 | 357,120 | 567,820.8 | *729,650* |
| | Business, institution | 14 | 294,750 | 448,310 | 1,071,410 | 1,703,541.9 | *2,189,051* |
| 5-a | Business, institution | 11/1 | 1,965,000 | 2,988,760 | 7,142,880 | 11,357,179.2 | *14,593,975* |
| 5-b | Business, institution | 11/3 | 982,500 | 1,494,380 | 3,571,440 | 5,678,589.6 | *7,296,988* |
| 6- | Business, institution | 11/2 | 589,500 | 896,620 | 2,142,830 | 3,407,099.7 | *4,378,123* |
| 7- | Business, institution | 12/2 | 982,500 | 1,494,380 | 3,571,440 | 5,678,589.6 | *7,296,988* |
| 8-a | <1000 (incl.) gr.ton | 22/a | 9,825,000 | 14,943,820 | 35,714,520 | 56,786,086.8 | *72,970,122* |
| | 1000-5000 (incl.) gr.ton | 22/a | 19,650,000 | 29,887,650 | 71,429,080 | 113,572,237.2 | *145,940,325* |
| | >5000 gr.ton | 22/a | 98,250,000 | 149,438,250 | 357,145,460 | 567,861,281.4 | *729,701,747* |
| 8-b | 18 -1000 (incl.) gr. ton | 22/b | 9,825,000 | 14,943,820 | 35,714,520 | 56,786,086.8 | *72,970,122* |
| | >1000 gr.ton | 22/b | 19,650,000 | 29,887,650 | 71,429,080 | 113,572,237.2 | *145,940,325* |
| *8-c* | *Up to 18 (excl.) gr. ton ships and other marine vehicles* | *22/c* | *589,500* | *896,620* | *2,142,830* | *3,407,099.7* | *4,378,123* |

**Source:** The Official Gazette, Circular about the Administrative Penalties according to Environment Act(No.2872), 1999, 2000, 2002, 2003, 2004.

Metering and pricing are essential parts of Turkish experience. Water bills cover water and waste water charges plus value added tax. Charges increase progressively and are used as a revenue raising tool. As of 2004, water bills will also include environment cleaning tax, which in force since mid-1990s. These are all market related measures expected to be effective in terms of overuse of water resources. Besides, serious penalties are in effect as Table 8.2 indicates. Yet, there are still much to do in terms of infrastructure which is a problem area because of both financial difficulties the government has to deal with, and increasing population, and migration.

Environmental charges and taxes are generating revenues and a fundamental distinction is whether revenues are earmarked specifically for environmental spending or contribute to general state or municipal budgets. Since, for this survey, the term "charge" is applied if all or major parts of the revenue from the instrument are earmarked for environmental expenditure. If not, the term "tax" is used. According to the current system in Turkey for revenues from the charges are contributing to general state or municipal budgets. However this is just about to change. New Law for Municipal Administrations has been prepared (under discussion in The Grand National Assembly of Turkey) and revenues from charges will be used only for Environmental expenditure and will be contributed to Municipal Budget rather than General State Budget. It has been used the term "charge" as in this meaning in this proposal. In the following diagram, it is presented the Land-Based Sources of Pollution (LBS) and proposed EIs for each source are identified in the Tables.

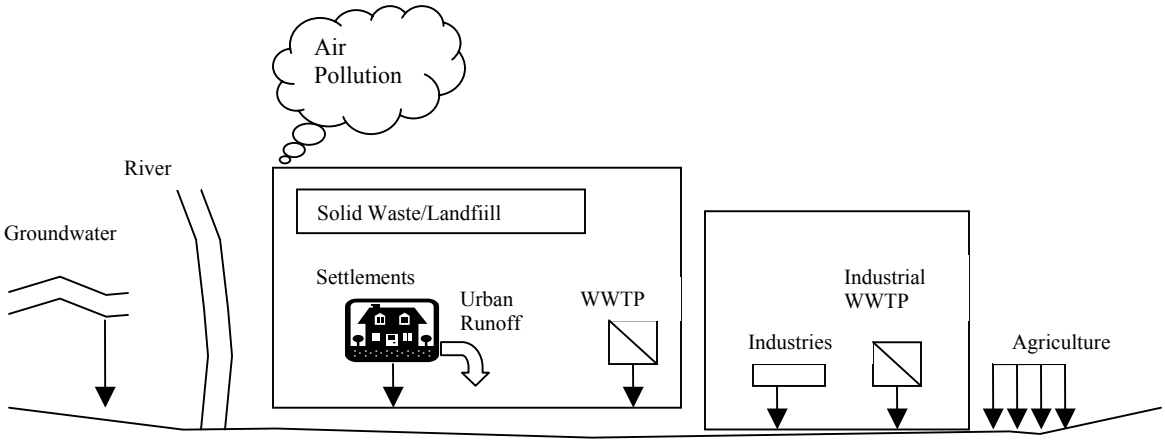


Figure 8.1 Schematic Diagram for the LBS

Economic instruments alternatives and their explanations are given below

- User charge
- Subsidies
- Ecocharge
- Tradable permits
- Tax
- Non-compliance fee
- Emission charge
- Product charge

**Timetable**

According to the Timetable below, it has been offered to implementation of the EIs should start since 2007.

**Table 8. 3** *Timetable*

| | |
|---|---|
| Initial discussions and approval in principle | 1 year(2005-2006) |
| Consultations Period | 18 months (2005-2006) |
| Legal Review and Clearance | 1 year (2005-2006) |
| Administrative Plan | 1 year(2006-2007) |
| Design of EI | 1 year (2006-2007) |
| Implementation Period | 3 years (2007-2010) |
| Review Period | 3 years (2007-2010) |

***Objectives of the EI***

***Log Frame for Objectives***

In this Section, Economic instruments that are to be introduced in the short term (2005-2010) have been presented.

### *User Charge for Domestic Wastewater*

| Hierarchy of Objectives | Key Performance Indicators | Monitoring and Evaluation | Critical Assumptions |
|---|---|---|---|
| **Development Objective:** Improvement of living standards of livelihoods in the context of sustainable development | Real incomes of local residents(baseline group will be established) | Monitoring will be performed according to the surveys of State Planning Organization and/or State Institute of Statistics | Improve the public health condition and beach quality, increase the quantity of sea foods |
| **Environmental Objective:** Continuous improvement in water quality and wastewater services of municipality | Number of households received the appropriate wastewater collection, treatment and disposal services | Compliance monitoring of water quality before and after EI | Revenues from EI are sufficient enough to enable municipality to increase spending in treatment and wastewater collection after basic services have been covered. |
| **Financial Objective:** To cover the full costs of collection of wastewater; planning, construction and operation of WWTP and canal systems | Revenues collected per wastewater generated before and after EI. Total revenues and costs before and after EI. | Wastewater tariffs of the municipalities will be used. Calculation and rearrangement will be done, if necessary | Estimates of charge rates are correct. All generators of wastewaters can be identified, measuring system is correct and no lost and leakage in the system |
| **Equity Objective:** Establishment of equity in such a way that all users pay the charge or tax per wastewater generated | Quality and quantity of the wastewater generated before and after EI for baseline group to be selected | Continuous monitoring before and after EI | Applying the SCADA system properly |

### *Ecocharge*

| Hierarchy of Objectives | Key Performance Indicators | Monitoring and Evaluation | Critical Assumptions |
|---|---|---|---|
| **Development Objective:** Development of the region by means of tourism activities | Real incomes of local residents. Number of visitors before and after the implementation of EI | Monitoring will be performed according to the surveys of State Planning Organization and/or State Institute of Statistics | EI causes in higher value tourism. Quality of the services in touristic facilities will be maintained. |
| **Environmental Objective:** Prevent unsustainable exploitation of coastal or marine resources | To comply with related EU Directives(such as 91/271/EC Urban WW Directive and/or EU Bathing Water Directive) | Baseline budget of pollutants to be identified. Quality monitoring survey to be conducted periodically. | Revenues from EI are sufficient enough to enable municipality to increase spending in treatment and wastewater collection after basic services have been covered. |
| **Financial Objective:** To cover the full cost of wastewater and infrastructure utilities. Each subscriber paying according to the wastewater they generate(PPP) | Revenues collected per wastewater generated before and after EI. Total revenues and costs before and after EI. | Surveys of the related agencies or Ministries will be used before and after EI | Estimates of charge rates are correct. All generators of wastewaters can be identified, measuring system is correct and no lost and leakage in the system |
| **Equity Objective:** Exemption of ecocharge for the people who are less well off | Real incomes of local residents. | A Baseline group by means of real incomes to be identified before and after EI. | Analysis for identification of baseline group should be carried out carefully. |

### *Tax for Urban Runoff*

| Hierarchy of Objectives | Key Performance Indicators | Monitoring and Evaluation | Critical Assumptions |
|---|---|---|---|
| **Development Objective:** Sustaining and improving of living standards in urban areas | Real incomes of local residents. Level of economical damage and pollution due to floods before and after the EI | Monitoring will be performed according to the surveys of State Planning Organization and/or State Institute of Statistics | Improve the public health condition and beach quality, reducing the number of casualties(human and living organisms) |
| **Environmental Objective:** To prevent the deterioration of the water quality, soil erosion and landslides after the flood. | Level of deteoriation due to erosion and change in water quality | Continuous quality monitoring for flood before and after EI. | Revenues from EI are enough for the infrastructure. |
| **Financial Objective:** To cover the full costs of infrastructure to be built up for flood period | Total revenues and costs before and after EI. | Surveys of the related agencies or Ministries will be used before and after EI | Estimates of tax rates are correct. |
| **Equity Objective:** Exemption of tax for the people who are less well off | Real incomes of local residents | A Baseline group by means of real incomes to be identified before and after EI. | Analysis for identification of baseline group should be carried out carefully. |

### *User Charge for Industrial Wastewater*

| Hierarchy of Objectives | Key Performance Indicators | Monitoring and Evaluation | Critical Assumptions |
|---|---|---|---|
| **Development Objective:** Maintaining sustainable livelihoods for communities by means of sustainable usage of natural resources. | Social and economical sustainability indexes | Monitoring of the indexes before and after EI | The amount of water used by industries is well identified |
| **Environmental Objective:** Improving of quality and quantity of natural resources | Level of deteoriation of natural resources | Continuous monitoring before and after EI | Purification capacity of receiving body will not be exceeded |
| **Financial Objective:** To cover the full costs of infrastructure to be built up | Total revenues and costs before and after EI. | Surveys of the related agencies or Ministries will be used before and after EI | Estimates of charge rates are correct. |
| **Equity Objective**: All industries pay the charge according to the wastewater they generated and pollution they created proportionally | Wastewater flow rates and quantity and quality of pollutants | Continuous monitoring before and after EI | Monitoring system applied correctly |

### *Non-Compliance Fee for Industrial Wastewater*

| Hierarchy of Objectives | Key Performance Indicators | Monitoring and Evaluation | Critical Assumptions |
|---|---|---|---|
| **Development Objective:** Sustainable exploitation of local natural resources | Adoption level of recycling and BAT usage | Compliance monitoring of water quality before and after EI | Quality of wastewater generated is well identified and monitored |
| **Environmental Objective:** Improving of quality and quantity of natural resources | Level of cleaner production applications | Monitoring of cleaner production applications | Monitoring and enforcement system is well applied |
| **Financial Objective:** Revenues will be used to support for environmental infrastructure investments | The cost of treatment in case of discharge limits are exceeded must be covered by the fees | Surveys of the related agencies or Ministries will be used before and after EI | Compliance monitoring, SCADA and enforcement system must be well established |
| **Equity Objective:** To sustain fair competitiveness among industries | Quota application and applying the fees for unit wastewater generated | Compliance monitoring of water quality before and after EI | Compliance monitoring, SCADA and enforcement system must be well established |

### *Emission Charge for Air*

| Hierarchy of Objectives | Key Performance Indicators | Monitoring and Evaluation | Critical Assumptions (*) |
|---|---|---|---|
| **Development Objective:** Improvement of living standards of livelihoods in the context of sustainable development | Real incomes of local residents | A Baseline group by means of real incomes to be identified before and after EI | Arrested development of industrial activities will be permitted |
| **Environmental Objective:** Improvement and sustaining ambient air quality and marine water | Level of adoption of technologies to reduce air pollutant emissions | Compliance monitoring of air and water quality before and after EI | Monitoring and enforcement system are well applied |
| **Financial Objective:** Minimizing the effect of atmospheric deposition and acid rain(e.g. stimulation of desulphurization and using fuels with low sulphur content | Percentage of revenues used for the emission reduction technologies | Monitoring and modeling atmospheric deposition before and after EI | Arrested development of industrial activities will be permitted |
| **Equity Objective:** All industries pay the charge according to the amount of pollutant they emitted proportionally | Level of total emissions of the industries to the atmosphere | Compliance monitoring before and after EI | Compliance monitoring, and enforcement system must be well established |

### *Tax for Agriculture*

| Hierarchy of Objectives | Key Performance Indicators | Monitoring and Evaluation | Critical Assumptions |
|---|---|---|---|
| **Development Objective:** Sustainable livelihoods for communities by means of sustainable usage of natural resources. | Real incomes of local residents | Compliance monitoring of water quality before and after EI | The amount of water used by agriculture is well identified |
| **Environmental Objective:** Control of pollution from non-point sources. | The amount of pesticides and fertilizers to be sold | Monitoring and modeling studies will be conducted before and after EI | The inventory of usage of fertilizers and pesticides will be well designated |
| **Financial Objective:** Revenue collected will be used to clean up the polluted coasts | Improve the public health condition and beach quality | Compliance monitoring of water quality before and after EI | Compliance monitoring, enforcement system must be well established |
| **Equity Objective:** Small sized farming will be exempted | Level of improvement on water quality | For baseline groups, estimate of taxes paid before and after the EI is introduced | Farmers have a capability of applying fertilizers and pesticides by correct methods |

## Implementation Plan

### *Log Frame for Implementation*

We have been proposing to implement the EIs as within two categories:

Domestic/Industrial

Agriculture

### *Domestic/Industrial*

| Activity | Actions/Inputs | Outputs | Critical Assumptions |
|---|---|---|---|
| **Consultations** | **Meetings:** With National and Local Government officials, local community representatives<br>**Discussions:** Discussions for increasing Public awareness | **Reports**<br>**Publicity Documents**<br>**Agreement with Municipalities(**Since New law have been promulgated related to Municipalities in Turkey, offers very extensive rights to local authorities in Turkey) | Scheme is acceptable to all stakeholders while retaining its capacity to fulfill environmental and financial objectives |
| **Administrative/ Legal Steps** | **Legal Review**<br>**Administrative Review** | **Legal approval**<br>**Administrative Plan:** Agreement for at least 3 years | Legal challenge is not made by any party negatively affected by EI Plan |
| **Design of EI** | **Modeling of links to objectives:**<br>Model results taken from other studies on subscribers and industries<br>Financial impacts of charge/tax modeled using budget analysis tool of Local Government<br><br>**Selection of key parameters:**<br>Charge rates for different groups(now and in future)<br>Determination of Baseline groups | **Results of applying the model or alternative method of selection**<br>**Report giving full design parameters:**<br>Report giving full design parameters for current and future charge/Tax and fees. e.g. charge scheme, exemptions, sharing of revenues between Local and governmental Agencies. | Assumptions are correct. Rates are selected appropriately. Exemptions and enforcement are being applied in a correct way. Initial charge rates are realistic which is acceptable to all stakeholders. If not, revision may be necessary |
| **Review** | **Plan for reviewing and monitoring** | **Report on review/ monitoring plan:**<br><br>Review of all aspects 12 months after implementation of EIs, and at the end of 2 years to be conducted by an independent auditor | Resources are made available for the review in a timely manner |

## Agriculture

| Activity | Actions/Inputs | Outputs | Critical Assumptions |
|---|---|---|---|
| **Consultations** | **Meetings:** With National and Local Government officials, local community representatives, farmers, manufacturers(fertilizers & pesticides)<br>**Discussions:** Discussions for increasing Public awareness | **Reports**<br>**Publicity Documents**<br>**Agreement with Municipalities(**Since New law have been promulgated related to Municipalities in Turkey, offers very extensive rights to local authorities in Turkey) | Scheme is acceptable to all stakeholders while retaining its capacity to fulfill environmental and financial objectives. Mediterranean Region is crucial in terms of both tourism and agriculture for Turkey. While preventing marine pollution, the other sectors should taken into consideration carefully |
| **Administrative/ Legal Steps** | **Legal Review**<br>**Administrative Review** | **Legal approval**<br>**Administrative Plan:** Agreement for at least 3 years | Legal challenge is not made by any party negatively affected by EI Plan |
| **Design of EI** | **Modeling of links to objectives:**<br>Model results taken from other studies on agriculture<br>Financial impacts of charge/tax modeled using budget analysis tool of Local Government<br><br>**Selection of key parameters:**<br>Charge rates for different groups(now and in future)<br>Determination of Baseline groups | **Results of applying the model or alternative method of selection**<br>**Report giving full design parameters:**<br>Report giving full design parameters for current and future charge/Tax and fees. e.g. charge scheme, exemptions, sharing of revenues between Local and governmental Agencies. | Assumptions are correct. Rates are selected appropriately. Exemptions and enforcement are being applied in a correct way. Initial charge rates are realistic which is acceptable to all stakeholders. If not, revision may be necessary |
| **Review** | **Plan for reviewing and monitoring** | **Report on review/ monitoring plan:**<br><br>Review of all aspects 12 months after implementation of EIs, and at the end of 2 years to be conducted by an independent auditor | Resources are made available for the review in a timely manner |

## 8.2. INTERNATIONAL FINANCIAL RESOURCES

In performing supportive and complimentary studies devoted to the successful realization of the National Action Plan, international financial resources have key role. Utilization of these resources should be planned very elaborately and appropriately coordinated.

Some of the financial resources and instruments that may be utilized in implementing the National Action Plan are listed below. There are also some major criteria that should be taken into consideration. These are available financial resources, types of organizations and geographical location. Major international financial resources are as follows:

Grants from GEF and UNDP or privileged assistance
Loans from multinational or regional banks
European Union financial instruments
Multinational programs: The Mediterranean Environmental Assistance Program METAP
Mutual bilateral agreements
Alternative supporting resources

# 9. PUBLIC PARTICIPATION

In most cases, the most successful way to protect marine environment against land based pollutants is regional collaborations. That is of considerable importance for rather enclosed or semi-enclosed seas.

## 9.1 CONSTITUTIONAL MODIFICATIONS

The most recent Constitution of the Turkish Republic that was formulated in 1982 stipulates that every citizen has the right to live in a healthy and balanced environment and further defines the mission of developing the environment, safeguarding environmental health and preventing pollution as a duty of both the government and citizens. Pursuant to such rights conferred in the Constitution, the Environmental Law was enacted in 1983, regulations were formulated and special funds were created devoted to the protection of environment. Furthermore, a Ministry of Environment and Forest and a Environmental Commission has been set up within the body of the Grand National Assembly of Turkey; environmental accountabilities have been entrusted to central agencies and local governments; and environmental susceptibilities have been integrated into the development plans. Again in the same period, the Environmental Council convened for three times and various activities devoted to building up National Agenda 21 have been performed. Programs aimed at raising environmental public consciousness have been initiated. The Environmental Law no 2872 includes the internationally adopted "polluter pays" principle and takes the "perfect liability" concept as basis to the implementation of such principle. At the initial stage, reports and recommendations have been developed by 19 workgroups on the following topics: air quality; natural, historical and cultural merits; population and public health; management of soil and water resources, solid wastes and hazardous wastes, wastewaters, marine resources, land utilization and coastal zones; economical and financial issues; legal and corporate regulations; training and participation; and noise pollution. Workgroups established by experts have, in collaboration with their local consultants, formulated reports incorporated into the synthesis document. State Planning Organization publishes such reports and makes them available to the public.
In the UNEP report, broad information on "non-governmental organizations (NGO)" and "Public Participation" has been provided under the heading of "environmental policies and international activities".

## 9.2 NON-GOVERNMENTAL ORGANIZATIONS AND THEIR MISSION:

The contribution of non-governmental organizations to the building up of an information community and further to reshaping of the society based on information is noteworthy. Therefore, primary mission of the non-governmental organizations is to "transfer experience", "to produce information and know-how", to convey the information and

experience produced through projects and also share them. For his reason, a non-governmental organization must consciously demonstrate its knowledge perception, what kind of a information-producing and transferring medium it is. Means of conveying so produced information via information technologies should be addressed.

It is estimated that the number of registered non-governmental organizations in Turkey is between 45-55 thousand and the number of their members exceed 3,5 million. Official records of the year 1996 reveal that number of non-governmental organizations acting in "environmental protection" is 113 where 63 of them being founded in the nature of an association, 81 as a trust, 6 as a club and the remaining 33 being comprised of provincial environmental trusts established in provinces under the presidency of governors (National Black Sea Strategic Action Plan, 1998). The "non-governmental organizations" guide based on a sampling comprised of 1.793 NGO addressed by the Turkish Economical and Social History Trust indicates that only 7% of a total of 60 thousand voluntary organizations, associations and trusts in Turkey are engaged in environmental activities. Majority of these organizations are located in metropolitan cities (39% in Istanbul, 25% in Ankara and 11% in İzmir). It is further pointed out that 21% of such organizations have branch offices and 14% have liaison offices.

It is necessary to review legal regulations to enable non-governmental organizations act more efficiently in environmental issues on national and international scale. Thus, it will be possible to render such organizations more productive upon removing all sanctions that restrict their development. However organizing NGOs in a way to make them function transparently in line with their exclusive goals will undoubtedly be very fruitful.

**Table 9.1.** List of national non-governmental organizations engaged in the protection of nature and ecologic life (http://www.yesilatlas.com/doga_korumacilar/00058)

| **Name of the Association** | **Web site** |
|---|---|
| Association for Preserving the Natural Life (DHKD ) | www.dhkd.org |
| WWF-Turkey (Foundation for Preserving the Natural Life) | www.wwf.org.tr |
| Greenpeace Mediterranean Campaign Office | http://www.greenpeacemed.org.mt/ |
| Foundation for Preserving the Environmental and Cultural Values (ÇEKÜL) | www.cekulvakfi.org.tr |
| Foundation for Forestation and Combating with Erosion in Turkey and (TEMA) | www.tema.org.tr |
| Turkish Marine Environment Protection Association (TURMEPA) | www.turmepa.org.tr |
| Turkish Marine Research Foundation (TÜDAV) | www.tudav.org |
| Underwater Research Association (SAD) | www.sad-uwrs.org |
| Mediterranean Seal Research Group (AFAG) | www.afag.org |
| Bird Research Association (KAD) | www.kad.org.tr |
| Foundation for Preserving Environment and Recycling of Package Wastes (ÇEVKO) | www.cevko.org.tr |
| Buğday Association of Fostering the Ecological Life | www.bugday.org |
| KORDON Association (Urban and Environmental Culture Association) | http://www.kordon.org |
| Akyaka Lovers Association | www.akyaka.org |
| Pamukkale Association for Search-Rescue & Natural Sports | http://www.pakdos.org.tr/ |
| ÇevGön<br>Diyarbakır Environment Volunteers Association | http://www.cevgon.org.tr.tc/ |
| Istanbul Water Initiative | http://www.istanbulunsuyu.net/ |
| Turkish Foundation for Preserving Environment and Green Development | http://www.turcek.org.tr |

## 9.3 RAISING PUBLIC CONSCIOUSNESS:

Publicizing the studies of the Ministry of Environment and Forest, Provincial Directorates for Environment and Forest, Governor's Offices and Municipalities, as well as raising public consciousness are crucial steps taken towards ensuring the public participation in the process of formulating, adapting and implementing National Action Plan and further ensuring the sustainability and permanency of the works carried out.

To this end, the following issues are vital:

Announcing the locations of sensitive spots and hot spots to the public

Listing and announcing the actions to be taken to reduce pollution in these zones,

Preserving sensitive spots and hot spots and re-assessing the same on national and regional level if necessary.

Announcing the conclusions of the works performed to the non-governmental organizations and public,

Employing visual and print media to elevate social consciousness in environmental issues,

Announcing the affirmative and successful studies performed by the Provincial Environmental Directorates and other related organizations,

Utilizing the aids of banks, non-governmental organizations, entrepreneurs and sponsors in addition to the governmental investments devoted to preserving the living environment,

Transforming such proceeds into environmental projects

Ensuring the effect of necessary legal revisions and amendments on the strength of sound information conveyed to policy makers through the projects implemented.

## 9.4 PUBLIC AWARENESS

- Technically
- Announcing total pollution loads both on regional and national scale
- Announcing conformance to discharge criteria (in case of excessive discharge, announcing the % excess amount),
- Announcing which sectors (industry, tourism, small residential areas) give rise to which sort of pollution (by specifying the names of sectors),
- Announcing programs, activities and projects implemented regarding the environment (specifying the environmental yields to be harvested)
- Financially;
- Elaborating the monetary aspects and time-frame of all works performed for preserving the environment and alleviating the pollution. Fixing the time and cost to be spent for each project,
- Problems- Advices;
- Formulating the legal framework and regulations for preserving the environment and alleviating the pollution and further for presenting the same to the public in line with SAP.

- Addressing technical and financial problems. Regulating procedures and standards.
- Putting forward proposals. Revising the budget and time-frame of the program and bringing up supplementary projects)

## 9.5 STUDIES FOR RAISING PUBLIC CONSCIOUSNESS

It is proposed to complete the studies to be conducted to increase public consciousness in 2005. Financial support for such studies to be performed has been identified.

These activities can be categorized as follows:

- Making regional and national announcements via print and visual media (radio, television, newspapers),
- Holding meetings where decision-makers and policy-makers attend,
- Holding meetings in towns to be selected out of the Aegean and Mediterranean regions where the non-governmental organizations, people and representatives of the major industries in the region will attend,

Stakeholders and target groups to take part in the process of formulating, adapting and implementing NAP.

- NGOs
- Industries
- Trade unions
- Scientific and academic organizations
- Journalists, media and communication experts
- Politicians
- Water-sewer and solid waste units of Metropolitan Mayoralties, and
- Teachers and educators

The list of activities to be performed with a view to increasing public awareness is provided in Table 3.63. below.

With the aim of increasing public participation, two meeting was held. One was held in Antalya from the participation of Mediterranean region at the 13$^{th}$ of June, other one was held in İzmir from the participation of Aegean region at the 20$^{th}$ of June. Moreover one stakeholders meeting was held in Ankara at the 23$^{th}$ of June after the public participation meetings.

In public participation meeting which was held in Antalya, total participation was 58 from 7 provinces

In public participation meeting which was held in Izmir, total participation was 90 from 12 provinces.

**Table 9.2 :** Schedule of activities devoted to increasing public awareness

| **Activity** | **Date** |
|---|---|
| **Print and visual media**<br>Web site prepared : www.kkkuep.com.<br>Cd prepared<br>Brochure prepared | May –December 2005 |
| **Meetings held in the Aegean region** | 20 June 2005 |
| **Meetings held in the Mediterranean region** | 13 June 2005 |

# 10. CONCLUSIONS

Our national coasts bear considerable importance for socioeconomic reasons such as fruitful lands around, intensive residential activities, aesthetics and touristic lands provided, water transportation and fishing activities. These factors also have crucial significance for the natural environment as they constitute pollution sources that adversely impact our coasts.

Within the framework of the study, the first of the project, for addressing land based pollutants in the Marmara region, land based pollutants giving rise to pollution have been categorized as pollutants stemming from industrial activities, residential areas, touristic activities, marine transportation, urban and rural diffused sources, aquaculture, hazardous and special wastes, crude oils and oil-origin hydrocarbons, extent of pollutions stemming from such pollutants have been addressed, a prioritization has been effected on basin basis, the methodology established to address pollution has been described and a literature study for the related basins and the Marmara Sea has been performed.

In the second stage of this study, as detailed investigations were carried out in previous years on region and basin basis, an assessment on Turkish coasts relating to the land based pollutants especially for the Mediterranean and Aegean Basins have been effected, the basins have been assessed in terms of environmental risks and environmental priorities of basins have been addressed, action plan devoted to alleviating pollution has been formulated, supporting tools for the action plan have been addressed and an investment portfolio has been established and economical instruments have been defined. Finally in the report, the public participation issue has been included. Furthermore methods employed in formulating the relevant legal legislation, other action plans and National Action Plan as well as methodologies employed by GPA and MAP have been described.

Furthermore, database built up within the framework of this project has been completed and now embodies the Mediterranean, Aegean, Black Sea and Marmara coasts.

For a large-scale country with huge industry like Turkey, it has not been possible to formulate the National Action Plan on company basis. Therefore, while elaborating the section with respect to urban pollution on county basis, actions for avoiding industrial pollution, priority pollutants accommodated in basins, the current state of pollution in the basins and predominant sectors in the basins have been taken into account and planning was made on sectoral basis.

To finalize the “National Action Plan for Land Based Pollutants” formulated within the framework of this project, two public participation, one stakeholders meetings was held.

Furthermore, it should be taken into account that Turkey has implemented particular amendments to their legislation during the period of harmonization with the European Union, numerous projects devoted to reducing pollution are currently in progress or planned, and several plans have been carried out in this regard. It should also be considered that the "National Action Plan on Land Based Pollutants" formulated in line with the studies carried out within the period of harmonization with the European Union may be revised in subsequent years. Moreover, when the current situation of Turkey and the targets of National Action Plan are considered, changing the timeframe for implementation from 2010 to 2015 will be more realistic.

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# ANNEX I

## DETAILS OF RELATED REGULATIONS

**Environmental Impact Assessment (EIA)**

The Regulations for Environmental Impact Assessment formulated pursuant to the EAI Directive is harmonized with the said directive in general terms. There are slight variations for different sectors. Liability in such regulations is on the part of the Ministry of Environment and Forest as well as the Ministry of Health. With the revisions effected on EIA Regulations, it is targeted to increase the efficiency of the EIA process, ensure harmonization with the Acquis Communautaire and establish the required technical infrastructure. It is known that the European Union Directive Draft is being formulated with respect to the strategic EIA practices and it is planned to conduct the necessary studies and arrangements in line with the said directive.

**Air Pollution**

So as to regulate the management of air pollution and air quality, the "Regulations for Protecting Air Quality", updated Regulations for the Control of Industrial-based Air Pollution" and the "Control of Air Pollution stemming from Heating" have been put into effect.

"Regulations for the Control of Industrial-based Air Pollution" has been published in the Official Journal no 25606 on the 7$^{th}$ of October 2004 and thereby put into effect. The Regulations lay down principles with respect to the applications for preliminary permits, conditional and partial permits for the establishment and operation of plants; avoiding, surveying and determining the emission outflow from the plant as well as the air pollution with the facility's zone of influence; as well as the production, use, storage and handling of facilities, fuels, raw materials and products.

So as to reduce and inspect the adverse impacts of pollutants, discharged to ambient air in the form of smut, smoke, dust, gas, steam and aerosol stemming from combustion plants employed to provide heating for houses, mass housings, cooperative apartment houses, housing estates, schools, universities, hospitals, governmental agencies, business places, social recreation facilities, industry and similar places, on air quality, the "Regulations for the Control of Air Pollution stemming from Heating" has been published in the Official Journal no 25699 on the 13$^{rd}$ of January 2005 and thereby put into effect in the 1$^{st}$ of April 2005.

Air quality measurements are conducted throughout the whole country and comprehensive information is limited to only two pollutants.

Air pollution in metropolitan cities reaches critical levels in winter season due to heating. Heating of houses is chiefly undertaken individually by property owners, and the quality of Turkish lignite coals that constitute the majority of energy resources in Turkey is low.

Central heating systems are not widespread and should be generalized in metropolitan cities.

In spite of improvements in fuel quality and especially the lead content of liquid fuels, sulphur and benzene rates constitute one of the major problems due to the fact that the EU fuel quality standards are directly connected with investments in refineries.

Turkey is a party to international conventions on long-range transboundary air pollution and depletion of the ozone layer, however it has not signed the convention on climatic changes.

Turkey attaches great importance to the execution of voluntary agreements with the sectors and ensuring the participation of such sectors in the process of reduction of pollution. To this end, agreements have been signed with the Cement industry on further reduction of emissions, and with the Turkish Automotive Sector on equipping automobiles with catalytic converters within the framework of a harmonization program as well the real-time application of the same stipulation to imported vehicles. Regular examination of old vehicles since 1992 has made considerable contributions to the reduction of pollution stemming from industrial and motor vehicles.

Agencies in charge of the air pollution issue are the Ministry of Environment and Forest, Ministry of Health, Ministry of Energy and Natural Resources, Ministry of Industry and Trade, State Planning Organization, Governor's Offices, Municipalities, Turkish Standards Institute, State Planning Institution and Private Sector.

**Waste Management**

**Household Solid Waste Management**

So as to control the adverse impacts of household solid wastes that are irregularly stored, the Regulations for the Control of Solid Wastes has been put into effect on 14.03.1991. The regulations establish technical and administrative procedures with respect to the collection, handling, recycling and disposal of household solid wastes under a specified system nationwide, as well as provide legal sanctions in the collection and recycling of packing wastes. Less waste production, recycling of wastes and disposal thereof without giving damage to the environment are the fundamental procedures of waste management.

Total amount of solid waste collected throughout Turkey reached 21 million tons in 1995. In studies conducted in Turkey on solid waste management, average amount of solid waste per capita is principally considered as 1 kg/day. Taking into account the population data for the year 1997 (around 63 millions people), daily household solid waste amount is app. 63000 tons. The average results derived from the study conducted by the State Planning Institute on determining the composition in 1993 reveal that the estimated

household solid waste composition of Turkey is as follows: wet waste (kitchen, park, garden etc):65,45%; ash, slag, soil and stone: 22,40%; and recyclable waste:12,07%.

Municipalities are authorized and responsible for the collection, handling, recycling and disposal of household solid wastes in Turkey by virtue of the municipal laws no 1580 and 3030.

Within the framework of the regulations, a "quota system" setting forth the principle of recollecting a particular percentage of plastic, metal, glass and laminated cardboard packages of liquid, food and cleaning products offered to the market, and the duty of collecting and processing such packages has been entrusted to the industry.

**Medical Wastes**

Studies on managing medical wastes are being assessed except for the household solid wastes and collection, handling and disposal of such wastes are being implemented in accordance with the Regulations for the Control of Medical Wastes dated 20.05. 1993.

Data presented by the Ministry of Health for the year 1997 reveal that total number of hospitals and beds in Turkey is 1120 and 160.884 respectively. The data of the State Planning Institute show that amount of medical waste per bed is 2 kg/day and the total amount of medical wastes produced per annum over an occupancy rate of 65% is 76.000 tons. The Regulations suggest that the combustion method is predominantly employed in the disposal of medical wastes, that number of combustions plants is low (6) due to high costs, and further that the preferred disposal method is regular storage, the second alternative.

**Management of Hazardous Wastes**

So as to avoid illegal waste traffic from advanced countries to our country, the "Basel Convention" has been signed in 1989 and approved in 1994.

For the goal of building up a system for managing hazardous wastes, the "Regulations for the Control of Hazardous Wastes (RCHW)" has been put into effect in 1995 and thereafter published in the Official Journal no 25755 of March 14, 2005 and thereby updated.

Categories of wastes and waste lists provided in the regulations have been adapted from the Basel Convention. Furthermore such lists have been detailed in conformity with our national conditions. By virtue of RCHW, every sort of waste inbound to our country has been prohibited. However, the import of scrapes with a metal content of and over 85% is subject to control. Such controls have been undertaken by the Ministry of Environment and Forest since 1993. Furthermore exploration sludge, waste oils, chips, ashes of thermal power stations and medical wastes have been included in the list of "Special Wastes" in this regulations. Plants for the recycling and final disposal of hazardous

wastes are obliged to acquire operating license from the Ministry of Environment and Forest.

With the Regulations for the Control of Hazardous Wastes, private rules with respect to hazardous wastes have been established and they specify more strict measures in various terms than those stipulated in the EU Directives. Characteristics of hazardous wastes, way, criteria and processes for disposing of them are set forth in the regulations. Activities that have potential to produce hazardous wastes together with code numbers of a waste listing with regard to the general types of wastes that should be controlled are also provided.

With the recent amendment to the Regulations for the Control of Hazardous Wastes, EU Directives with respect to the combustion of hazardous wastes (94/67/EC; 897/283/EC) and the said legislation have entirely been harmonized.

A project on the Management of Hazardous and Private Waste Management embodying the Marmara, Aegean and Black Sea regions has been initiated.

Studies on waste management, studies for harmonizing regulations for waste management held by the Ministry of Environment and Forest are being implemented in coordination with the Ministry of Industry and Trade, Ministry of Agriculture and Rural Affairs, Ministry of Interior Affairs, Ministry of Health, Ministry of Public Works and Settlement, Turkish Standards Institute, Municipalities, Foreign Trade Undersecretariat, Turkish Union of Trade Chambers and Stock Exchanges and Marine Union of Trade Chambers and Stock Exchanges.

**Water Pollution**

In line with the provisions of the Environmental Law no 2872, the "Regulations for Controlling Water Pollution (RCWP)" has been published in the Official Journal no 19919 dated September 4, 1998 and thereby put into effect and subsequently published in the Official Journal no 25687 dated December 31, 2004 and thereby updated.

In general, Turkey has plenty of water resources unevenly distributed over every section of the country. Turkey is geographically split into twenty six water basins in terms of surface waters. However more than half of s surface runoffs stems from six primary basins that are Dicle, Fırat, East and West Black Sea, Antalya and West Mediterranean basins. The Fırat basin (occupies 15% of the overall surface area of Turkey and has a water volume of 32 billion cubic meters) is the biggest. 200 natural lakes (50 of which have respective surface areas over 5 $km^2$) occupy an overall area of 1 million hectares, constituting the 1% of the overall surface area of Turkey. Van Lake in East Anatolia (374.000 hectares) and Tuz Lake in Central Anatolia (128.000 hectares) are ranked top in terms of size.

Total underground water supply is 41 billion cubic meters, 12 billion of which is estimated to be technically and economically serviceable. Currently, only 8 billion cubic meters of supply can be served (55% for irrigation and 45% for potable water supply and industrial purposes). One fourth of current underground water reserves is hosted in the Fırat and Sakarya water collection basins.

Rapid social and economical development in our country has given rise to considerable increases in water requirements. While increasing demand to water on one hand, such developments threaten the availability of water resources of appropriate quality required for various uses through pollution and further restrict the multifunctional use of water resources on the other hand.

Quality of inland waters (rivers, natural and artificial lakes) have been assessed in terms of 20 parameters (pH, oxygen, suspended and dissolved solid matters, nitrate, phosphorus, ammonium, fecal coliform and some heavy metals) and classified into four quality groups in the Regulations for the Control of Water Pollution.

Regulations for the Control of Water Pollution set forth the procedures of categorizing underground waters into four groups. They also provide planning for water quality.

Regulations also specify protected areas for reservoirs employed as potable water resources and lakes, and further the procedures for land utilization strategies as well as the discharge of wastes into underground and surface waters.

State Water Works (SWW) is continually monitoring the water quality in two natural and two artificial lakes. In addition to the quality of underground waters, water quality of 126 lakes is periodically monitored as well. Initially commenced at 65 sampling points in 1979, the monitoring studies expanded over a total of 1080 sampling points in 1996. The laboratories of SWW are equipped in a way to be capable of measuring 40 parameters. In 1998, State Planning Institute has given a start to collect these data and other water-related information in 1998. However, database required for healthy monitoring of water quality could not be built yet in our country.

Ministry of Health has been implementing these studies in accordance with the “Regulations for Consumption, Packing and Sale of Natural Resources, Mineral, Potable and Medical Waters” and standards on the potable and service water quality issued by the Turkish Standards Institute in 1984.
With the context of the European Blue Flag Campaign, the microbiological quality of coastal wasters is analyzed on a fortnight basis during the tourism season in particular beaches and marinas.

River pollution mainly stemming from industrial and household waste waters is accumulated in regions of intensive urban and industrial concentration.

Rivers convey pollution stemming from agricultural activities (BOD, COD, phosphorus, nitrogen) to coastal waters in Mediterranean. Industrial waste waters that constitute less than 1% of total waste waters discharged contain very toxic agents such as mercury, lead, chrome and zinc. Discharges to the Aegean Sea increase in parallel to the development of tourism. Pollution occurring around the Black Sea coast stems from natural causes and waste waters conveyed by big rivers. The BOD and COD load inflowing to the Marmara Sea stems from industries in metropolitan cities such as Istanbul and İzmit.

Water utilization volume during the period between 1980 and 1997 has risen to 15% from 7% of current resources (near the OECD European average). Upon the completion of water works both in progress and envisaged, it is anticipated to reach quite higher volumes.

Irrigation chiefly accounts for the total water consumption. Maintenance and restoration works in water supply networks are usually delayed or even in no way planned. .

Furthermore, Turkey is a party to the following international conventions and protocols with respect to the water management issue and carrying on its works to this end:

Convention on Protecting Mediterranean Sea against Pollution (BARCELONA CONVENTION) (June 12, 1981, published in the Official Journal no 17368).

Protocol for Preventing the Pollution of the Mediterranean Sea by dumping from Ships and Aircrafts, Barcelona 1976 (June 12, 1981, published in the Official Journal no 17368)

Protocol concerning cooperation in combating pollution of the Mediterranean Sea by oil and other harmful substances in cases of emergency, Barcelona 1976 (June 12, 1981, published in the Official Journal no 17368)

Protocol for Protecting the Mediterranean Sea against Pollution due to Land Based Pollutants, Athens 1980 (March 18, 1987, published in the Official Journal no 19404)

Protocol on the Mediterranean Specially Protected Areas, Geneva 1982 (Turkey – November 6, 1986), (Published in the Official Journal no 19968 of October 23, 1988).

International Convention on the prevention of Sea Pollution from Ships (MAR-POL-73 CONVENTION) (Cabinet Resolution no 89/14547 of September 13, 1989) (published in the Official Journal no 20558 of June 24, 1990).

Convention on Protecting Black Sea against Pollution (BUCHAREST CONVENTION) (signed on April 21, 1992) (published in the Official Journal no 21869 of March 6, 1994).

Protocol on Protecting the Marine Environment of Black Sea against Pollution due to Land Based Pollutants

Protocol concerning cooperation in combating pollution of the Marine Environment of Black Sea by oil and other harmful substances in cases of emergency

Protocol on Protecting the Marine Environment of Black Sea against Pollution due to dumps

**Potable Water**

Around 78% of the urban population and 62% of the rural population can reach healthy and sufficient potable water. For the 20% of the urban population and 17% for the rural population, availability of potable water is insufficient, and 2% of the urban population and 21% of the rural population could not be provided with potable water. The average annual potable water consumption per capita, summing 74 cubic meters is below the average European rate that is 100 cubic meters.

The latest data reveal that 58% of 3126 municipalities served by the Banks Association of Turkey and Ministry of Culture and Tourism are equipped with potable water supply network, 4% of that portion has potable water treatment plants.

The data for the year 1995 show that, three fourth of a total of 35.000 villages served by the General Directorate of Rural Affairs is provided with potable water of sufficient quality, and 15% with potable water of insufficient quality. On the other hand 7% can be provided with no water.

In 1997, the bacteriological and chemical quality of potable water has been found unacceptable in 12% of the samples taken on national level. Number of beaches having sufficient swimming water quality that are also called “Blue Flags” has augmented to 64 in 1999 from 12 in 1994.

In the Potable Water Standard no TS 266, recommended figures and maximum limit values are provided. However, no restriction is provided in this standard for chlorinated-organic compounds.

**Infrastructure**

Central administration accounts for the utmost financing for the urban water, sewer and treatment plants through the Municipal Funds that are under the authority of the Banks Association of Turkey. Municipalities other than the Banks Association of Turkey can borrow loans from foreign sources to finance big projects (on the strength of central government warranty). Contribution of the private sector to expenditures incurred in infrastructure investments is very limited.

Spearheaded by the Banks Association of Turkey, designs and constructions have been initiated to the end of 1960’s to supply cities with potable and service water. In 70’s, eleven sewer systems have been established by the Banks Association. In 80’s, twenty

five sewer systems have been completed in metropolitan municipalities by the newly founded Water and Sewer Administrations. Three fourth of such eighty six systems are only network plants and the remaining are treatment plants. 250 municipalities that have preliminarily proposed sewer projects are expecting for the incorporation of such projects into the investment scheme of the Banks Association.

Construction of wastewater treatment plants and marine discharges were initiated in the early 80's. Construction of thirty six wastewater treatment plants, twenty nine marine discharges and one hundred and sixty three sewer networks have been completed by the Banks Association to date, and constructions of twenty seven wastewater treatment plants and eighteen marine discharges are in progress. The central wastewater treatment plant in Ankara has been completed in 1997. Seventeen marine discharge projects have been completed and constructions of fourteen projects are in progress.

Household wastewater treatment could score a very minor progress to date. Recently, around 62% of the population in municipalities with urban population over 300 could be connected to the sewer system and only 12% to the wastewater treatment system. 70% of the treatment is primary and the rest is secondary. Only 11% of a total of 2800 municipalities served by the Banks Association and the Ministry of Culture and Tourism are equipped with sewer networks and only 2% (65 municipalities) have wastewater treatment plants. Only 0,3% of 35.000 villages served by the General Directorate of Rural Affairs are furnished with sewer system.

Turkish legal regulations with respect to urban wastewaters are similar to the EU's Urban Wastewater Treatment Directive of 1991, however no explicit requirement has been stipulated on municipalities with population over 2000 to collect their wastewaters. Maximum permissible BOD concentration is double in the Turkish legislation and there are no limit values stipulated for total nitrogen and phosphorus concentrations in urban wastewater discharges.

Major problem for household wastewaters is that regulations with respect to treatment totally he characteristics of the receiving environment both in terms of the provisions of the regulations and discharge limits and also during the stage of choosing the process in practice.

**Industrial wastewaters**

In the early 90's, (the last available survey), one fourth of 1870 firms having an employment rate of over twenty five employees were equipped with wastewater treatment plants.

While industrial enterprises are allowed to dump their wastewaters into the local sewer systems and deep marine sections, companies may be asked to preliminarily treat their wastewaters before discharging them into the common wastewater treatment plants.

Discharge of hazardous agents into water has been prohibited. Permit procedure is applicable since 19689. Wastewater standards have been established along with the fundamental procedures to be observed for different type of industries and dischargeable substances. Quite strict rules have been introduced for discharges especially located in fish-breeding pools. Authorization for permit to discharge is renewed on three-year basis. Permit request may be rejected or permits conferred may be withdrawn so as to avoid adverse environmental impact (such as direct discharge into excessively polluted areas).

In the Regulations for the Control of Water Pollution, every sort of pollutant source has been subjected to permit procedure and industries have been split into sixteen different categories in terms discharge to the receiving environments. Sets of voluntary agreements have been concluded between the Ministry of Environment and Foresty and industries for the construction of wastewater treatment plants.

The bodies and agencies responsible in the process of handling water pollution are Ministry of Environment and Forestry, Ministry of Energy and Natural Resources, Ministry of Agriculture and Rural Affairs, Ministry of Culture and Tourism, Ministry of Health, General Staff Presidency, Prime Ministry Maritime Undersecretariat, Turkish Standards Institute, General Directorate of State Water Works, Banks Association, Coast Guard, Coast Security and Ship Rescue Operations as well as Ship Rescue Operations and Turkish State Railways, Turkish Marine Operations, BOTAŞ and refineries. Additionally coordination is established with relevant associations, agencies and organizations.

# ANNEX II

## "INTEGRATED MANAGEMENT OF COASTAL ZONES" CONCEPT AND PRACTICES IN OUR COUNTRY"

## 1.6. "Integrated Management Of Coastal Zones" Concept And Practices In Our Country

Thanks to the advantages such as the favorable ecological structure of coastal zones accommodating a rich potential of resources for agriculture and fishing, and also easy transportation opportunities, people have always tended to settle in coastal zones throughout the history; civilizations and cities have developed in coastal regions. Natural beauties and historical wealth of coastal zones, which have mostly functioned as economical, cultural and political contact agent between countries, have also greatly contributed to the development of tourism today. It is naturally essential to locate marine constructions, shipyards and regional infrastructural facilities such as industrial establishments and pipelines in coastal sections owing to their functional nature (Sönmez, 1993).

Coastal zones, apart from other regions accompanied with their above detailed peculiar characteristics, turn out to be attractive zones for economic and social competitive activities such as urbanization, industry, transportation and tourism. In coasts composed of susceptible ecosystems, intensive pressure for development and excessive utilization of resources as well as natural disasters, coastal erosion and similar causes give rise to the occurrence of environmental problems that are specific to coastal zones. In addition to the soil, sea and water pollution stemming from intensive urban, industrial, touristic and secondary housing settlements deprived of infrastructure arising out of irrational land utilization, devastation and deterioration of archeological, historical and urban sites, beaches and coastal characteristics; social and economical problems stemming from sector variations are obstacles to the sustainable change in coastal zones (Sönmez 1993).

Seas and the sea environment embracing the adjacent coastal zones constitute a whole complete with its resources that are essential factors of the global living assistance system and providing opportunities for sustainable development. As current approaches regarding the management and planning of coastal zones, embodying the diversified and productive living environments for human settlements and economical development, are mostly not qualified enough to ensure sustainable development, the need to handle the issue of protecting and developing marine and coastal resources on national, regional and global levels has arisen. This situation has been put forward as a crucial problem in Agenda 21. Furthermore, in Agenda 21, basis, scope and means of actions regarding the rational utilization and development of live resources in marine and coastal regions have been defined in Agenda 21 (Agenda 21, 1993).

In the West, such a management model whose conceptualization process dates back to 70's in the United States was first put forward as a tool for bringing solutions to sectoral problems such as coastal erosion, land utilization arising in coastal regions, and after the midst of 80's, the multi-sector approach was adopted and the "Integrated Management of

Coastal zones (IMCA)" concept was developed as a new management model and successfully implemented in many developing countries.

IMCA represents a broad approach covering all sectoral activities impacting the coastal zones and resources, and incorporating environmentalist and ecological concerns in addition to the economical and social dimensions. Primary objective in IMCA is to minimize conflicts between different utilizations of coastal zones and thereby to harmonize them within a particular equibilirum, as well as to provide the optimum benefit directly in coastal zones. One of the factors required for the effective and appropriate employment of this approach is developing mechanisms that will enable the involvement of different interest groups, utilizing coastal resources, in such processes.

In our country, plenty of programs have been held, projects have been developed and test studies have been carried out on the Management of Coastal Zones within the framework of the Mediterranean Environmental Program (MAP), some of which can be counted as follows: formulation of a consultancy program for developing an Integrated Coastal Area Management structure appropriate with our national conditions within the framework of the Mediterranean Technical Assistance Program (METAP); again in the same period, formulation of the "An Integrated Management Plan for İzmir" (1994) with a view to reducing pollution in the İzmir Gulf, and the "İskenduren Gulf Project" (1994) within the framework of the Mediterranean Action Plan – Priority Action Plan (MAP – PAP); foundation of line units on branch level under the bodies of the Ministry of Public Works and Settlement and the Ministry of Environment and Forest upon the continual increase in the volume of problems suffered in coastal areas; foundation of the Turkish National Committee for the Management of Coastal Zones as a civil initiative; seminars and similar studies on the IMCA concept, methodology and practices on national and international level; and publicizing of information regarding the management of coastal zones as well as building up a public opinion in this regard. There are a few pilot projects, limited in number, implemented in our country within the framework of utilization and protection of coastal zones. The "Management Plan" formulated by the Ministry of Culture and the Private Environmental Protection Institution in the Patara Specially Protected Environmental Zone can be given as an example to this end (Sönmez 1998).

The susceptible, restricted and restrained nature of coastal zones makes it necessary to develop a management approach based on integrated policies and strategies that will allow the harmonized and collaborative actions of the public and local groups devoted to ensuring resource utilization and sustainable development. İntegrated management of coastal zones is defined as a crucial tool in the nature of a permanent, circumspect and adopted resource management process in ensuring a sustainable development in coastal zones. Optimizing the environmental and socio-economical gains and minimizing the conflicts and problems arising out of such activities, establishing an equibilirum between

the activities and sectors are the primary objectives of the İntegrated management of coastal zones (UNEP, 1995).

Efforts devoted to realizing the approaches aimed at ensuring a sustainable development within the "balance of conservation and use" of coastal zones cannot be assessed independently of the environmental management policy adopted by the country. Policies built with respect to environmental management in our country date back to the beginning of 80's. In parallel to the "rights of citizens to live in a healthy and balanced environment" as assured by the 54$^{th}$ article of the Turkish Constitution of 1982, the environmental law no 2872 was enacted in 1983 and then the Ministry of Environment was established, laying the foundation of the legal and organizational regulations in this regard. However, environmental rules have not been integrated into the economical and social resolutions yet.

In addition to the Environmental Law, a set of legal regulatory arrangements focusing on environmental protection such as the Coastal Law, National Parks Law, Law of Preserving the Cultural and Natural Heritage, Regulations for Preserving the Quality of Coastal Waters, Regulations for Environmental Impact Assessment, Decree Law on Establishing Specially Protected Environmental Zones have been integrated into the system. Furthermore within Turkey's agenda for environment, plenty of new regulations arising out of international conventions and commitments are waiting for adaptation.

Corporate regulations with regard to environmental management restrict the regulatory and collaborative nature of the Ministry of Environment and Forest in this area. Within a sectoral-oriented organizational approach, organizations cannot act resiliently in performing cooperative studies with other organizations and agencies as well as in sharing their authoritative qualifications within their fields of responsibility or competence. Furthermore the centralized nature of the organizational structure of institutions is not appropriately furnished to allow the enforcement of local interventions in handling the matters on local level. For public administration, a restructuring, especially in local level, is necessary to efficiently handle environmental issues (Sönmez, 1998).

In the Seventh Five-Year Development Plan (1996-2000), that is one of the material indicators of Turkey's policies in the field of environmental management, abovementioned matter was highlighted and emphasis was given on the need to a national environmental strategy and further to develop implementing instruments in this field, and the directly formulated "National Environmental Strategies and Action Plan" (NEAP) was directed by an Executive Board comprised of the State Planning Organization (SPO), Ministry of Health and Representatives of the fund-provider World Bank. This reports was rendered ready for going into effect upon the protocol signed between the SPO and Ministry of Health on May 8, 1998.

Under the "Sectoral Action Options for Environmental Management" section in NEAP, 43 actions were listed in the following areas: "Actions for the Management of Seas, Coastal Zones and Other Sensitive Environments", policies, organization, legal arrangements, economical and financial measures, training-education, participation, techniques and Research & Development Activities (SPO, 1998).

### 1.6.1 Addressing National Strategies

The process of İntegrated management of coastal zones consists of the initial, planning and implementation stages. Identifying policies, objectives and strategies constitutes a major leg of the planning stage.

Main problems and priorities in organizational and legal areas within the framework of IMCA in our country are listed below (Sönmez, 1998).

As there is neither a comprehensive law on coastal zones in Turkey nor a special related organizational structure, there are plenty of official bodies and agencies acting in the field of coastal zones. Therefore, authorities of many agencies overlap or conflict with other, or there are authoritative gaps. In our country, there are some studies elaborated on the management of coastal zones on basin or sub-region scale, yet no coastal management program on national or regional basis has been formulated and put into practice.

A serious cooperative gap is suffered due to confusion or conflicting authorities in the organization structure. As well as in horizontal cooperation in central, regional and local level, there are also gaps in the vertical cooperation.

In Turkey, local organizations are feebler than the central ones, leading to the appearance of problems between the provincial organizations of central management agencies and local governments especially in the matters of decision making, building up the budget, creating resources and cooperation.

Legal mechanisms with regard to public participation and information acquisition are inadequate. Legal arrangements in this field allow very limited rate of public participation in particular areas. On the other hand, there is a continually expanding and widespreading non-governmental incentive and public opinion formation.

Within the EIA process implemented since 1993, problems related to monitoring and inspection still prevail. No legal support, measure or practice is available for strategic EIA and environmental inspection.

No "land and water utilization plans" have been elaborated in line with integrated coast and basin zones management".

Relationships between various planning levels are feeble.

Failure to ensure coordination during the planning process, no reflection of balance between the sectors on plans elaborated, failure to integrate fundamental planning techniques into the planning process (handling capacity etc), lead to widespreading negative decisions in physical plans.

Plans cannot be implemented and their sanction power fall short due to the unavailability of planning instruments (especially in the field of finance). (Sönmez and Görer, 1998)
İntegrated management of coastal zones strategies include proposals for actions relating to legal organizational regulations that conform to the policies, objectives and targets; development of human resources, provision of financing, and international cooperation.

In this regard, initiating and sustaining a comprehensive Integrated Coastal and Basin Zones Management program that focus on the status of coastal areas of our country and allow the development of a totalitarian approach should be adopted as a fundamental strategic objective. To this end; national strategies with respect to the development of legal, organizational and sustainable environmental and human resources, financing, international cooperation and public participation (Sönmez, 1998).

So as to establish the national strategies; it is necessary to elaborate the land and water utilization plans for coastal zones; ensuring an organization and legal clarity; build up basin-based coastal zones inventory and database and further to ensure regular updates therein; formulate the coastal profile addressing human sensitive areas in terms of human settlements, coastal erosion and bio-diversification; develop urban and industrial wastewater and solid waste investments and their management with a view to reducing pollution stemming from high-priority pollutant sources; formulate contingency plans, formulate research projects with respect to coastal erosion in coastal zones; build up basin based monitoring and management systems in coastal zones for pollution control; develop on-line monitoring systems in high-priority water sources addressed; formulate a strategic development plan to enhance ecotourism; hold internal training programs in central and local agencies and organizations; broadcast programs and employ similar tools to raise public awareness and consciousness and establish the essential platform necessary to allow direct access to the information on coastal zones and further to ensure opinion exchange and participation into the decision-making process.

**The Integrated Management of Coastal Zones (IMCA) Concept**

Coastal zones are crucial geographical locations where marine and land ecosystems meet and interact, allowing plentiful and enriched living environments. Around half of total population of coastal countries lives in and around coasts and the rates of migration from the inner territorial sections to coastal areas constantly accelerate. Attractive for many areas of use, coastal areas stand as crucial resources for human life and also major living environments among the land and coast ecosystems that should be preserved (Sönmez and Görer, 1998). There are two fundamental approaches with respect to coastal resources. The first suggests the utilization and consumption of coastal zones to the benefit of human, and the second puts forward the conservation of these resources for long-term utilizations and the need to preserve them. Such confliction in many of the countries have come up to very critical levels and the coastal zones and resources have

irrecoverably been deteriorated (Noordwijk Guidelines, 1993). In addition to the wrong, unconscious and self-centered utilization of the limited coastal resources, lack of instrument for harmonizing the conflicting activities in this area critically brings up the need to adopt a management and planning approach allowing the use of coastal resources within a protection-development equibilirum.

Before the IMCA concept has come up, some studies on coastal zones were also present. Such studies that are different than IMCA in nature have first emerged in the United States as a planning and resource management process. In 70's and the early 80's coastal management has been implemented in many countries under different names such as the management of coastal resources, management of coastal zones etc. Such regulations in international level to this end are included in the Mediterranean Action Plan of 1975, the first of the Regional Maritime Programs initiated within the body of the UN Environmental Program. Initial practices with regard to this concept were aimed at surmounting sectoral problems such as coastal erosion and coastal utilization and further at preserving the economical and aesthetic heritage of coastal territories. Such approach delimited with avoiding pollution and taking measures against the deterioration of the coastal character, has incorporated rather the engineering discipline.

# ANNEX III FIGURES

## DISTRIBUTION OF COD, BOD AND TSS, T.N, T.P, LOADS IN THE RIVER BASINS BY POLLUTANT SOURCE

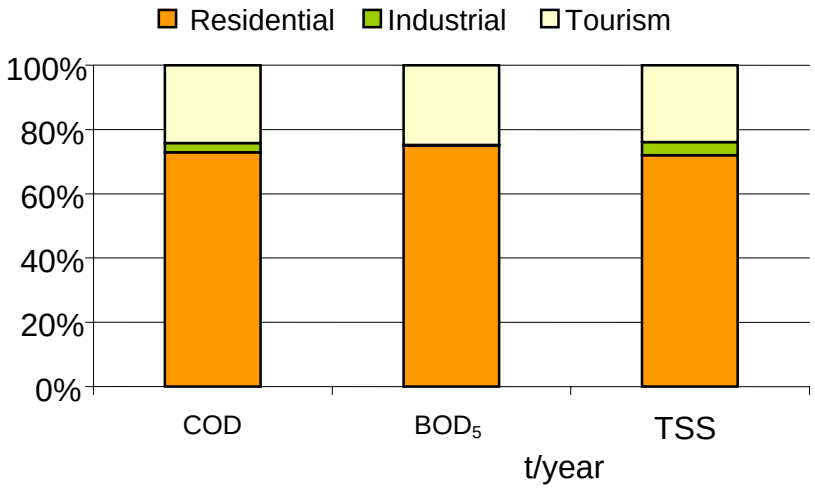



**Figure 3.16** Distribution of COD, BOD and TSS loads in the Batı Akdeniz river basin by pollutant source

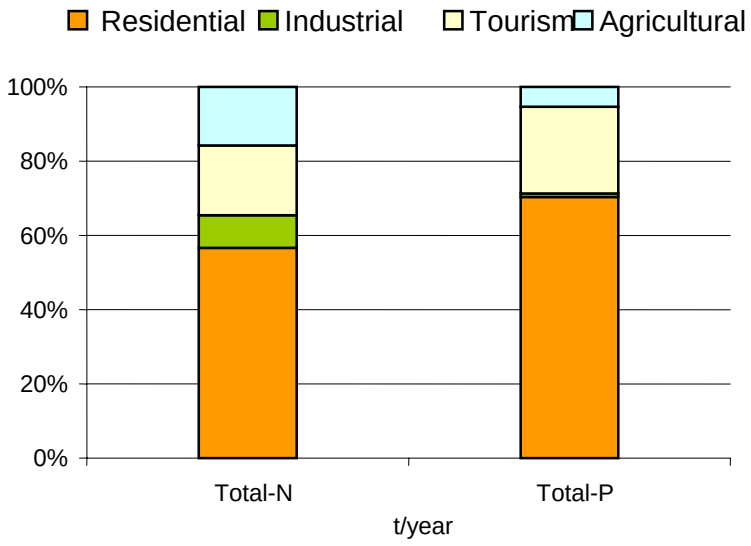



**Figure 3.17** Distribution of Total N and Total P loads in Batı Akdeniz river basin by the pollutant source

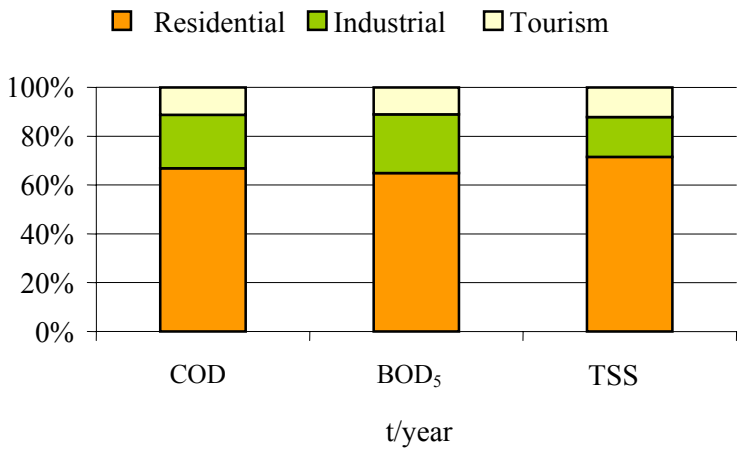



**Figure 3.18** Distribution of COD, BOD and TSS loads in Antalya river basin by pollutant source

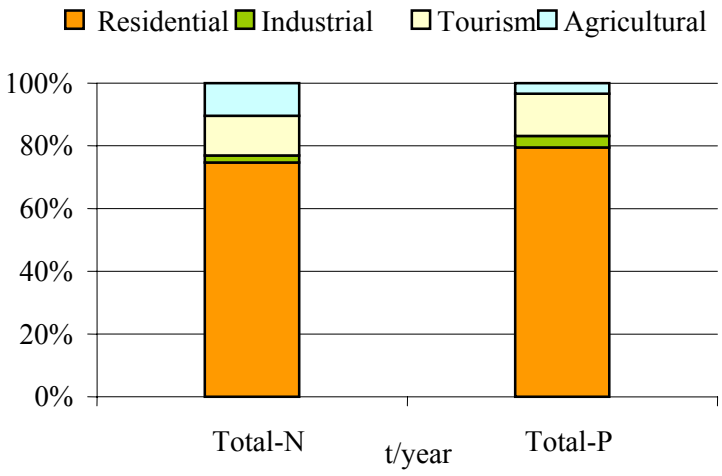



**Figure 3.19** Distribution of Total N and Total P loads in the Antalya river basin by the pollutant source

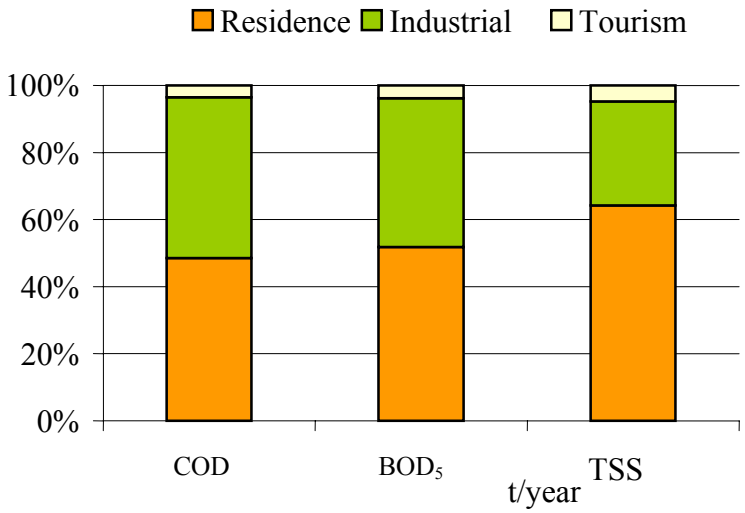



**Figure 3.20** Distribution of the COD, BOD and TSS loads in the Doğu Akdeniz basin by the pollutant source


**Figure 3.21** Distribution of Total N and Total P loads in the Doğu Akdeniz basin by the pollutant source

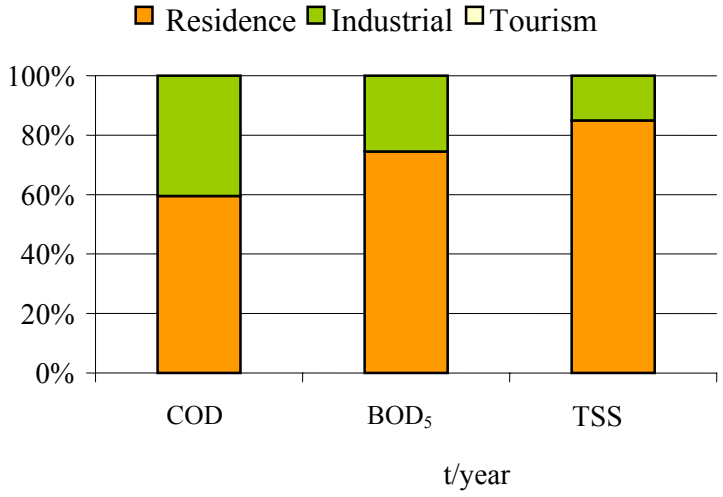



**Figure 3.22** Distribution of the COD, BOD and TSS loads in the Seyhan basin by the pollutant source

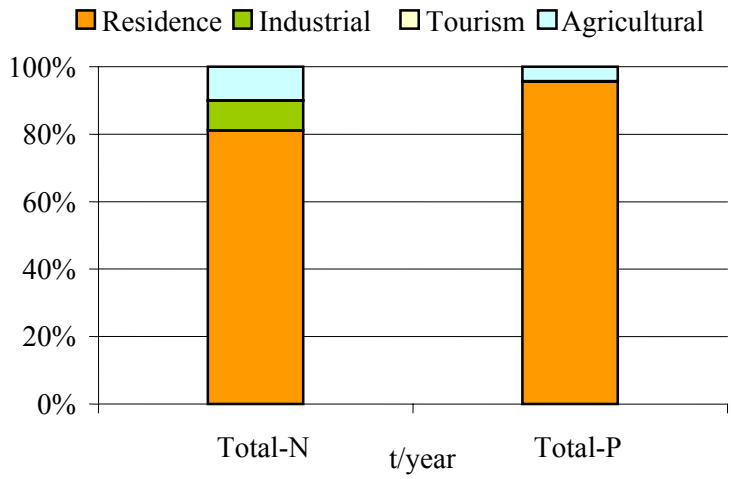



**Figure 3.23** Distribution of Total N and Total P loads in the Seyhan basin by the pollutant source

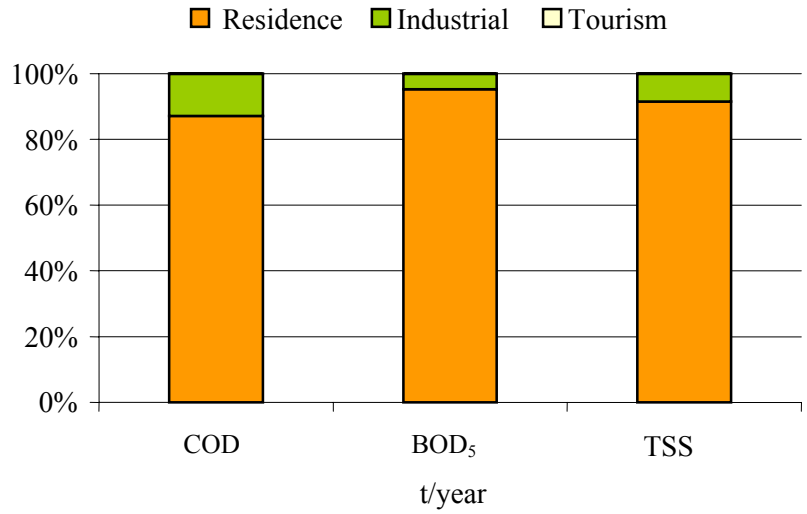



**Figure 3.24** Distribution of the COD, BOD and TSS loads in the Ceyhan basin by the pollutant source

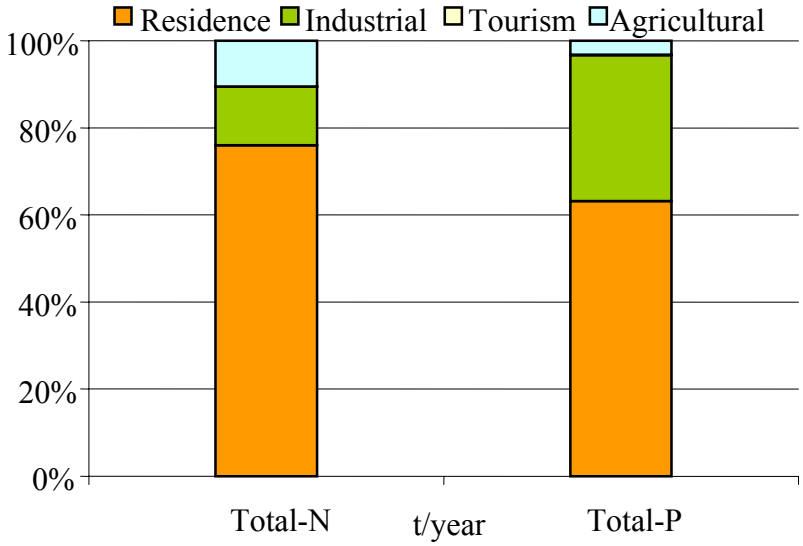



**Figure 3.25** Distribution of Total N and Total P loads in the Ceyhan basin by the pollutant source

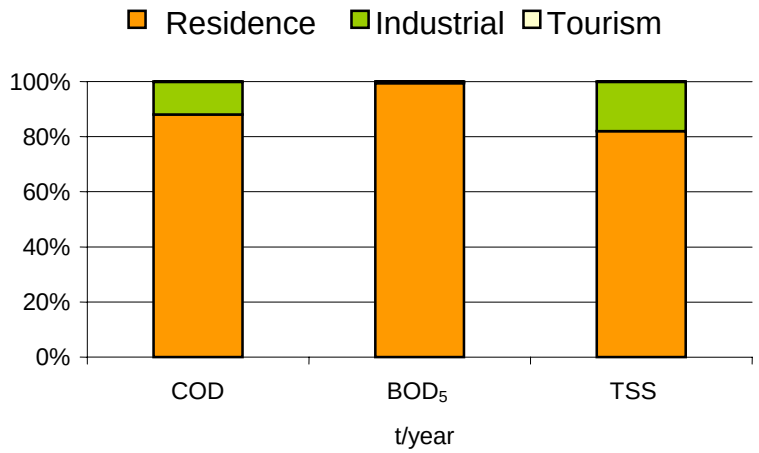



**Figure 3.26** Distribution of the COD, BOD and TSS loads in the Asi basin by the pollutant source

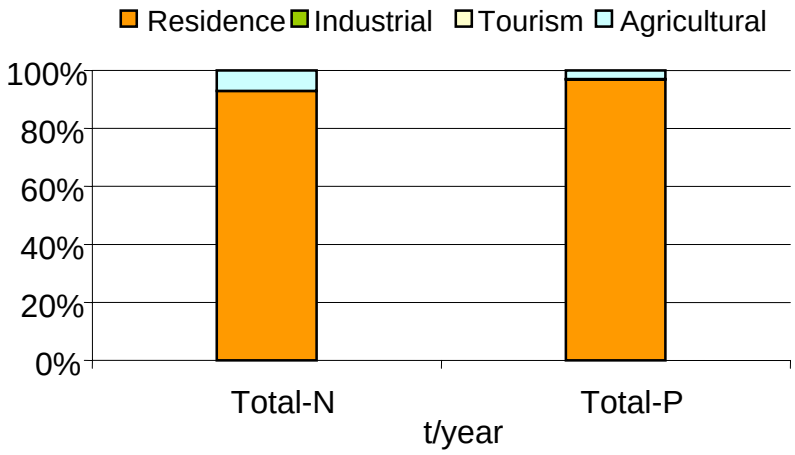



**Figure 3.27** Distribution of Total N and Total P loads in the Asi basin by the pollutant source

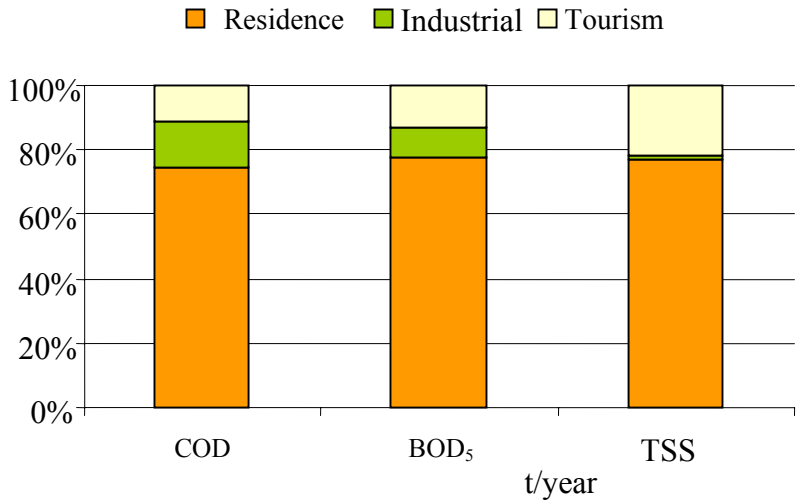
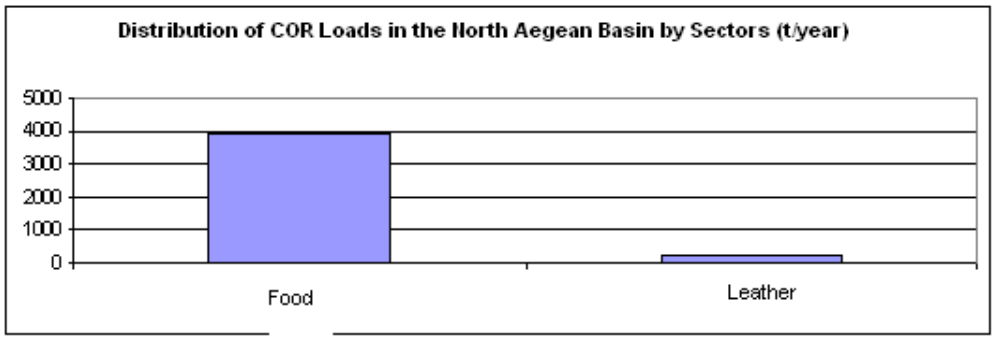



**Figure 3.28** Distribution of COD, BOD and TSS loads in the Kuzey Ege basin by the pollutant source



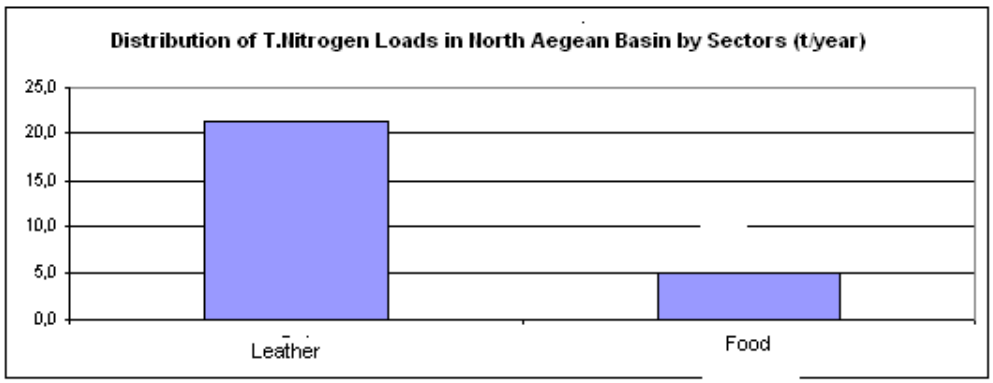




**Figure 3.29** Distribution of COD and Total Nitrogen pollution loads in the Kuzey Ege Basin by sectors (Avaz, 2002)

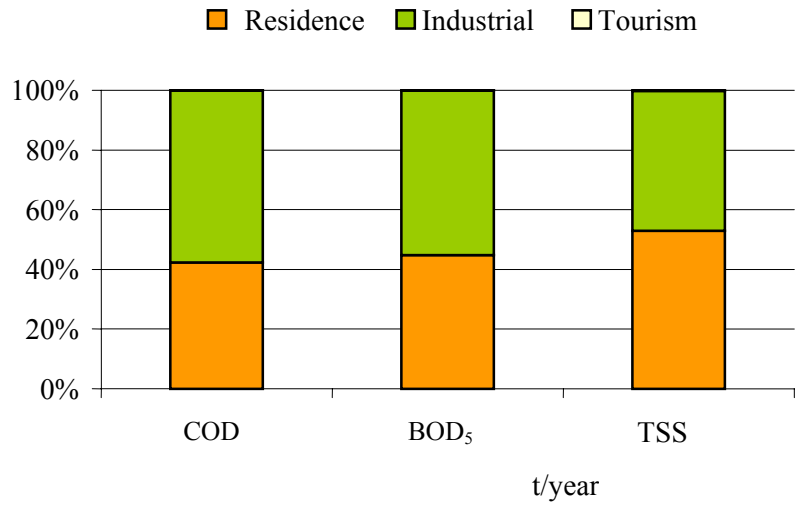
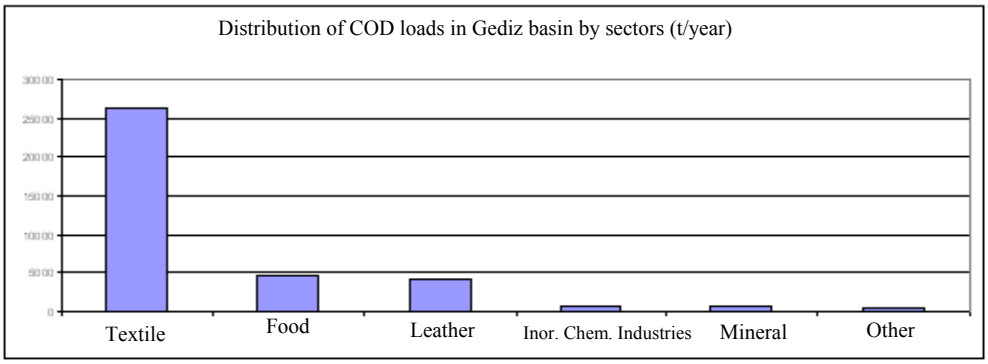



**Figure 3.30** Distribution of COD, BOD and TSS loads in the Gediz basin by the pollutant source



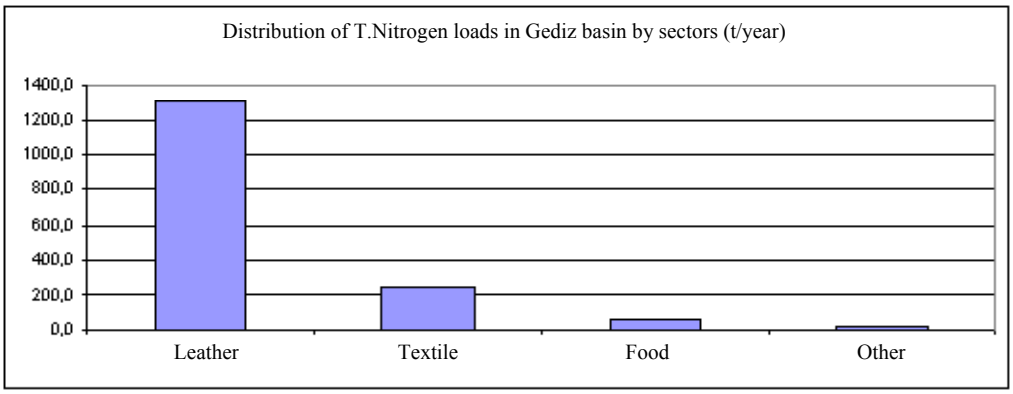
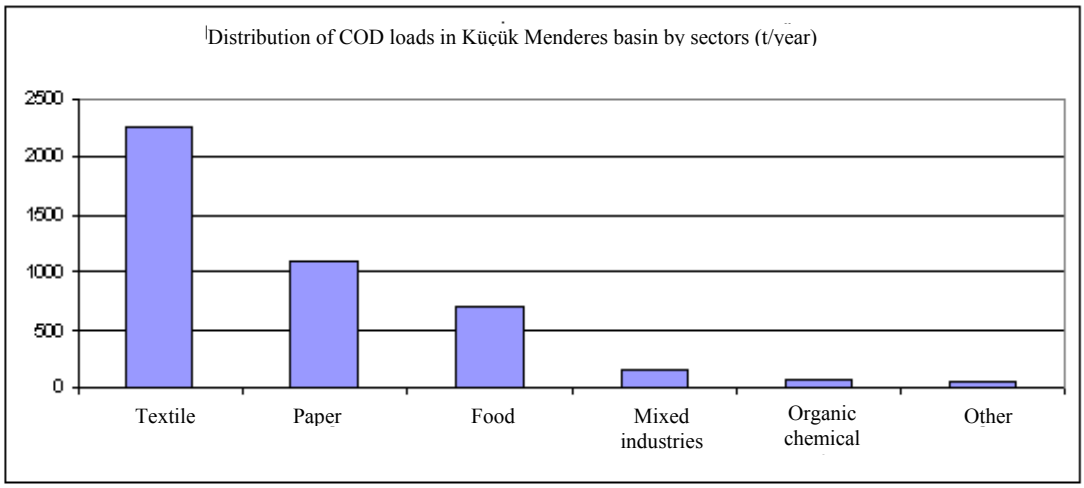




**Figure 3.31** Distribution of COD and Total Nitrogen loads in the Gediz basin by sectors (Avaz, 2002)


**Figure 3.32** Distribution of COD, BOD and TSS loads in the Küçük Menderes basin by the pollutant source



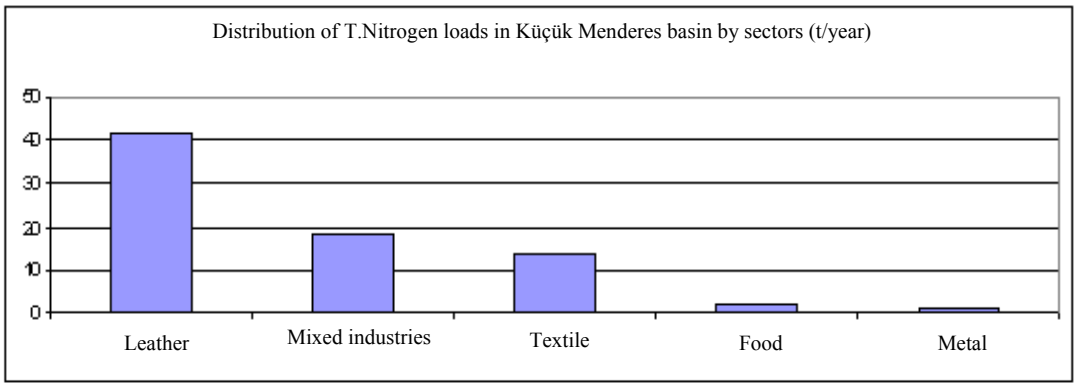
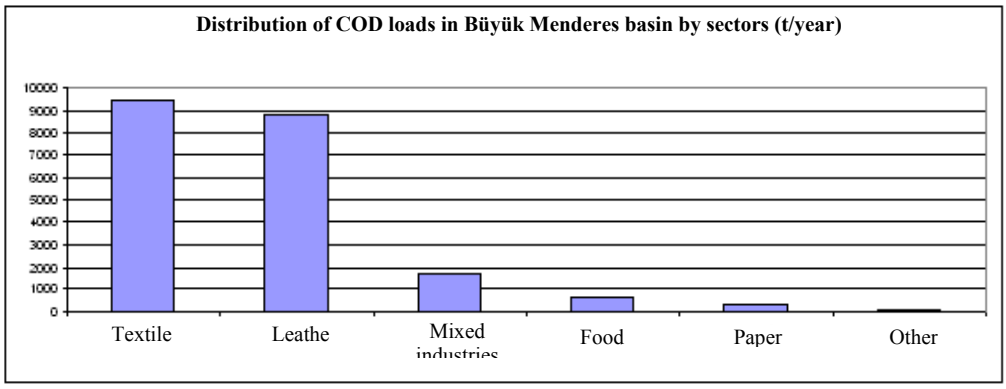




**Figure 3.33** Distribution of COD and Total Nitrogen loads in the Küçük Menderes basin by sectors (Avaz, 2002)


**Figure 3.34** Distribution of COD, BOD and TSS loads in the Büyük Menderes Basin by pollutant source



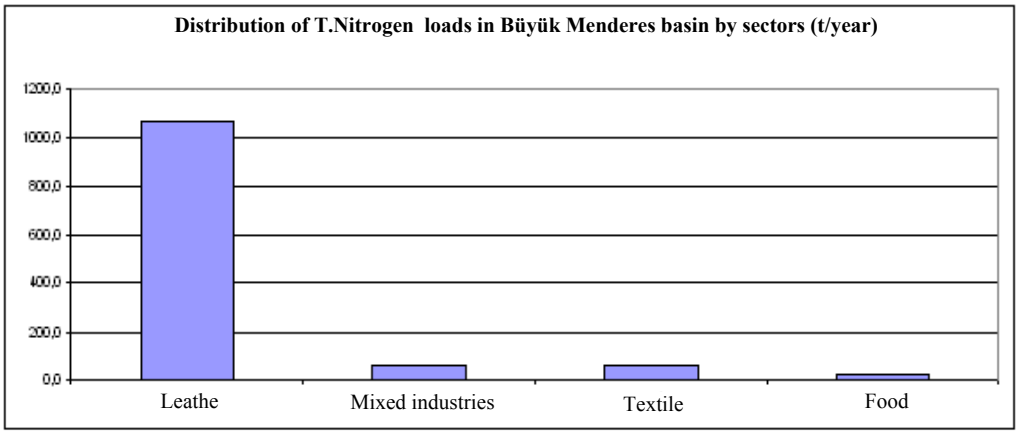




**Figure 3.35** Distribution of COD and Total Nitrogen pollution loads in the Büyük Menderes River Basin by sectors

# ANNEX IV
# INVESTMENT PORTFOLIO MATRIX

**Table 3.41** Elaboration of the investment portfolio for the Batı Akdeniz Basin

| Basin | Project | Scoring | | | | | |
|---|---|---|---|---|---|---|---|
| | | Benefit | Contribution to development | Financial sustainability | Feasibility | Estimated Cost | Total |
| Batı Akdeniz, hot spot | Household Wastewater Treatment Plant for **Muğla-Datça** county | 5x5 | 4x5 | 3x5 | 2x3 | 1x3 | 69 |
| Batı Akdeniz<br>Population >100.000 | Household Wastewater Treatment Plant for **Muğla-Milas** county | 5x5 | 4x5 | 3x5 | 2x5 | 1x1 | 71 |
| Improvement of current Waste Treatment Plants in Batı Akdeniz | Improvement of current Household Wastewater Treatment Plant (e.g: increasing capacity, transforming physical treatment into biological treatment etc.)for **Muğla-Dalaman, Muğla-Ortaca, Muğla-Bodrum, Muğla-Fethiye** counties | 3x5 | 4x3 | 3x3 | 2x1 | 1x1 | 39 |
| Batı Akdeniz | Wastewater Treatment Plant for summer housing complexes and accommodation facilities | 5x5 | 4x5 | 3x3 | 2x3 | 1x3 | 63 |
| Batı Akdeniz<br>Population> 100.000 | Regular Solid Waste Storage Plants (solid wastes stemming from tourism have also been included) for **Muğla-Milas , Muğla-Fethiye, Muğla-Bodrum** counties | 5x5 | 4x5 | 3x5 | 2x5 | 1x5 | 75 |
| Batı Akdeniz | Treatment of industrial wastewaters stemming from Aquaculture Production effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x3 | 63 |
| Batı Akdeniz | Treatment of industrial wastewaters stemming from mining activities effected in lack of wastewater treatment plants, improving the current wastewater treatment plants. | 5x5 | 4x5 | 3x3 | 2x3 | 1x3 | 63 |
| Batı Akdeniz | Treatment of industrial wastewaters stemming from energy generation activities effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x3 | 63 |

**Scoring**

**2 x 3**

Scaling of impact

Weight of impact

**Tablo 3.42** Elaboration of the investment portfolio for the Antalya Basin

| Basin | Project | Scoring | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Benefit** | **Contribution to development** | **Financial sustainability** | **Feasibility** | **Estimated Cost** | **Total** |
| Antalya<br>Population >100.000 | Household Wastewater Treatment Plant for **Isparta-Yalvaç** county | 5x5 | 4x3 | 3x5 | 2x5 | 1x3 | 65 |
| Improvement of current Waste Treatment Plants in Antalya | Improvement of current Household Wastewater Treatment Plant (e.g: increasing capacity, transforming physical treatment into biological treatment etc.) for **Antalya-Merkez, Antalya-Alanya Antalya-Manavgat** counties | 5x3 | 4x3 | 3x3 | 2x1 | 1x1 | 39 |
| Antalya | Wastewater Treatment Plant for summer housing complexes and accommodation facilities | 5x5 | 4x5 | 3x3 | 2x3 | 1x3 | 63 |
| Antalya<br>Population >100.000 | Regular Solid Waste Storage Plants (solid wastes stemming from tourism have also been included) for **Antalya-Serik Antalya-Merkez, Antalya-Alanya, Antalya-Manavgat Isparta-Merkez, Isparta-Yalvaç** counties | 5x5 | 4x5 | 3x5 | 2x5 | 5 | 75 |
| Antalya | Treatment of industrial wastewaters stemming from **textile industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x3 | 63 |
| Antalya | Treatment of industrial wastewaters stemming from **Aquaculture Production** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x3 | 3x3 | 2x3 | 1x3 | 55 |
| Antalya | Treatment of industrial wastewaters stemming from **Food industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x3 | 3x3 | 2x3 | 1x3 | 55 |
| Antalya | Treatment of industrial wastewaters stemming from **mining industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x3 | 3x3 | 2x3 | 1x3 | 55 |

**Scoring**

**2 x 3**

Scaling of impact

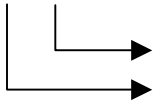
Weight of impact

**Tablo 3.43** Elaboration of the investment portfolio for the Doğu Akdeniz Basin

| Basin | Project | Scoring | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Benefit** | **Contribution to development** | **Financial sustainability** | **Feasibility** | **Estimated Cost** | **Total** |
| Doğu Akdeniz<br>Hot spot, Population 100.000 | Household Wastewater Treatment Plant for **İçel-Erdemli** county | 5x5 | 4x5 | 3x5 | 2x5 | 1x3 | 73 |
| Improvement of current Waste Treatment Plants in Doğu Akdeniz | Improvement of current Household Wastewater Treatment Plant (e.g: increasing capacity, transforming physical treatment into biological treatment etc.) for **İçel-Mersin, İçel-Silifke, İçel-Tarsus** counties | 15 | 4x3 | 3x3 | 2x1 | 1x1 | 39 |
| Doğu Akdeniz | Wastewater Treatment Plant for summer housing complexes and accommodation facilities | 5x5 | 4x5 | 3x3 | 2x3 | 1x3 | 63 |
| Doğu Akdeniz Population >100.000 | Regular Solid Waste Storage Plants (solid wastes stemming from tourism have also been included) for **İçel-Mersin, İçel-Silifke, İçel-Tarsus, İçel-Erdemli** counties | 5x5 | 4x5 | 3x5 | 2x5 | 1x5 | 75 |
| Doğu Akdeniz | Treatment of industrial wastewaters stemming from **Food industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x3 | 63 |
| Doğu Akdeniz | Treatment of industrial wastewaters stemming from **mining industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x3 | 3x3 | 2x3 | 1x3 | 55 |
| Doğu Akdeniz | Treatment of industrial wastewaters stemming from **textile industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x3 | 3x3 | 2x3 | 1x3 | 55 |
| Doğu Akdeniz | Treatment of industrial wastewaters stemming from **petroleum industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x3 | 63 |
| Doğu Akdeniz | Treatment of industrial wastewaters stemming from **metal industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x3 | 63 |
| Doğu Akdeniz | Treatment of industrial wastewaters stemming from **paper industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x3 | 63 |

**Scoring**

**2 x 3**



Scaling of impact

Weight of impact

**Tablo 3.44** Elaboration of the investment portfolio for the Seyhan Basin

| Basin | Project | Scoring | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Benefit** | **Contribution to development** | **Financial sustainability** | **Feasibility** | **Estimated Cost** | **Total** |
| Seyhan Sensitive area, | Household Wastewater Treatment Plant for **Adana-Karataş** county | 5x5 | 4x5 | 3x5 | 2x3 | 1x5 | 71 |
| Seyhan Population >100.000 | Household Wastewater Treatment Plant for **Adana-Seyhan, Adana-Yüreğir** counties | 5x5 | 4x3 | 3x5 | 2x5 | 1x3 | 65 |
| Seyhan | Wastewater Treatment Plant for summer housing complexes and accommodation facilities | 5x5 | 4x5 | 3x3 | 6 | 1x5 | 65 |
| Seyhan Population >100.000 | Regular Solid Waste Storage Plants (solid wastes stemming from tourism have also been included) for **Adana-Seyhan, Adana-Yüreğir** counties | 5x5 | 4x5 | 3x5 | 2x5 | 1x5 | 75 |
| Seyhan | Treatment of industrial wastewaters stemming from **textile industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x3 | 63 |
| Seyhan | Treatment of industrial wastewaters stemming from **Food industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x3 | 63 |
| Seyhan | Treatment of industrial wastewaters stemming from **other organic chemicals industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x3 | 63 |
| Seyhan | Treatment of industrial wastewaters stemming from **paper industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x3 | 63 |

**Scoring**

**2 x 3**

Scaling of impact

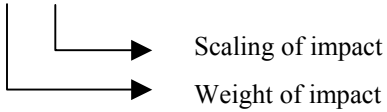
Weight of impact

**Tablo 3.45** Elaboration of the investment portfolio for the Ceyhan Basin

| Basin | Project | Scoring | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Benefit** | **Contribution to development** | **Financial sustainability** | **Feasibility** | **Estimated Cost** | **Total** |
| Ceyhan (hot spot) | Household Wastewater Treatment Plant for **Adana-Ceyhan** county | 5x5 | 4x5 | 3x5 | 2x5 | 1x3 | 73 |
| Ceyhan population >100.000 | Household Wastewater Treatment Plant for **K.Maraş-Merkez, K.Maraş-Elbistan, Osmaniye-Kadirli** counties | 5x5 | 4x3 | 3x5 | 2x5 | 1x3 | 65 |
| Improvement of current Waste Treatment Plants in Ceyhan | Improvement of current Household Wastewater Treatment Plant (e.g: increasing capacity, transforming physical treatment into biological treatment etc.) for **Adana-Yumurtalık** | 3x5 | 4x3 | 3x3 | 2x1 | 1x5 | 43 |
| Ceyhan population >100.000 | Regular Solid Waste Storage Plants (solid wastes stemming from tourism have also been included) for **Adana-Ceyhan, Adana-Kozan, K.Maraş-Merkez, K.Maraş-Elbistan, Osmaniye-Merkez, Osmaniye-Kadirli** counties | 5x5 | 4x5 | 3x5 | 2x5 | 1x5 | 75 |
| Ceyhan | Treatment of industrial wastewaters stemming from **textile industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x3 | 63 |
| Ceyhan | Treatment of industrial wastewaters stemming from **Food industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x3 | 63 |
| Ceyhan | Treatment of industrial wastewaters stemming from **Aquaculture Production** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x3 | 63 |
| Ceyhan | Treatment of industrial wastewaters stemming from **other organic chemicals industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x3 | 3x3 | 2x3 | 1x3 | 55 |

**Scoring**

**2 x 3**



**Tablo 3.46** Elaboration of the investment portfolio for the Asi Basin

| Basin | Project | Scoring | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Benefit** | **Contribution to development** | **Financial sustainability** | **Feasibility** | **Estimated Cost** | **Total** |
| Asi<br>Sensitive area, population >100.000 | Household Wastewater Treatment Plant for **Hatay-Samandağ** county | 5x5 | 4x5 | 3x5 | 2x5 | 1x3 | 73 |
| Asi<br>Hot spot,<br>population>100.000 | Household Wastewater Treatment Plant for **Hatay-Dörtyol** county | 5x5 | 4x5 | 3x5 | 2x5 | 1x3 | 73 |
| Improvement of current Waste Treatment Plants in Asin | Improvement of current Household Wastewater Treatment Plant (e.g: increasing capacity, transforming physical treatment into biological treatment etc.) for **Hatay-İskenderun** county | 15 | 4x3 | 3x3 | 2x1 | 1x3 | 41 |
| Asi<br>population >100.000 | Regular Solid Waste Storage Plants (solid wastes stemming from tourism have also been included) for **Hatay-Dörtyol, Hatay-İskenderun, Hatay-Samandağ Hatay-Antakya** counties | 5x5 | 4x5 | 3x5 | 2x5 | 1x5 | 75 |
| Asi | Treatment of industrial wastewaters stemming from **metal industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x5 | 65 |
| Asi | Treatment of industrial wastewaters stemming from **Food industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x5 | 65 |

**Scoring**

**2 x 3**

Scaling of impact

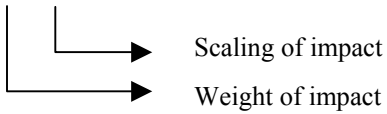
Weight of impact

**Tablo 3.47** Elaboration of the investment portfolio for the Kuzey Ege basin

| Basin | Project | Scoring | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Benefit** | **Contribution to development** | **Financial sustainability** | **Feasibility** | **Estimated Cost** | **Total** |
| Kuzey Ege<br>Sensitive area, population>100.000 | Household Wastewater Treatment Plant for **İzmir-Bergama** county | 5x5 | 4x5 | 3x5 | 2x5 | 1x5 | 75 |
| Kuzey Ege<br>Hot spot,<br>population >100.000 | Household Wastewater Treatment Plant for **Balıkesir-Ayvalık, Balıkesir-Gömeç** counties | 5x5 | 4x5 | 3x5 | 2x5 | 1x5 | 75 |
| Improvement of current Waste Treatment Plants in Kuzey Ege | Improvement of current Household Wastewater Treatment Plant (e.g: increasing capacity, transforming physical treatment into biological treatment etc.) for **Balıkesir-Edremit Balıkesir-Burhaniye** counties | 5x3 | 4x3 | 3x3 | 2x1 | 1x5 | 43 |
| Kuzey Ege | Wastewater Treatment Plant for summer housing complexes and accommodation facilities | 5x5 | 4x5 | 3x3 | 2x3 | 1x5 | 65 |
| Kuzey Ege<br>population >100.000 | Regular Solid Waste Storage Plants (solid wastes stemming from tourism have also been included) for **İzmir-Bergama** county | 5x5 | 4x5 | 3x5 | 2x5 | 1x5 | 75 |
| Kuzey Ege | Treatment of industrial wastewaters stemming from **food industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x5 | 65 |
| Kuzey Ege | Treatment of industrial wastewaters stemming from **tannery industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x5 | 65 |

**Scoring**

**2 x 3**

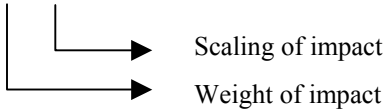


**Tablo 3.48** Elaboration of the investment portfolio for the Gediz Basin basin

| Basin | Project | Scoring | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Benefit** | **Contribution to development** | **Financial sustainability** | **Feasibility** | **Estimated Cost** | **Total** |
| Gediz<br>Sensitive area<br>population>100.000 | Household Wastewater Treatment Plant for **İzmir-Menemen** county | 5x5 | 4x5 | 3x5 | 2x5 | 1x3 | 73 |
| Gediz<br>population>100.000 | Household Wastewater Treatment Plant for **Manisa-Salihli, Manisa-Turgutlu** counties | 5x5 | 4x3 | 3x5 | 2x5 | 1x3 | 65 |
| Gediz | Wastewater Treatment Plant for summer housing complexes and accommodation facilities | 5x5 | 4x5 | 3x3 | 2x3 | 1x5 | 65 |
| Gediz<br>population >100.000 | Regular Solid Waste Storage Plants (solid wastes stemming from tourism have also been included) for **İzmir-Menemen, Manisa-Salihli, Manisa-Turgutlu İzmir-Bergama** counties | 5x5 | 4x5 | 3x5 | 2x5 | 1x5 | 75 |
| Gediz | Treatment of industrial wastewaters stemming from **textile industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x3 | 63 |
| Gediz | Treatment of industrial wastewaters stemming from **tannery industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x5 | 65 |
| Gediz | Treatment of industrial wastewaters stemming from **food industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x5 | 65 |

**Scoring**

**2 x 3**

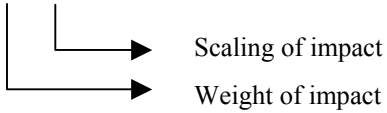


**Tablo 3.49** Elaboration of the investment portfolio for the Küçük Menderes Basin

| Basin | Project | Scoring | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Benefit** | **Contribution to development** | **Financial sustainability** | **Feasibility** | **Estimated Cost** | **Total** |
| Küçük Menderes<br>Hot spot, population >100.000 | Household Wastewater Treatment Plant for **İzmir-Çeşme** county | 5x5 | 4x5 | 3x5 | 2x5 | 1x5 | 75 |
| Küçük Menderes<br>population>100.000 | Household Wastewater Treatment Plant for **İzmir-Buca, İzmir-Ödemiş** counties | 5x5 | 4x5 | 3x5 | 2x5 | 1x1 | 71 |
| Improvement of current Waste Treatment Plants in Küçük Menderes | Improvement of current Household Wastewater Treatment Plant (e.g: increasing capacity, transforming physical treatment into biological treatment etc.) for **İzmir-Foça** county | 3x5 | 4x3 | 3x3 | 2x1 | 1x5 | 43 |
| Küçük Menderes | Wastewater Treatment Plant for summer housing complexes and accommodation facilities | 5x5 | 4x5 | 3x3 | 2x3 | 1x5 | 65 |
| Küçük Menderes<br>population >100.000 | Regular Solid Waste Storage Plants (solid wastes stemming from tourism have also been included) for **İzmir-Ödemiş** county | 5x5 | 4x5 | 3x5 | 2x5 | 1x5 | 75 |
| Küçük Menderes | Treatment of industrial wastewaters stemming from **textile industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x5 | 65 |
| Küçük Menderes | Treatment of industrial wastewaters stemming from **tannery industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x5 | 65 |
| Küçük Menderes | Treatment of industrial wastewaters stemming from **food industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x5 | 65 |
| Küçük Menderes | Treatment of industrial wastewaters stemming from **paper industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x5 | 65 |

**Scoring**

**2 x 3**



**Tablo 3.50** Elaboration of the investment portfolio for the Büyük Menderes Basin

| Basin | Project | Scoring | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Benefit** | **Contribution to development** | **Financial sustainability** | **Feasibility** | **Estimated Cost** | **Total** |
| Büyük Menderes<br>population>100.000 | Household Wastewater Treatment Plant for **Denizli-Merkez, Uşak-Merkez** counties | 5x5 | 4x3 | 3x5 | 2x5 | 1x3 | 65 |
| Büyük Menderes | Wastewater Treatment Plant for summer housing complexes and accommodation facilities | 5x5 | 4x5 | 3x3 | 2x3 | 1x5 | 65 |
| Büyük Menderes population >100.000 | Regular Solid Waste Storage Plants (solid wastes stemming from tourism have also been included) for **Denizli-Merkez, Uşak-Merkez** counties | 5x5 | 4x5 | 3x5 | 2x5 | 1x5 | 75 |
| Büyük Menderes | Treatment of industrial wastewaters stemming from **textile industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x3 | 63 |
| Büyük Menderes | Treatment of industrial wastewaters stemming from **tannery industry** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x3 | 63 |
| Büyük Menderes | Treatment of industrial wastewaters stemming from **industrial organized district** effected in lack of wastewater treatment plants, improving the current wastewater treatment plants | 5x5 | 4x5 | 3x3 | 2x3 | 1x5 | 65 |

**Scoring**

**2 x 3**

Scaling of impact

Weight of impact